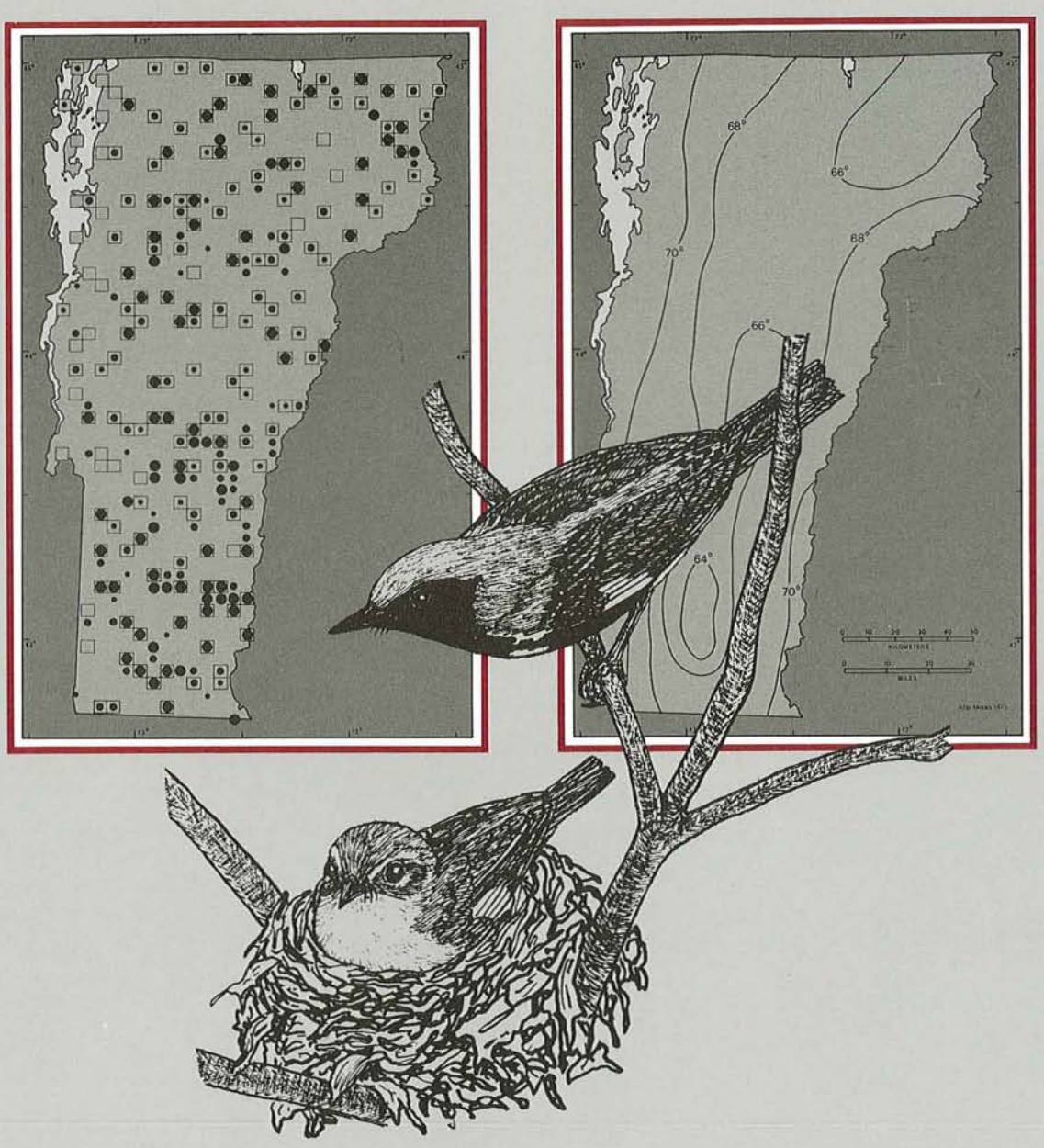
The Atlas of Breeding Birds of Vermont



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The Atlas of Breeding Birds of Vermont

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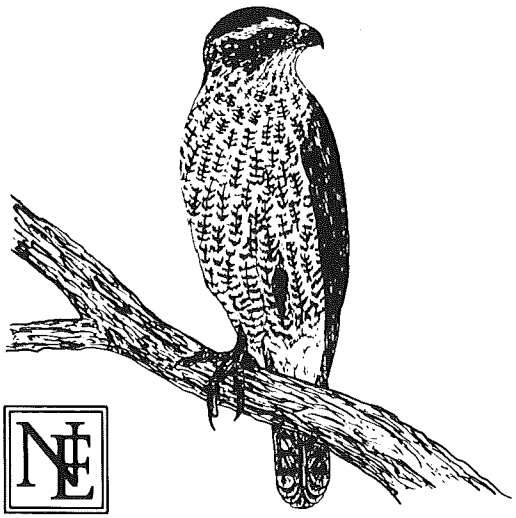

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To all the Vermont Breeding Bird Atlas Project workers,
whose fieldwork this Atlas represents

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FIGURES AND MAPS

FOREWORD

You are holding in your hands the first in a new generation of wildlife volumes—a book that documents the present distribution of all the nesting birds of Vermont and lays a firm basis for detecting the many changes that will take place in the years to come. Man is altering his environment at an ever accelerating pace, and many of the renewable resources that we have taken for granted in the past will not remain our legacy for the future. We have arrived at the time when it becomes imperative to resort to land-use planning in order that representative samples of our various native habitats will remain intact for the benefit of future generations.

Vermont is blessed with an abundance of rural land, including extensive forests, a mosaic of fields and brushlands, streams that flow throughout the year, and a scattering of lakes and marshes. Although most of this heritage is not under an immediate threat, we are aware of many environmental influences that gradually reduce biotic diversity and that combine to make it increasingly urgent that sound planning for the future be undertaken. Consider, for example, the loss of elm trees from the introduced Dutch elm disease; the spruce forests defoliated by spruce budworm; periodic defoliations by the introduced gypsy moth; the disappearance of forest, orchard, farm, and roadside birds from use of pesticides; the draining of wetlands for agriculture; decline of productivity in lakes and forests as a result of acid rain; roadside pollution from lead and other heavy metals; eutrophication of lakes from agricultural runoff; and loss of topsoil from poor soil conservation practices. Consider also the trend toward monoculture or at least toward more aggressive management of our forests; shorter rotation cutting with a resultant decrease in tree cavities; the direct competition for nesting cavities between introduced starlings and House Sparrows and such native species as flickers and bluebirds; the decline in neotropical migrants as our forests become increasingly fragmented; and also the threat of water contamination from toxic waste disposal. These are but a few examples of the forces that are acting to reduce biotic diversity in Vermont and across the whole continent.

Of all the wild animals that might serve as indicators of environmental change, birds are uniquely suited for study. They are highly mobile, have specific habitat requirements, and react rapidly to changes in their surroundings. Birds also are easier to find and to identify than are most other animals, and it is possible to enlist a corps of trained and enthusiastic amateurs to conduct much of the fieldwork.

Until now, information on the distribution of birds in Vermont has been fragmentary. Meticulous local records have been kept over several decades at localities such as Bennington, Burlington, St. Johnsbury, Wells River, and Woodstock. For other areas of the state, and especially the mountains, little published information is available. The 21 Breeding Bird Survey routes in Vermont provide an index to population trends for the more common species. This sampling, however, is limited to the vicinity of roads, and is not effective for the rare species or those dependent on special restricted habitats.

A unique advantage of grid-based atlases such as this one is that they give information from throughout an area of interest rather than merely compiling data from existing sources. The six years of atlas fieldwork have provided the challenge for expert observers to visit places never before searched by naturalists. The results have been outstanding. Every priority block in Vermont was visited. Seven species never before found nesting in the state have been discovered. Much has been learned about the habitat requirements of the rarer species. For the first time there is adequate knowledge of the elevational range of each nesting species. Numerous changes in distribution have been documented by comparing atlas results with historic records. Furthermore, some species that were assumed to be widely distributed were undetected in places where they had been expected to occur; this has provided the first evidence that those populations may be in jeopardy.

The successful completion of this atlas is a tribute to the organizational abilities of the Vermont Institute of Natural Science, to the collaboration of the various Audubon groups throughout the Green Mountain State, to the expertise and dedication of two hundred active field observers, and to the untold numbers of Vermont landowners who perceived the importance of the atlas project and granted permission for the atlasers to explore their woodlands, fields, swamps, and ponds. All may be justly proud of the result.

CHANDLER S. ROBBINS

PREFACE

Vermont's Breeding Bird Atlas Project (1976–81) represents the most complete set of baseline data gathered to date on the nesting birds of Vermont, and one of the first sets of statewide information on breeding birds ever gathered in the United States. Atlas Project data were gathered by 200 volunteers—including members of the seven Vermont chapters of the National Audubon Society and of the Vermont Institute of Natural Science (VINS) research staff—who spent six summers in the field. This volume is the first state or provincial breeding bird atlas to be published in North America.

The purpose of a breeding bird survey such as the Vermont Atlas Project is to document the current status and distribution of all the breeding species of birds within a geographical area, and to publish these data in an atlas as a permanent record. Similar surveys are going on in many parts of the world now, and are adding immeasurably to our knowledge of the natural world. All such surveys depend on the dedication and involvement of amateur, unpaid—but highly skilled—fieldworkers.

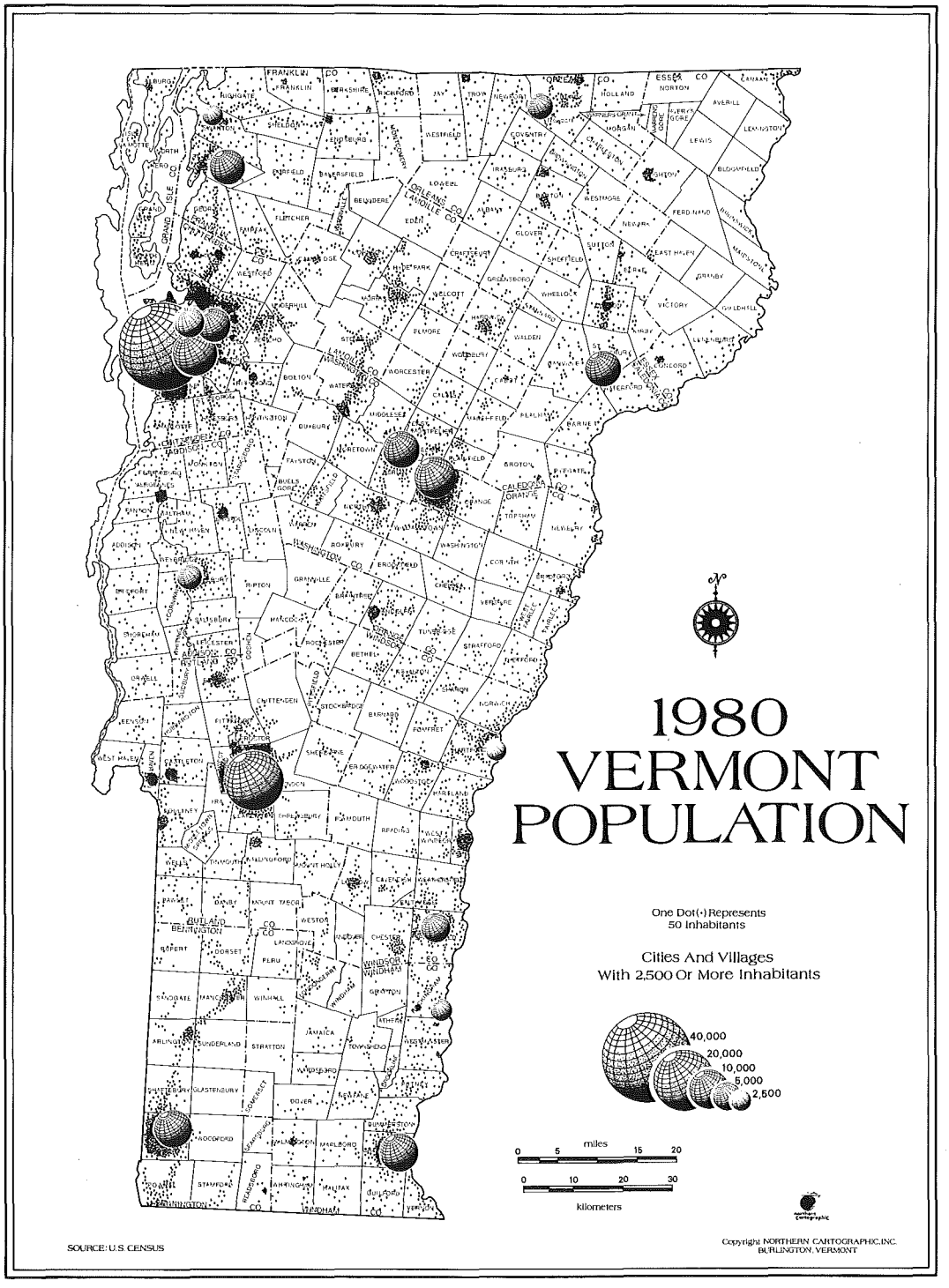
The breeding bird atlas is a valuable conservation tool, especially in times of great environmental change. Because birds are reliable environmental indicators, each survey completed and each atlas published represents a major advance in our knowledge of bird distribution and in our ability to evaluate the state of the environment. Although breeding bird distribution is not static and is constantly changing as a result of natural processes and human manipulation of the environment, an atlas documents the existing situation. A breeding bird atlas provides a basis for comparative evaluations of future surveys.

This atlas of the breeding birds of Vermont owes its inception, methods, and procedures to the natural history surveys based on latitude and longitude and the atlases that have preceded it. Natural history surveys based on maps have a long history, and have traditionally been a compilation of known distributional information placed on maps. In the past several decades a new survey method, involving widespread cooperative fieldwork to systematically collect data in specific survey areas defined by a map grid, has greatly increased the value of natural history atlases (Robbins 1982a). By this method, the distribution of the flora of Great Britain and Ireland was determined and published as the *Atlas of the British Flora* (Perring and Walters 1962). This project inspired the British Trust for Ornithology and the Irish Wildbird Conservancy to undertake an atlas of the breeding birds in Britain and Ireland (1968–71). The resulting book, the *Atlas of Breeding Birds in Britain and Ireland* (Sharrock 1976) was published in 1976; it

serves as an inspiration and a model. The British enthusiasm quickly spread to other European countries, and in 1971 the European Ornithological Atlas Committee (EOAC) was formed. The EOAC developed standardized atlas codes and recommended a standard map grid. The French atlas (Yeatman) and the Danish atlas (Dybbro) were published in 1976, the West German atlas (Rheinwald) in 1977, the Netherlands atlas (Teixeira) in 1979, and the Swiss atlas (Schifferli et al.) in 1980. The first African atlas, the *Bird Atlas of Natal* (Cyrus and Robson), was published in 1980.

The first North American atlas project to be modeled after the British example entailed two countywide surveys of the breeding birds of Maryland, initiated by the Maryland Ornithological Society in 1971. In 1974, the Massachusetts Audubon Society began an atlas project survey of the breeding birds of Massachusetts, which directly inspired the Vermont Atlas Project. Communications among American breeding bird atlas project organizers were greatly facilitated by the Northeastern Breeding Bird Atlas Conference held in November 1981 at the Vermont Institute of Natural Science in Woodstock, Vermont. The conference adopted recommendations for the use of standardized map grids and standardized data recording codes (see Appendix D), and published its proceedings (Laughlin et al. 1982).

The Vermont Breeding Bird Atlas Project owes its inception to the Massachusetts Breeding Bird Atlas Project (1974–79). When Deborah Howard, Massachusetts Audubon Society's coordinator for the Masssachusetts Atlas Project, spoke at the annual Vermont Bird Conference on June 14, 1975, she impressed Vermonters with the need to undertake an atlas before their swamps became paved parking lots and their untrammeled hillsides were overrun with second-home developments. Although funding of the project was problematic, Vermont birders felt the urgency of carrying out the survey as soon as possible, while Vermont balanced on the edge of inevitable environmental change. The Vermont Institute of Natural Science undertook the planning, coordination, and funding of the project, which the Vermont Audubon Council and the Vermont chapters of the National Audubon Society cosponsored. The Vermont Audubon Council appointed coordinators for each of the Vermont chapters, who organized fieldwork in their counties or regions. The summer of 1976 was the pilot year for the Atlas Project, during which each regional coordinator undertook the surveying of one or two 7½-minute sections, with as many volunteer workers as could be mustered, to determine how much of the state's area could be surveyed. The pilot project year made it clear that Vermont lacked the manpower to survey the entire land area of the state, and that only designated areas (*priority blocks*)—one-sixth of the state's total area—could be adequately surveyed.



MAP 1. Vermont's Human Population Density

The governing body for Vermont's project, the Vermont Breeding Bird Atlas Committee, was made up of representatives appointed by each of Vermont's regional chapters of the National Audubon Society, prominent Vermont ornithologists, field birders, and members of the Vermont Institute of Natural Science's research staff. The institute's executive director, Sarah B. Laughlin, provided overall direction; the regional editor of *American Birds*, Douglas P. Kibbe, served as ornithological adviser; and VINS staff member Annette L. Gosnell served as Atlas Project coordinator. Volunteers were recruited from all over the state, although the less populous areas (Map 1) presented a challenge.

A breeding bird atlas project is structured to allow volunteer, amateur birders to obtain field data, the collection of which would be prohibitively expensive if collected by professionals. The 200 volunteer workers who participated in the project in Vermont donated at least 25,000 hours to the project over the years. A critically important aspect of an atlas project survey is the codes employed to determine the breeding status of the birds located. Vermont adopted with very little change the Massachusetts Atlas Project breeding criteria codes, which in turn had been adopted with little change from the codes used in the British atlas. The Vermont codes appear after the introduction. Today, uniform codes (Appendix D) exist for North America; they will greatly facilitate comparisons among the atlas data of different states and provinces.

It is hoped this atlas will provide a model for the North American atlases that will follow. Each atlas project completed is an important step forward in our knowledge of the natural world.

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Ascutney Mountain Audubon
Central Vermont Audubon
Green Mountain Audubon
Northeast Kingdom Audubon
Otter Creek Audubon
Rutland County Audubon
Southeastern Vermont Audubon

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REGIONAL COORDINATORS:
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Central Vermont Audubon, Marion F. Metcalf
Green Mountain Audubon, Barbara S. and Oliver R. Eastman
Lyndonville area, Edward W. Cronin (1977–79)
Missisquoi National Wildlife Refuge and surrounding area, George F. O'Shea (1976 pilot project)
Northeast Kingdom Audubon, G. Frank Oatman
Otter Creek Audubon, Alan Pistorius (1981), Wayne S. Scott
Peru, Jamaica, Wardsboro, Landgrove, William J. Norse
Rutland County Audubon, Roy W. Pilcher
Saxtons River area, Donald B. Clark
Southeastern Vermont Audubon and the Bennington area, Whitney D. Nichols
White River Junction area, George F. and Walter G. Ellison
Woodstock and Arlington areas, Annette L. Gosnell

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The Atlas of Breeding Birds of Vermont

INTRODUCTION

The introduction presents information which will be helpful to the reader in interpreting and using the species accounts that constitute the body of the atlas. The preface presents a brief overview of the history and methods of breeding bird atlas surveys.

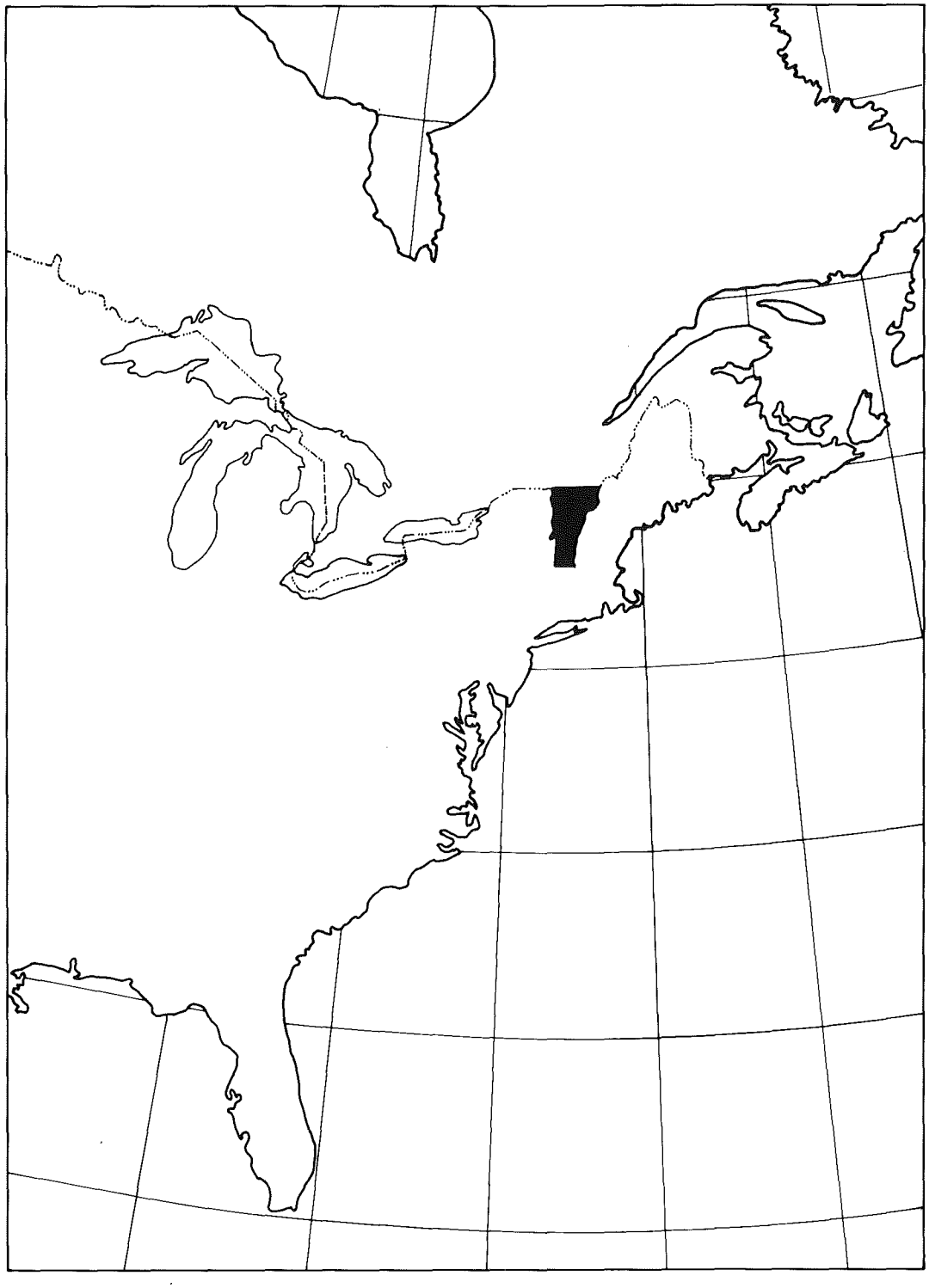
Vermont is a small state in northeastern North America (Map 2), but it has, as the species accounts show, a rich diversity of bird life. While the chief purpose of this atlas is to document the status and distribution of the species of birds breeding within Vermont between 1976 and 1981, additional objectives include: documenting an ecological data base for biologists and researchers against which future and inevitable change can be measured; providing distributional data on Threatened or Endangered species; providing a record of unique and fragile habitats vital to continued reproduction of certain species; providing hard data for legislators, land-use planners, developers, and environmentalists concerned with conservation measures and environmental impact issues; explaining survey techniques that can be repeated 10, 50, or 100 years in the future; informing the public about birds as a natural resource; and providing information for naturalists and birders on the breeding birds of Vermont.

For a breeding bird atlas, surveys are made to determine which species nest in an area, rather than to determine the number of individuals of a given species in an area. The field observer reports every species of bird breeding within the surveyed geographical area, attempting to confirm breeding for as many species as possible. Most breeding bird surveyors, following the lead of the British atlas organizers, have carried out their surveys over a five-year period, judged by the British to be the shortest time possible in which to accomplish the prodigious amount of fieldwork necessary, and the maximum period of time desirable for "freezing" the distribution of avifauna. The Vermont Atlas Project ran for six years, including the 1976 pilot project year; the survey of priority blocks extended from 1977 to 1981.

Collecting data: priority blocks and coverage standards

The first step in planning an atlas project is to establish geographical areas (usually squares or rectangles called *blocks*) by utilizing a map grid. The blocks are then surveyed by fieldworkers to determine which species occur in each area, and what each species' breeding status is within the area.

The basic grid for the Vermont survey was provided by U.S. Geological Survey maps, which are mapped by minutes of latitude and longitude. Each 7.5-minute map was divided into six blocks of



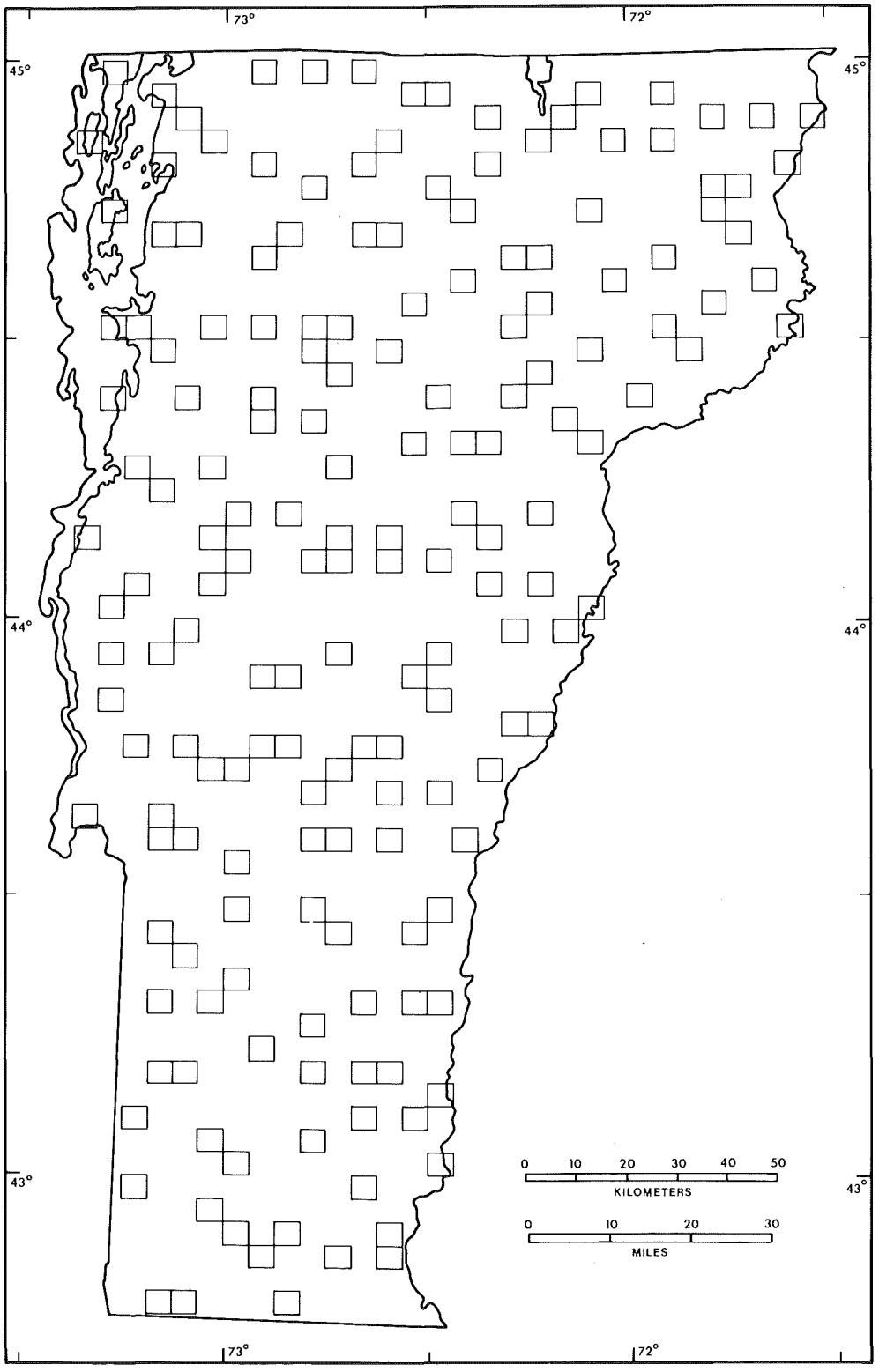
MAP 2. Position of Vermont in North America

approximately 25 square kilometers (10 square miles), measuring approximately 5 kilometers (3 miles) to a side (7.5 minutes = 1/8 of 1 degree of latitude or longitude). During the pilot project year, it became evident that it would be impossible to survey all 24,887 square kilometers (9,609 square miles) of the state with the manpower available. (For full information on the history of and procedures for grid-based atlasing, the reader is referred to the *Proceedings of the Northeastern Breeding Bird Atlas Conference* [Laughlin, Kibbe, and Robbins 1982] and to "Atlasing the Distribution of the Breeding Birds of North America" [Laughlin, Kibbe, and Eagles 1982].)

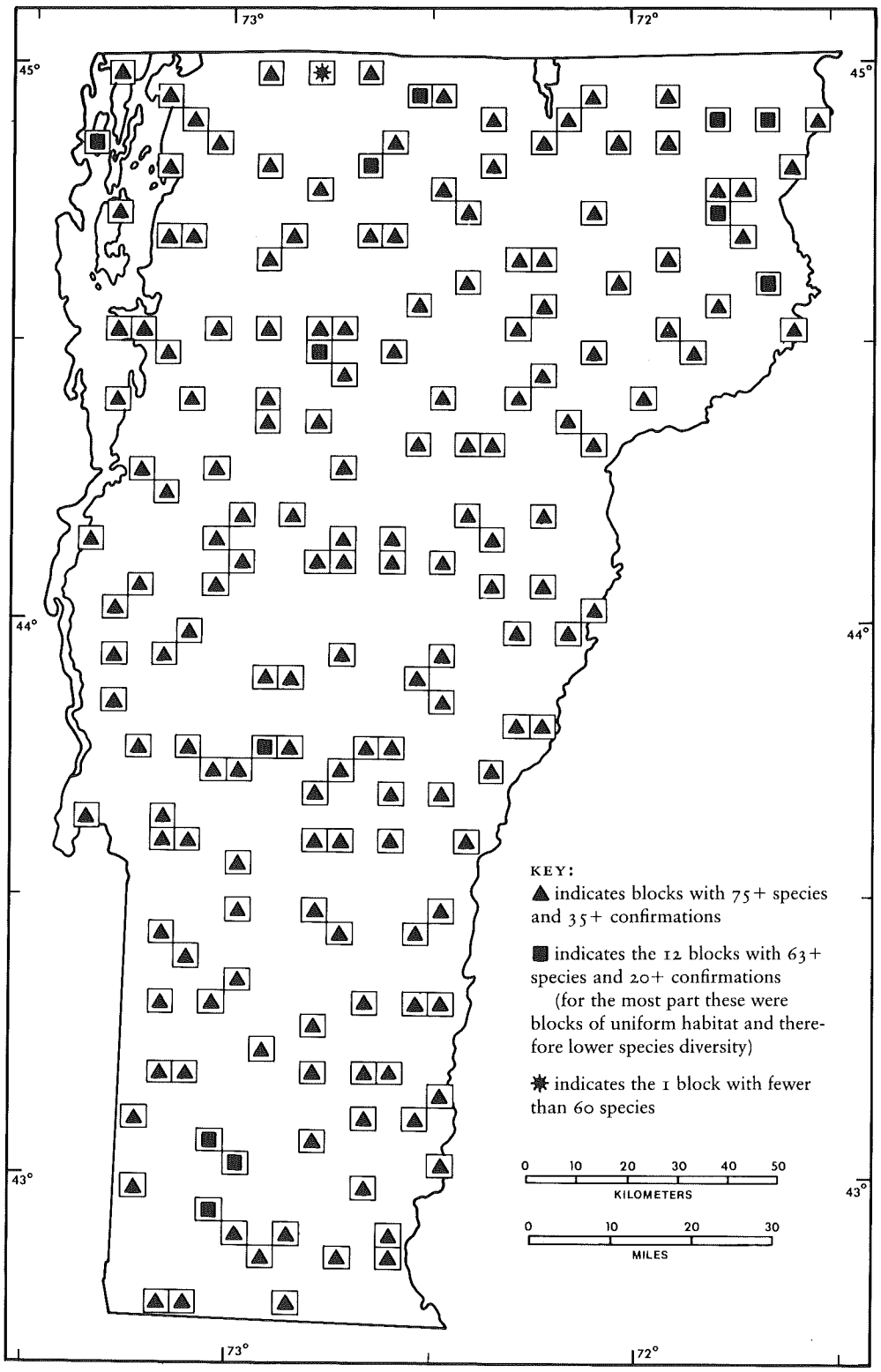
A selective sampling system was therefore employed. One *priority block* was randomly selected to be surveyed from the six blocks occurring in each 7.5-minute quadrangle; 179 priority blocks were selected (to be assured of as complete coverage as possible) (Map 3). Since the grid system employed divides the state into some 1,000 blocks, there were also 821 non-priority blocks; any locality in the state was within either a priority or a non-priority block, so all reports of breeding birds from both priority and non-priority blocks were accepted by the Atlas Project. The dots on the map in each species account indicate from which priority and non-priority blocks reports for that species came. *However, the hollow squares outlined on the maps delineate only the priority blocks.* In addition, 24 blocks containing areas of unique and fragile habitat (UFAs; see p. 7) were selected to be surveyed.

In 1978, utilizing their two years of personal fieldwork in blocks which they were covering themselves, the experienced field birders who made up the Vermont Breeding Bird Atlas Committee established standards for field coverage in blocks: a block was to be considered satisfactorily surveyed when 75 species were located in the block, and 35 of those species were confirmed as breeders. The committee members' experience indicated that most blocks in Vermont contain approximately 100 breeding species (W. G. Ellison, W. J. Norse, D. P. Kibbe, S. B. Laughlin, D. B. Clark, pers. observs.); the presence of 75 species would indicate that at least 75% of the species in the block during the breeding season were recorded.

At the end of the 1979 season, all 179 priority blocks and 24 unique and fragile areas had been entered by a field worker at least once, and surveying in 60 priority blocks had resulted in data meeting adequate coverage standards. To cover the remaining 119 priority blocks, the Vermont Institute of Natural Science launched intensive block-busting efforts in the summers of 1980 and 1981. Atlas Project teams averaged 70 species and 35 confirmations in priority blocks worked for 10 to 12 hours. Regional coordination, regular fieldwork, and block-busting efforts yielded adequate statewide coverage by atlas committee standards (see Map 4).



MAP 3. Location of Vermont Atlas Project Priority Blocks



MAP 4. Coverage Obtained at the Close of the Atlas Project

Recording field data: codes and verification

Field observations were interpreted and entered on an Atlas Project recording sheet (Figure 1), which categorized breeding records for each species as Possible, Probable, or Confirmed. (For definitions of the codes used by fieldworkers and in some species accounts, see Recording Codes Used by the Vermont Atlas Project, following the introduction.) To fulfill the goal of the survey, a species had to be confirmed only *once* in each block; for the purposes of the survey, it did not matter if 1 American Robin or 100 was nesting in the block, as long as 1 was confirmed. The recording sheet used by each fieldworker was submitted at the end of every season to the regional coordinator, who then submitted it to VINS. A new recording sheet was provided to fieldworkers for each summer of the survey; after the first year, a master sheet was provided to each block worker each season as well, showing which species had been located in the block so far. Atlas Project staff reviewed the records and compiled the data each fall from the recording sheets submitted to the Vermont Institute of Natural Science.

Recording species of rare or unknown status

Birds that were considered by the Vermont Atlas Committee to be of limited distribution, rare, or of unknown nesting status in Vermont were designated by an asterisk on the recording sheet and were called *asterisked species*. Forty-five (23%) of the 199 species listed on the recording sheet were so classified. Asterisked Species Reports (ASRs) were required on the species originally asterisked on the recording sheet (except for a few later found to be in good numbers), on species determined after the first two years of the project to be far rarer than expected, and on species not originally listed because they had never before been known to breed in Vermont. The species on the Vermont Atlas Committee's final list of species for which Asterisked Species Reports were required were:

Common Loon
Double-crested Cormorant
Great Egret
Cattle Egret
Gadwall
Northern Shoveler
Lesser Scaup
Turkey Vulture
Bald Eagle
Osprey
Spruce Grouse
Gray Partridge
Yellow Rail†
Great Black-backed Gull
Yellow-billed Cuckoo
Common Barn-Owl
Short-eared Owl
Boreal Owl†
Red-headed Woodpecker
Black-backed Woodpecker
Three-toed Woodpecker
Horned Lark
Gray Jay
Tufted Titmouse
Carolina Wren
Sedge Wren
Blue-gray Gnatcatcher
Loggerhead Shrike
Philadelphia Vireo
Worm-eating Warbler†
Blue-winged Warbler
Tennessee Warbler
Cape May Warbler
Cerulean Warbler
Bay-breasted Warbler
Prairie Warbler
Palm Warbler†
Yellow-breasted Chat
Wilson's Warbler
Orchard Oriole
Pine Grosbeak
House Finch
Pine Siskin
Red Crossbill
White-winged Crossbill
Grasshopper Sparrow
Henslow's Sparrow
Lincoln's Sparrow

†No records obtained during the Atlas Project survey

Upon sighting an asterisked species, a fieldworker was requested to call his or her regional coordinator or the Vermont Institute of Natural Science. Where possible, the regional coordinator or a VINS staff member confirmed the report by an on-site visit. The worker then submitted a detailed Asterisked Species Report form, signed by both the observer and the regional coordinator, giving details of the sighting and the breeding evidence. These reports were reviewed by experts familiar with the species, who reported in turn to the Vermont Atlas Committee. Final acceptance of all Asterisked Species Reports rested with the atlas committee. Some asterisked species were determined by the Atlas Project survey to be present in Vermont in good numbers, and some species not so designated were established as rare or declining in numbers, indicating how little was known of Vermont's bird life in 1976.

Data analysis by physiographic region

The recorded distribution of bird species that breed in Vermont was computer analyzed by physiographic region (Map 5). The physiographic map used is based, with some variations, on a detailed map developed by the Vermont Fish and Game Department (Dickinson and Garland 1974; Garland 1977; for a description of the state's regions, see Appendix A). The table below relates Vermont's physiographic regions to state area, area surveyed, and number of priority blocks.

Physiographic region	approximate area of region (sq km/sq mi)	% of state's area	number of priority blocks	% of surveyed area of state
Champlain Lowlands	4,999 (1,930)	20	31	17
Green Mountains	7,252 (2,800)	29	54	30
North Central	3,289 (1,270)	13	19	11
Northeast Highlands	1.968 (760)	8	16	9
East Central	2,461 (950)	10	19	11
Taconic Mountains	2,279 (880)	9	16	9
Eastern Foothills	2,642 (1,020)	11	24	13

Unique and fragile areas (UFAs)

Thirty-four areas of unique and fragile habitat (UFAs) were selected for survey for the Atlas Project. Surveyed were the block or blocks into which the UFA fell and the UFA itself. UFAs were selected from areas indicated by published sources—the *Vermont Natural Areas Project* (Klein 1976), *Natural Areas in Vermont* (Vogelman 1964), *Vermont Natural Areas* (Vogelman 1969)—and from areas nominated by the Audubon chapters and members of the Vermont Atlas Committee. The final list was adopted by the Vermont Atlas Committee.

VERMONT ATLAS PROJECT RECORDING SHEET

BLOCK # 1 2 3 4 = 1 8 2 3 YEAR 1 9 5 6

NAME	DO NOT WRITE: FOR COMPUTER USE A.O.U.# 7 8 9 10	CODE 11	PO	PR	CO
Common Loon *	0 0 7 .0				
Pied-billed Grebe	0 0 6 .0		✓		
Great Blue Heron	1 9 4 .0		✓		
Green Heron	2 0 1 .0				
Cattle Egret *	2 0 0 .1				
Bl.-crowned Night Heron	2 0 2 .0				
Least Bittern	1 9 1 .0				
American Bittern	1 9 0 .0				
Canada Goose	1 7 2 .0				
Mallard	1 3 2 .0				
Black Duck	1 3 3 .0				FL
Gadwall *	1 3 5 .0				
Pintail	1 4 3 .0				
Green-winged Teal	1 3 9 .0				
Blue-winged Teal	1 4 0 .0				
American Wigeon	1 3 6 .0				
Northern Shoveler *	1 4 2 .0				
Wood Duck	1 4 4 .0		✓		
Redhead *	1 4 6 .0				
Ring-necked Duck	1 5 0 .0		✓		
Lesser Scaup *	1 4 9 .0				
Common Goldeneye	1 5 1 .0				
Hooded Merganser	1 3 1 .0				
Common Merganser	1 2 9 .0				
Red-breasted Merganser	1 3 0 .0				
Turkey Vulture *	3 2 5 .0				
Goshawk	3 3 4 .0		✓		
Sharp-shinned Hawk	3 3 2 .0			S	
Cooper's Hawk	3 3 3 .0				
Red-tailed Hawk	3 3 7 .0		✓		
Red-shouldered Hawk	3 3 9 .0		✓		
Broad-winged Hawk	3 4 3 .0		✓		
Bald Eagle *	3 5 2 .0				
Marsh Hawk	3 3 1 .0				
Osprey *	3 6 4 .0				
American Kestrel	3 6 0 .0		✓		
Spruce Grouse *	2 9 8 .0				FY
Ruffed Grouse	3 0 0 .0				FY
Bobwhite	2 8 9 .0				
Ring-necked Pheasant	3 0 9 .1				
Gray Partridge *	2 8 8 .1				
Turkey	3 1 0 .0				
King Rail *	2 0 8 .0				
Virginia Rail	2 1 2 .0				
Sora	2 1 4 .0				
Yellow Rail *	2 1 5 .0				
Common Gallinule	2 1 9 .0		✓		
American Coot	2 2 1 .0				
Killdeer	2 7 3 .0		✓		
American Woodcock	2 2 8 .0			D	
Common Snipe	2 3 0 .0			D	

NAME	DO NOT WRITE: FOR COMPUTER USE A.O.U.# 7 8 9 10	CODE 11	PO	PR	CO
Upland Sandpiper	2 6 1 .0				
Spotted Sandpiper	2 6 3 .0				DD
Solitary Sandpiper *	2 5 6 .0				
Least Sandpiper *	2 4 2 .0				
Great Bl.-backed Gull *	0 4 7 .0				
Herring Gull	0 5 1 .0				
Ring-billed Gull	0 5 4 .0				
Common Tern	0 7 0 .0				
Black Tern	0 7 7 .0				
Rock Dove	3 1 3 .1				
Mourning Dove	3 1 6 .0				
Yellow-billed Cuckoo *	3 8 7 .0				
Black-billed Cuckoo	3 8 8 .0				
Barn Owl *	3 6 5 .0				
Screech Owl	3 7 3 .0				
Great Horned Owl	3 7 5 .0		✓		
Barred Owl	3 6 8 .0		✓		
Long-eared Owl	3 6 6 .0				
Short-eared Owl *	3 6 7 .0				
Boreal Owl *	3 7 1 .0				
Saw-whet Owl	3 7 2 .0			T	
Whip-poor-will	4 1 7 .0				
Common Nighthawk	4 2 0 .0				
Chimney Swift	4 2 3 .0		✓		
Ruby-throated Hummingb.	4 2 8 .0		✓		
Belted Kingfisher	3 9 0 .0				FY
Common Flicker	4 1 2 .0				ON
Pileated Woodpecker	4 0 5 .0			D	
Red-headed Woodpecker *	4 0 6 .0		✓		
Yellowbellied Sapsucker	4 0 2 .0				ON
Hairy Woodpecker	3 9 3 .0			S	
Downy Woodpecker	3 9 4 .0		✓		
Bl-bk. 3-T Woodpecker *	4 0 0 .0				FL
N. 3-toed Woodpecker *	4 0 1 .0				
Eastern Kingbird	4 4 4 .0			T	
GreatCrested Flycatcher	4 5 2 .0				
Eastern Phoebe	4 5 6 .0				UN
Yel.-bellied Flycatcher	4 6 3 .0			T	
Alder Flycatcher	4 6 6 .3				
Willow Flycatcher	4 6 6 .4				
Least Flycatcher	4 6 7 .0				
Eastern Wood Pewee	4 6 1 .0		✓		
Olive-sided Flycatcher	4 5 9 .0			T	
Horned Lark *	4 7 4 .0				
Tree Swallow	6 1 4 .0				ON
Bank Swallow	6 1 6 .0		✓		
Rough-winged Swallow	6 1 7 .0				
Barn Swallow	6 1 3 .0				UN
Cliff Swallow	6 1 2 .0				
Purple Martin	6 1 1 .0				
Gray Jay *	4 8 4 .0				FY

PO=Possible, PR=Probable, CO=Confirmed -- Enter Criteria Code in Correct Column *Indicates

FIGURE 1

Name G.F. Oatman et al. Address _____ (zip) Map Name Averill Quad.

NAME	A.O.U.# 7	8	9	10	CODE 11	PO	PR	CO
Blue Jay	4	7	7	.0				FL
Common Raven	4	8	6	.0				NB
Common Crow	4	8	8	.0		✓		
Black-capped Chickadee	7	3	5	.0				FY
Boreal Chickadee	7	4	0	.0				FY
Tufted Titmouse *	7	3	1	.0				
White-breasted Nuthatch	7	2	7	.0				
Red-breasted Nuthatch	7	2	8	.0				FY
Brown Creeper	7	2	6	.0				NY
House Wren	7	2	1	.0				
Winter Wren	7	2	2	.0			S	
Carolina Wren *	7	1	8	.0				
Long-billed Marsh Wren	7	2	5	.0				
Sh-billed Marsh Wren *	7	2	4	.0				
Mockingbird	7	0	3	.0				
Gray Catbird	7	0	4	.0			D	
Brown Thrasher	7	0	5	.0		✓		
American Robin	7	6	1	.0				FY
Wood Thrush	7	5	5	.0			S	
Hermit Thrush	7	5	9	.0				FL
Swainson's Thrush	7	5	8	.0			D	
Gray-cheeked Thrush	7	5	7	.0				
Veery	7	5	6	.0			S	
Eastern Bluebird	7	6	6	.0				
Blue-gray Gnatcatcher *	7	5	1	.0				
Golden-crowned Kinglet	7	4	8	.0				FY
Ruby-crowned Kinglet	7	4	9	.0			D	
Cedar Waxwing	6	1	9	.0			S	
Loggerhead Shrike *	6	2	2	.0				
Starling	4	9	3	.0		✓		
Yellow-throated Vireo	6	2	8	.0				
Solitary Vireo	6	2	9	.0			S	
Red-eyed Vireo	6	2	4	.0			S	
Philadelphia Vireo *	6	2	6	.0				
Warbling Vireo	6	2	7	.0				
Black-and-white Warbler	6	3	6	.0		✓		
Worm-eating Warbler *	6	3	9	.0				
Golden-winged Warbler	6	4	2	.0				
Blue-winged Warbler *	6	4	1	.0				
Tennessee Warbler *	6	4	7	.0			S	
Nashville Warbler	6	4	5	.0				DD
Northern Parula	6	4	8	.0			S	
Yellow Warbler	6	5	2	.0		✓		
Magnolia Warbler	6	5	7	.0				NE
Cape May Warbler *	6	5	0	.0				FY
Black-throated Blue W.	6	5	4	.0				NE
Yellow-rumped Warbler	6	5	5	.0				NB
Black-throated Green W.	6	6	7	.0		✓		
Blackburnian Warbler	6	6	2	.0			D	
Chestnut-sided Warbler	6	5	9	.0				FY
Bay-breasted Warbler *	6	6	0	.0				

NAME	A.O.U.# 7	8	9	10	CODE 11	PO	PR	CO
Blackpoll Warbler	6	6	1	.0			S	
Pine Warbler	6	7	1	.0				
Prairie Warbler *	6	7	3	.0				
Palm Warbler *	6	7	2	.0				
Ovenbird	6	7	4	.0		✓		
Northern Waterthrush	6	7	5	.0				FY
Louisiana Waterthrush	6	7	6	.0				
Mourning Warbler	6	7	9	.0				
Common Yellowthroat	6	8	1	.0				FY
Yellow-breasted Chat *	6	8	3	.0				
Wilson's Warbler *	6	8	5	.0				
Canada Warbler	6	8	6	.0				DD
American Redstart	6	8	7	.0		✓		
House Sparrow	6	8	8	.2				
Bobolink	4	9	4	.0				
Eastern Meadowlark	5	0	1	.0				
Red-winged Blackbird	4	9	8	.0				FL
Orchard Oriole *	5	0	6	.0				
Northern Oriole	5	0	7	.0				FL
Rusty Blackbird	5	0	9	.0				FL
Common Grackle	5	1	1	.0				FY
Brown-headed Cowbird	4	9	5	.0		✓		
Scarlet Tanager	6	0	8	.0			S	
Cardinal	5	9	3	.0				
Rose-breasted Grosbeak	5	9	5	.0		✓		
Indigo Bunting	5	9	8	.0			S	
Evening Grosbeak	5	1	4	.0		✓		
Purple Finch	5	1	7	.0				FL
Pine Grosbeak *	5	1	5	.0				
House Finch *	5	1	9	.0				
Pine Siskin *	5	3	3	.0		✓		
American Goldfinch	5	2	9	.0		✓		
Red Crossbill *	5	2	1	.0				
Wh.-winged Crossbill *	5	2	2	.0			D	
Rufous-sided Towhee	5	8	7	.0				
Savannah Sparrow	5	4	2	.0				
Grasshopper Sparrow *	5	4	6	.0				
Henslow's Sparrow *	5	4	7	.0				
Vesper Sparrow	5	4	0	.0				
Dark-eyed Junco	5	6	7	.0				FY
Chipping Sparrow	5	6	0	.0				NE
Field Sparrow	5	6	3	.0				
White-throated Sparrow	5	5	8	.0				NY
Lincoln's Sparrow *	5	8	3	.0			D	
Swamp Sparrow	5	8	4	.0				NB
Song Sparrow	5	8	1	.0				FY

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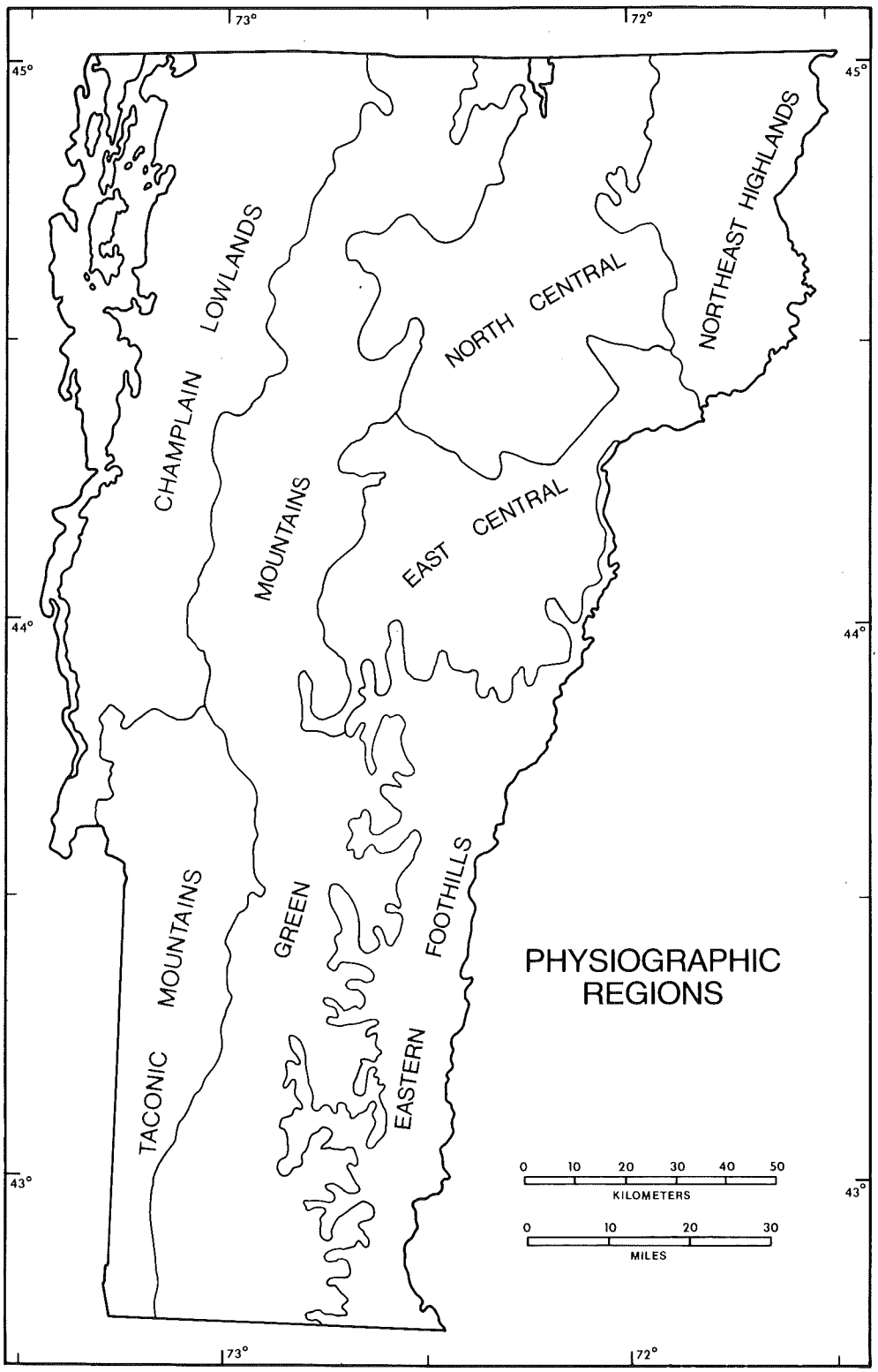
hypothetical or little-known, potential breeding species--all records must be fully documented.



MAP 5. Vermont Physiographic Regions (based on Garland 1977)

The following criteria were considered in designating UFAS: (1) whether an area contained breeding habitat for Endangered, Threatened or Rare species of birds; (2) whether it represented a unique ecosystem, as determined by completeness of the ecological unit, diversity of species, extent of human disturbance, or aesthetic value; (3) the relative rarity of an area's habitat in state, county, or country; (4) an area's physical characteristics, such as size (the larger areas were considered the most important); (5) usefulness of an area for education or research; (6) the viability of preserving an area; and (7) the ecological stability of an area. Areas judged by the Vermont Atlas Committee to be the most important were designated as primary UFAS, and were assured of field coverage; less important areas were designated as secondary UFAS, and were not all covered. Full data on species located in each primary UFA are on file at the Vermont Institute of Natural Science, as is information on those secondary UFAS which were surveyed.

The following UFAS were chosen and surveyed:

Primary UFAS	**Town**
MARSHES	
Barton River Marsh (including Black River Marsh and South Bay Channel)	Coventry
Dead Creek	Panton and Addison
East Creek	Orwell
Little Otter Creek	Ferrisburg
Missisquoi Marsh	Swanton
Sandbar Marsh (including Sandbar Swamp Forest)	Milton
West Rutland Marsh	West Rutland
Herrick's Cove	Rockingham
Intervale	Burlington
SWAMPS	
Cornwall Swamp	Cornwall
Vernon Black Gum Swamp	Vernon
BOGS	
Bog Pond	Fairlee
Chickering Bog	Calais
Colchester Bog	Colchester
Cranberry Bog (Pownal Bog)	Pownal
Franklin Bog	Franklin
Lost Pond Bog	Mt. Tabor
Peacham Bog	Peacham
Scanlon Bog	Brandon

BOREAL HABITATS

Bear Swamp	Wolcott
Chimney Hill	Wilmington
Haystack	Dover and Wilmington
Moose Bog	Ferdinand
Mt. Snow	Dover

PONDS

Shelburne Pond	Shelburne
Wallingford Pond	Wallingford
Bristol Pond	Bristol

ARCTIC-ALPINE HABITATS

Camels Hump summit	Huntington
Mt. Mansfield ridge	Underhill

LAKE CHAMPLAIN NESTING ISLANDS

Young Island	Grand Isle
Grandma or No-Name Island	North Hero
Hen Island	North Hero
Popasquash Island	St. Albans
Rock Island	Georgia

Secondary UFAs

MARSHES

Dorset Marsh	Dorset
Fairfield Marsh	Fairfield
La Platte River Marsh	Shelburne
Mallets Creek Marsh	Colchester
Whitney Creek Marsh	Addison
Tinmouth Channel	Tinmouth

BOGS

Alburg Black Spruce (Tamarack Bog)	Alburg
Ferdinand Bog	Ferdinand
Lake Carmi Black Spruce Bog	Franklin

OTHER

Ryder Pond	Jacksonville
Peckham Hill	Pownal

The species accounts

The species accounts are comprised of an individual text and a map for each of the 178 species confirmed as breeders during the Atlas Project; there is an additional account for the White-winged Crossbill, which is an irregular breeder in Vermont and was not

confirmed during 1976–81. Fourteen shorter species accounts contain text on each of those species for which fieldwork indicated possible or probable breeding status, but for which confirmation was lacking between 1976 and 1981. A concluding section provides accounts on two other species—one a former Vermont breeding species now being reintroduced, and one a species newly established as a breeder in Vermont.

Each species account contains information on the species' habitat and life history, an analysis of the species' distribution as documented by the Vermont Atlas Project survey, a summary of Vermont nesting information, the species' historical status (where appropriate), and an indication of whether the species is recommended for Vermont's Endangered, Threatened, or Species of Special Concern lists. This list was prepared by the Vermont Endangered Species Committee, and proposed to the Secretary of the Agency of Environmental Conservation in January 1985.

Statistical data that accompany each account define the species' occurrence in priority blocks; although occurrence in non-priority blocks is incorporated on the maps, it is not considered in the statistical data. Statistical information on the number and the percentage of the priority blocks in which the species was found, and a breakdown of its recorded breeding status, are given. Dots on a species' map indicate its presence in both priority and non-priority blocks, and dot size represents breeding status:

- possible breeding
- probable breeding
  confirmed breeding

Also accompanying each species account are figures showing the number of priority blocks in each physiographic region in which the species occurred, in what percentage of the region's priority blocks it was found, and the percentage of the species' occurrence in priority blocks statewide that is represented by its regional occurrence. For example, the statistical data for the Veery's occurrence in one of the state's physiographic regions are:

	no. of priority blocks in which recorded	% of region's priority blocks	% of species total priority blocks
Champlain Lowlands	29	94	16

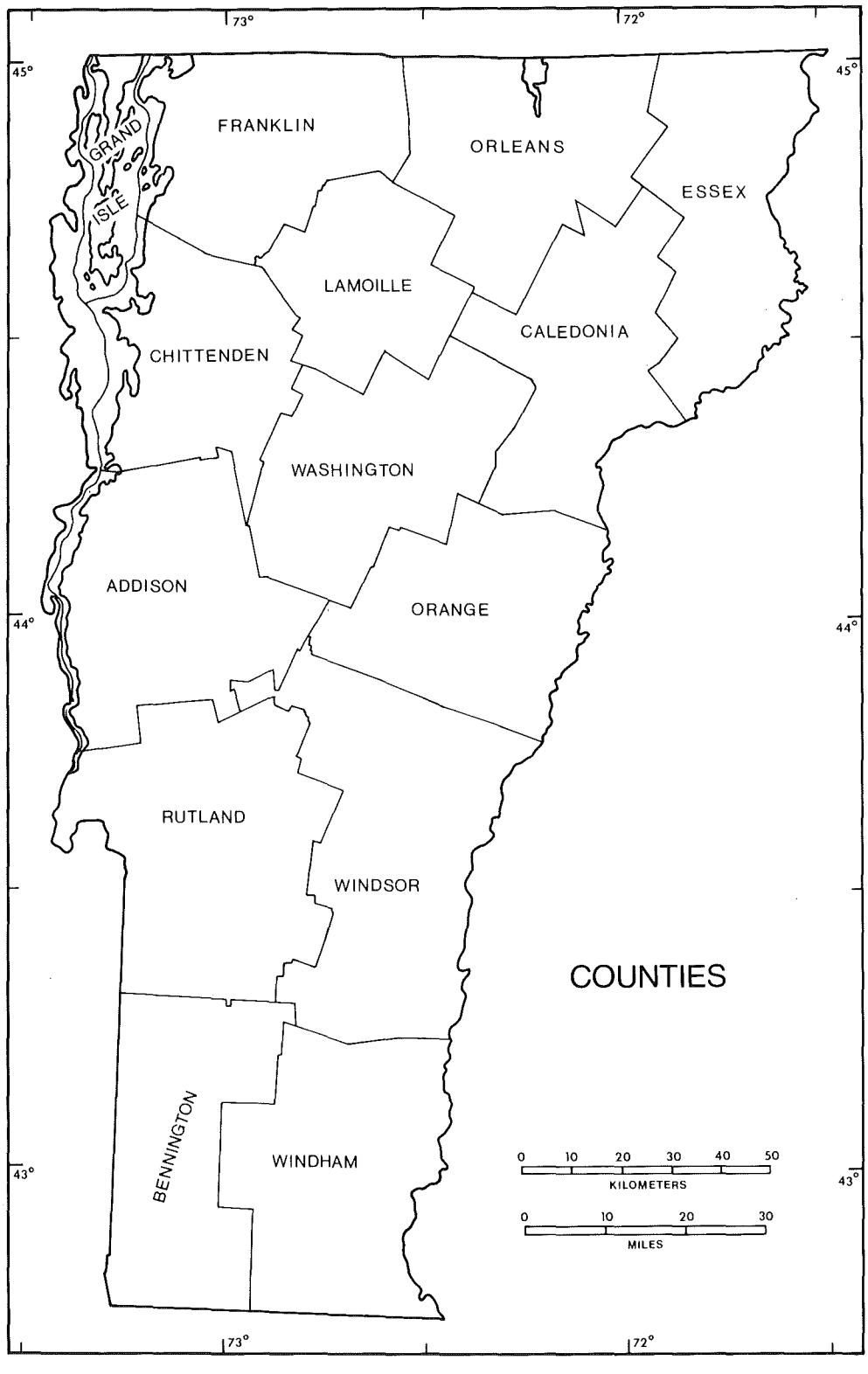
Thus the Veery occurred in 29 priority blocks (of the total 31) within the Champlain Lowlands region; these represented its occurrence in 94% of the blocks of that region; and its occurrence in the Champlain Lowlands represented 16% of its occurrence in priority blocks statewide.

Environmental conditions and land-use practices within each region have affected the composition and distribution of the state's avifauna to a marked degree. Maps 5–12 and the corresponding overlays will help the reader to evaluate species occurrence and distribution in Vermont. Many species are distributed according to elevational gradients (Map 7 and Overlay 3). Changes in agricultural use, as farmland reverts to woodland, greatly affect species dependent on hayfields (such as Eastern Meadowlarks and Bobolinks) and agricultural land (Upland Sandpipers, Vesper Sparrows); Map 8 and Overlay 4 indicate the present expanse of Vermont's farmland. Summer temperatures vary with elevation and topography (Map 9, Overlay 5), and influence many breeding species' distribution. The amount of rainfall affects both vegetation and species distribution (Map 10, Overlay 6). The most profound influences on avifauna are vegetative cover (Map 11, Overlay 7), and the distribution of river systems and wetlands (Map 12, Overlay 8). The state's ecological zones and geography are discussed in Appendix A.

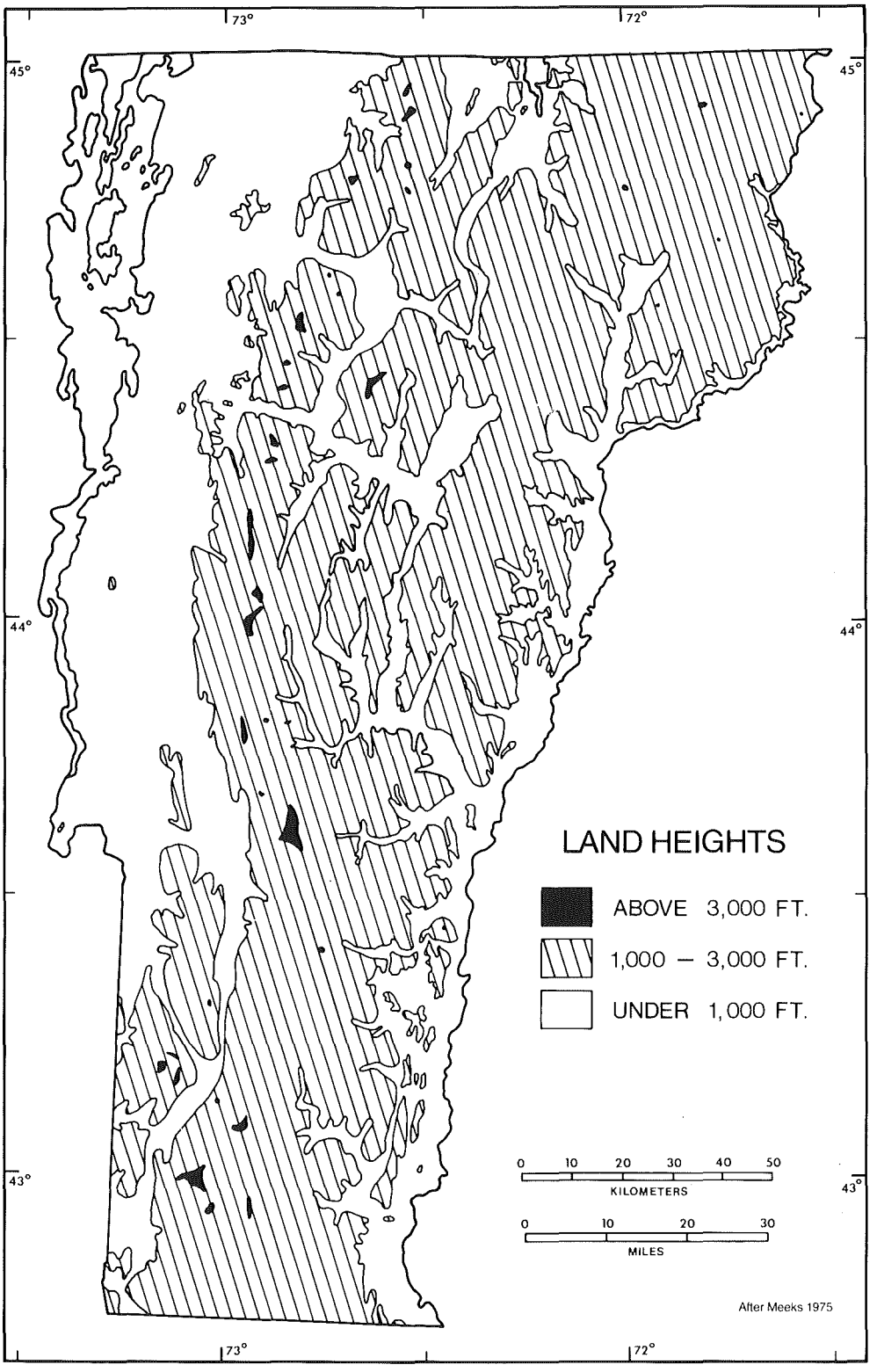
Authors of many individual accounts have identified features influencing the species' distribution, but detailed comparative assessments of the specific factors involved in the patterns of occurrence observed were beyond the scope of the Atlas Project survey. Similarly, relatively little information was collected on habitat relationships, breeding chronology, or relative abundance. Authors of species accounts relied to a large degree on published data and on their personal assessment of a species' abundance and habitat selection, as well as on the Atlas Project results.

Each of the species' accounts attempts to place the Atlas Project findings in the perspective of earlier work. However, no comprehensive survey of Vermont's avifauna had been done before the Atlas Project, so appraisals of changes in species' status must be tempered with the knowledge that earlier published work may be fragmentary or extremely local in coverage.

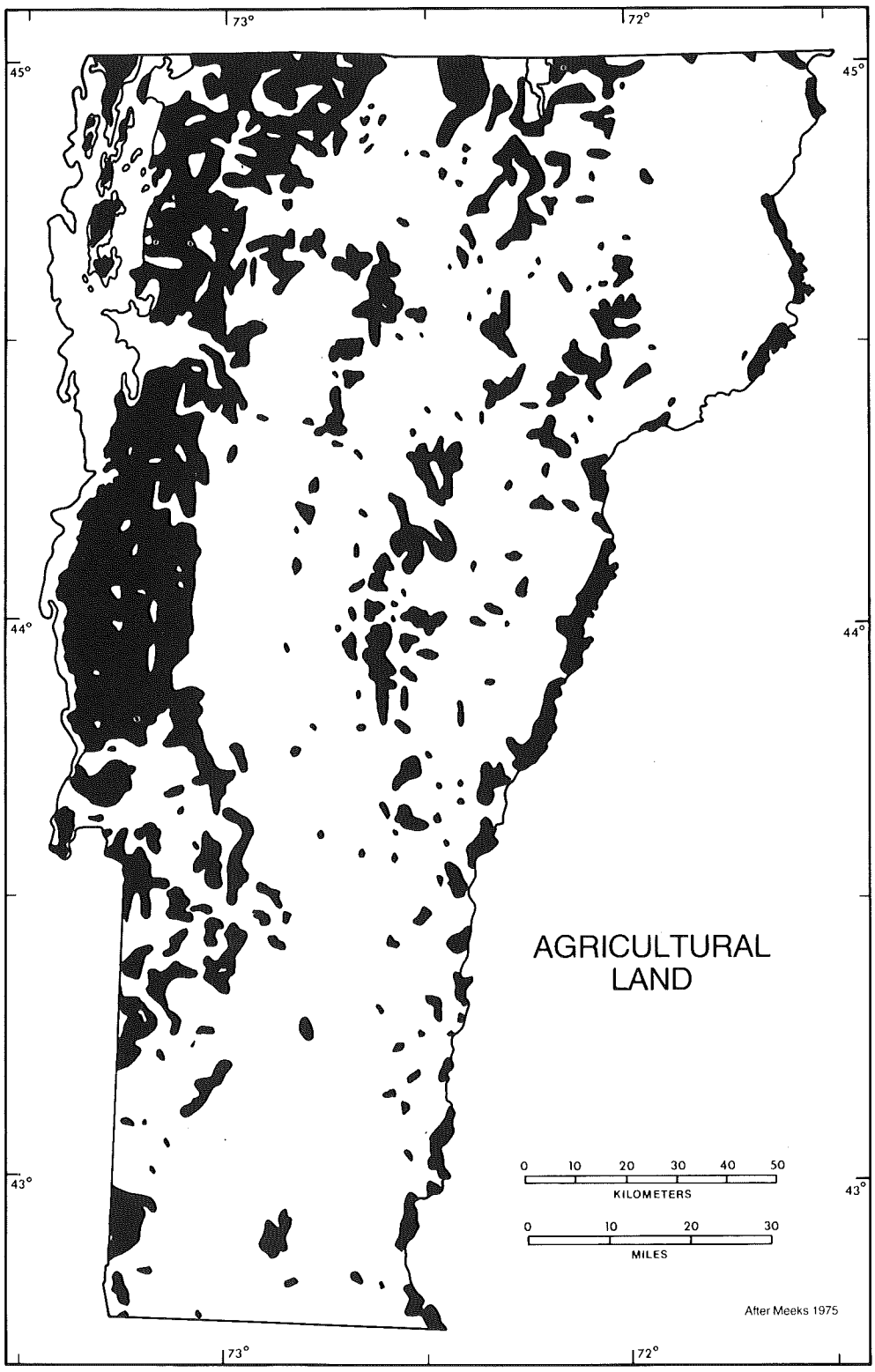
For each species, all available data on that species' dates of nest building, egg laying, hatching young, and fledging young have been researched. The North American Nest Record Program's data at the Cornell Laboratory of Ornithology in Ithaca, New York, were especially valuable. In addition, data were collected from Vermont fieldworkers; gleaned from published information in the *Records of Vermont Birds*, *Bulletin of New England Bird Life*, and *Records of New England Birds*; and obtained from the egg collections at the Montshire Museum in Hanover, New Hampshire, and the Pember Collection at the University of Vermont in Burlington, Vermont. Historical data came from L. H. Ross's field notes, now at the Vermont Institute of Natural Science, and the bird records of the Green Mountain Audubon Society in Huntington, Vermont. All available data are used in the species accounts, although for



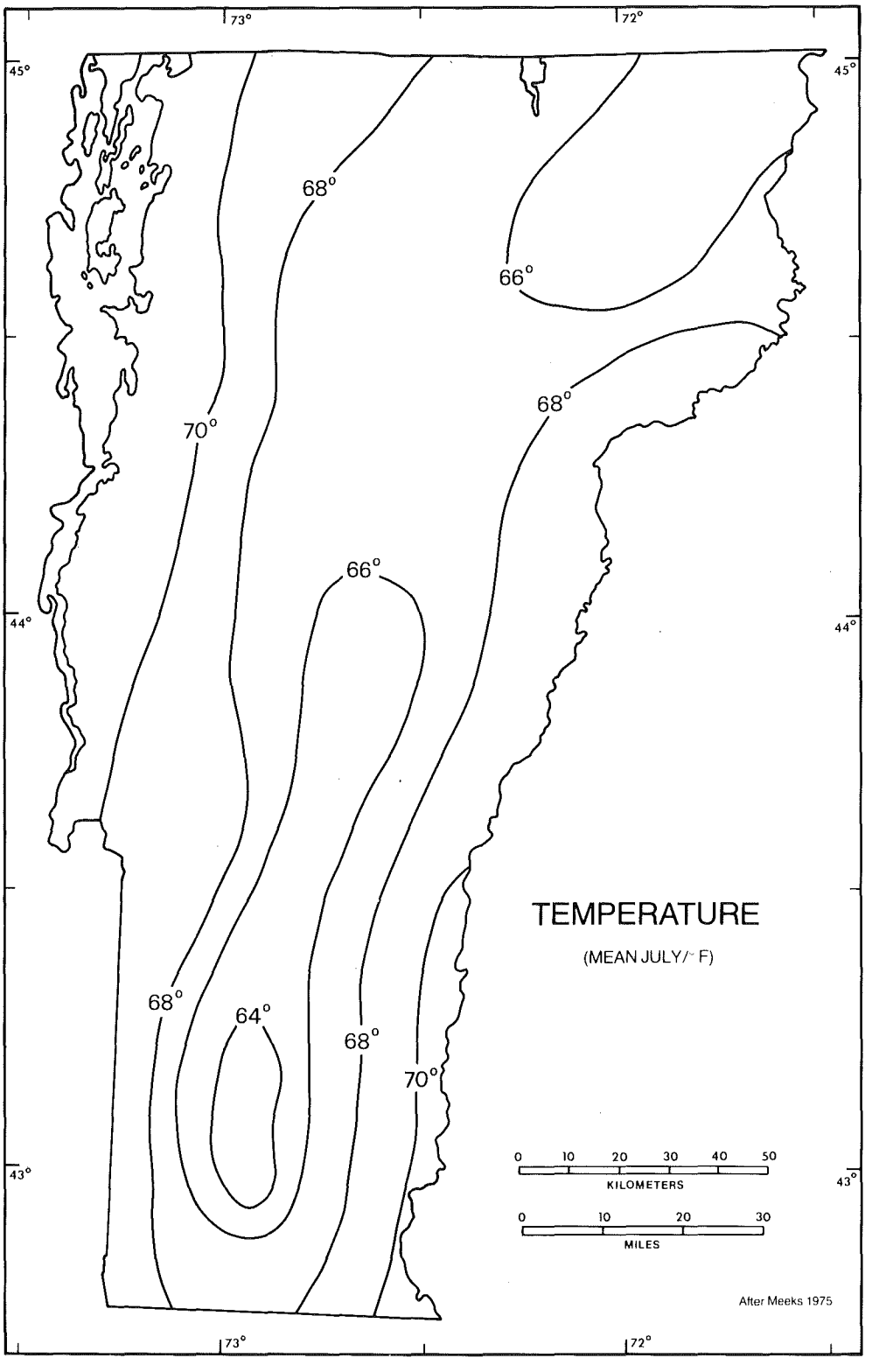
MAP 6. Vermont Counties



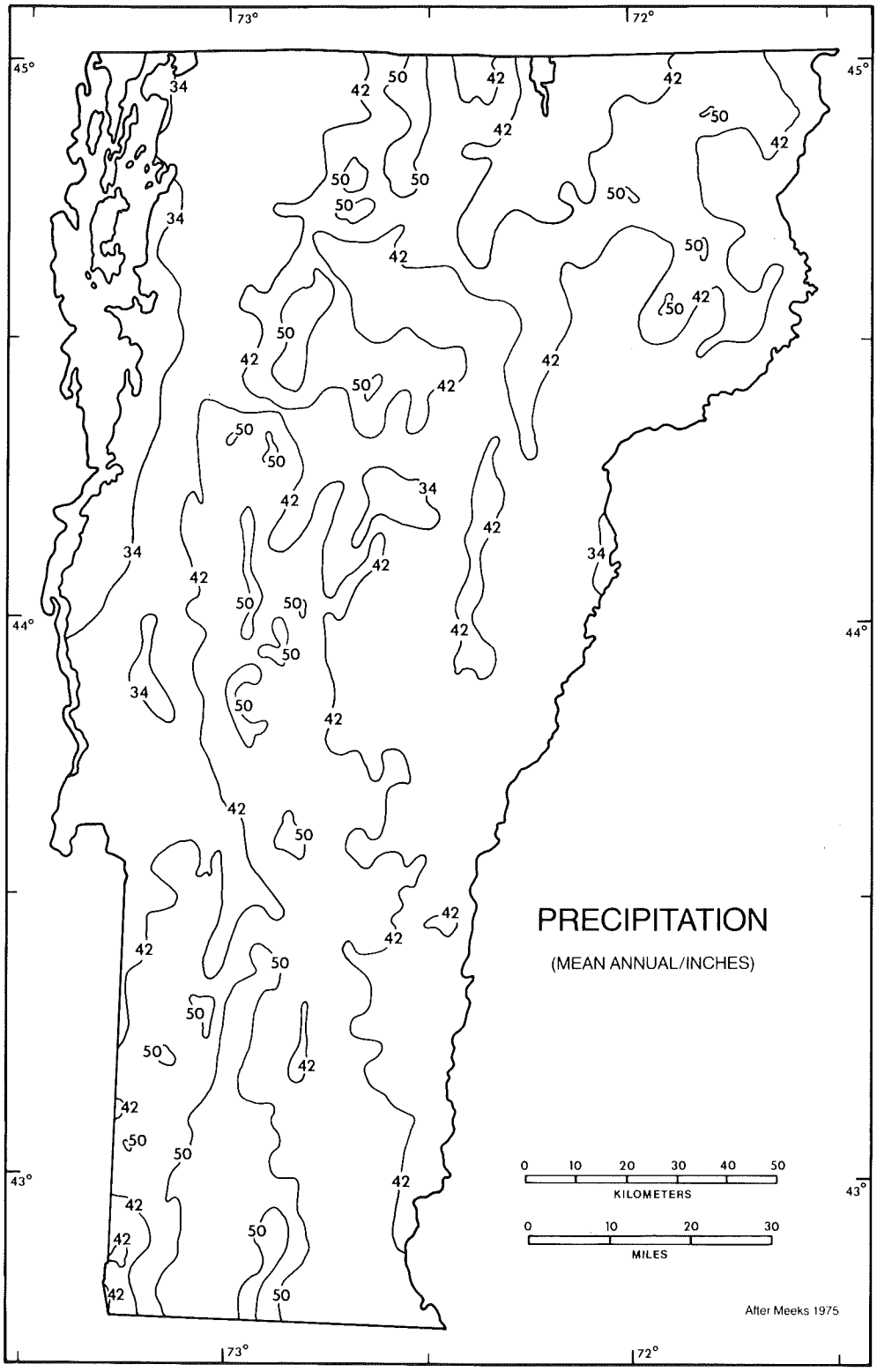
MAP 7. Land Heights



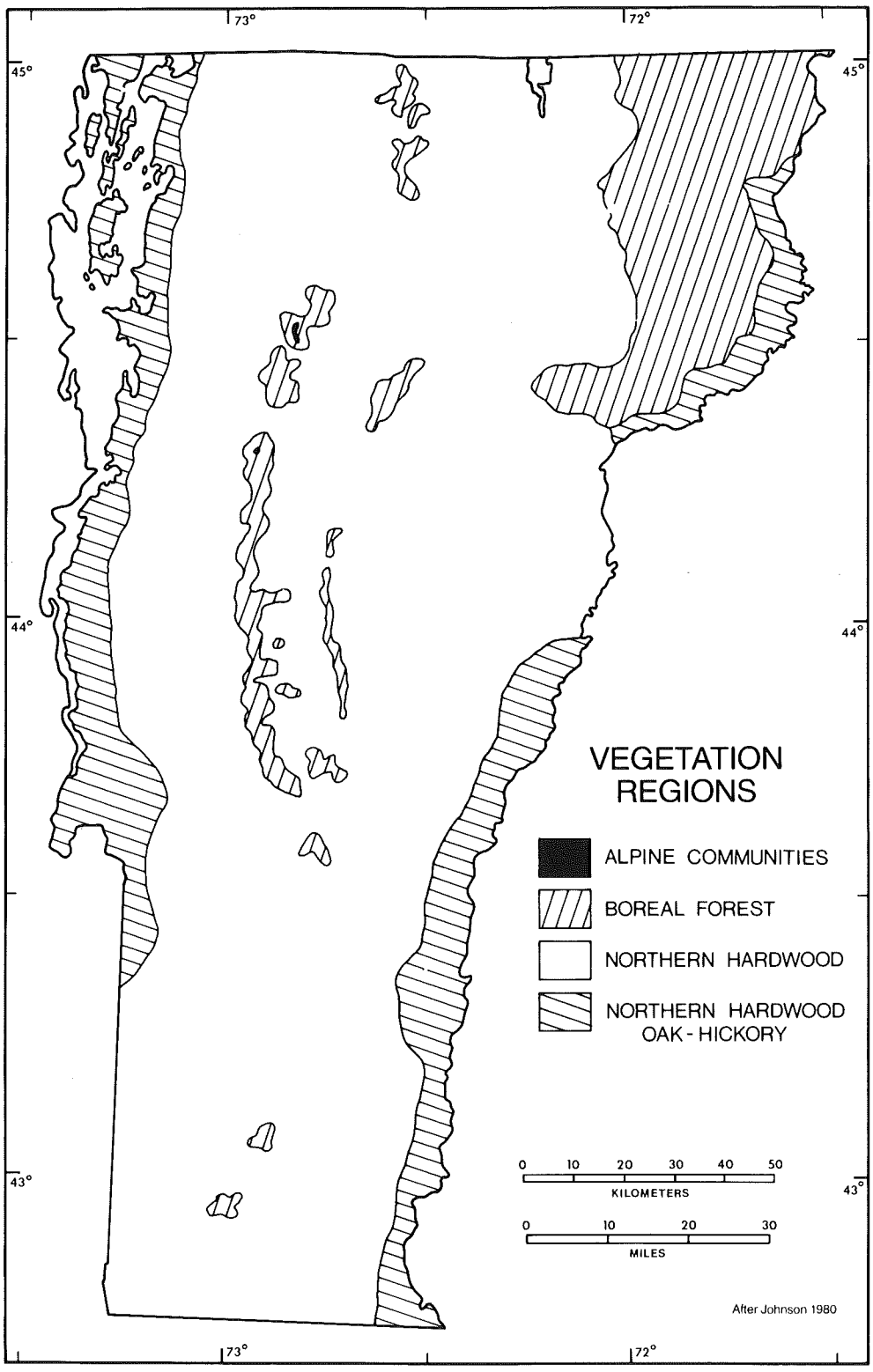
MAP 8. Agricultural Land



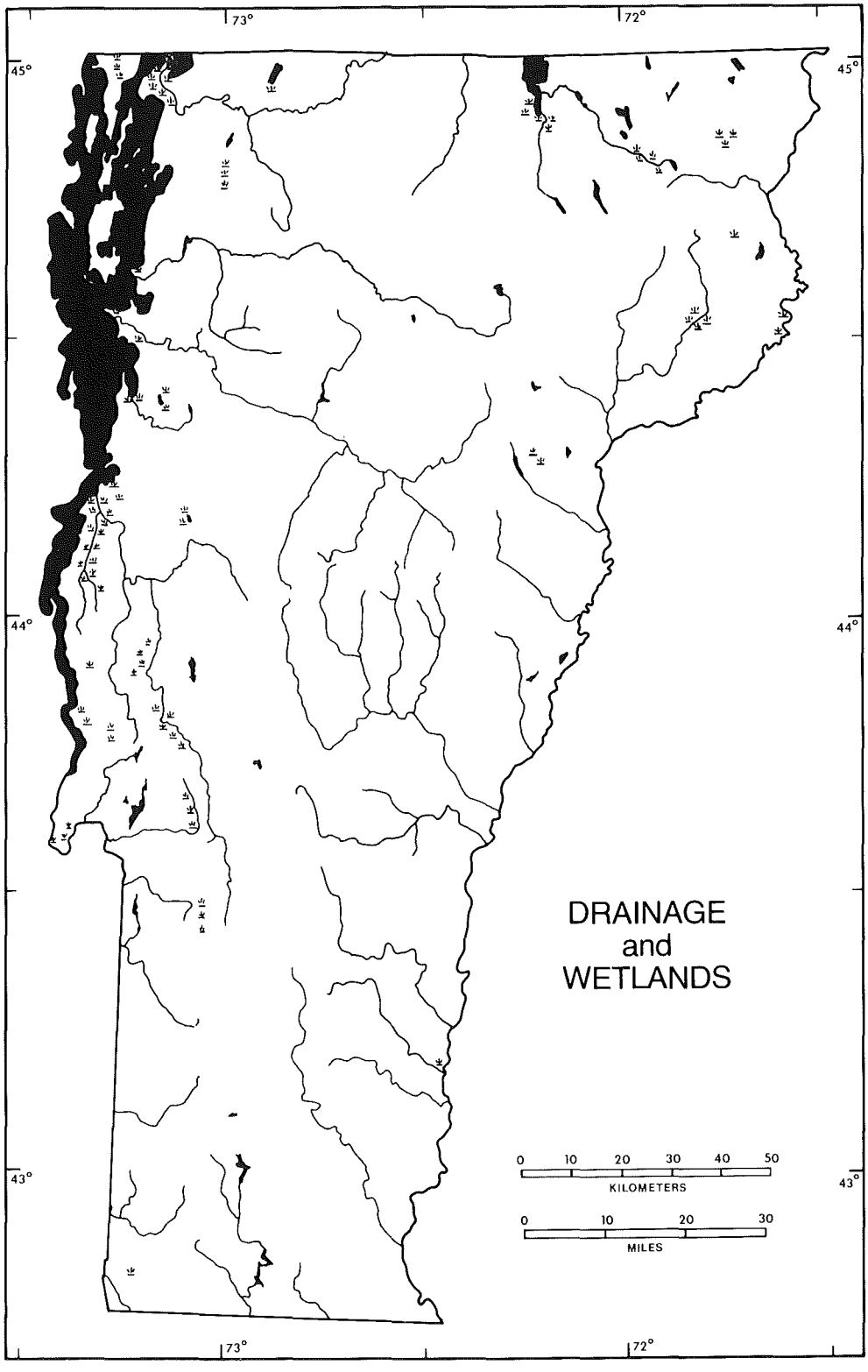
MAP 9. Mean July Temperature (in Fahrenheit)



MAP 10. Annual Mean Precipitation (in inches)



MAP 11. Vegetation Regions



MAP 12. Drainage and Wetlands

many species data are extremely scant. The data on nest building, egg laying, hatching, and fledging young are available on file cards at the Vermont Institute of Natural Science; future fieldworkers are urged to report their observations to the Vermont Institute of Natural Science to increase this important resource.

Results and interpretation

During fieldwork in 1976–81, 193 species of birds were recorded as breeders: 8 species as possible breeders, 7 species as probable breeders, and 178 species as confirmed breeders. Of the 191 species listed on the recording sheet in 1976, 8 were not found (Redhead, King Rail, Yellow Rail, Solitary Sandpiper, Least Sandpiper, Boreal Owl, Worm-eating Warbler, Palm Warbler); and 3 species not listed were located (Double-crested Cormorant, Great Egret, Cerulean Warbler).

Statewide, an average of 84 species was seen in each priority block. The Champlain Lowlands had the highest regional average—88 species per block—an indication of the region's varied habitat of marshes, fields, and woodlands. The Eastern Foothills and East Central and North Central regions averaged 86 species per block; these regions support a large number of boreal forest species, as well as many southern, lowland birds. The Taconic Mountains were next with 83 species per block, while the Green Mountains and Northeast Highlands each had an average of 81 species per priority block. The latter two areas received much of their coverage during block-busting surveys that ceased once adequate coverage standards were achieved. Although large areas of the two regions contain relatively unbroken forest with little habitat diversity, it should be pointed out that the highest species tallies in the state—107 in the Victory Bog block, and 130 and 112 in blocks in Winhall and Londonderry—came from these regions.

The Vermont Atlas Project made discoveries that changed many preconceived ideas about Vermont's birds and their distribution. Some species once considered very limited in Vermont were found to be more widely distributed than expected. These include the Blue-gray Gnatcatcher, Yellow-throated Vireo, Mourning Warbler, Rusty Blackbird, and Lincoln's Sparrow. Several species formerly considered regular nesters were found to be either very rare (Sedge Wren) or almost totally absent (Henslow's Sparrow). First state breeding records were established for 7 species: Turkey Vulture, Barn Owl, Carolina Wren, Blue-winged Warbler, Cerulean Warbler, Bay-breasted Warbler, and House Finch.

Despite the severity of Vermont's winter weather, a pronounced expansion of "southern" breeding species is evident in the Atlas Project data. Species considered very local in even the southernmost reaches of the state only a quarter of a century ago seem to

be expanding their northern distributional limits well into the state. Species included in this movement are both migratory (e.g., Blue-winged Warbler) and nonmigratory (Northern Cardinal, Tufted Titmouse, and Northern Mockingbird). Although the increasing popularity of birdfeeders may have aided a few of the latter species, much remains to be learned about the factors underlying the success of these expanding populations. This atlas will enable us to document future expansions.

Biases and limitations

Although efforts were made to ensure that all priority blocks met minimum standards for adequate coverage (75 species identified, with 35 confirmed), several biases are known to be reflected in Atlas Project data. Biases pertaining to nocturnal, secretive, or early-nesting species are treated in the species' accounts; in general, species in these categories were undersurveyed. Many species, such as owls and rails, were seldom located without special survey efforts. In Vermont's Atlas Project, attempts were made to reduce underrepresentation to the greatest possible extent by publicity campaigns directed to the general public (i.e., to urge reporting of Whip-poor-wills and woodcock), and, in a few local instances, concerted searches with tape recorders in suitable habitat.

A more general bias affecting coverage of all species resulted from the uneven distribution of Atlas Project workers in the state. Attempts to minimize this problem by selecting priority blocks for survey only partially alleviated the situation, since vast tracts, particularly in the mountainous regions and Northeast Highlands, were outside the normal range of the state's active birders. Efforts to solicit aid from active local birders unaffiliated with organized bird clubs resulted in some additional coverage, but it was necessary to mobilize block-busting teams to achieve adequate coverage in more than half the blocks in those areas. Because block-busters concentrated their efforts in June and July, when the probability of getting confirmations for a large number of species is greatest, many of the early- or late-nesting species and more secretive species may be underrepresented in these blocks.

Rare species, such as the Loggerhead Shrike, probably were found in priority blocks in proportion to their actual abundance statewide, unless they were secretive as well as rare (Kibbe 1982).

Actual hours of coverage in various blocks varied tremendously. Coverage is impossible to compare among blocks, particularly since an expert block-busting team could in one or two days identify and confirm twice as many species as a less experienced observer could in hundreds of hours. *Readers are cautioned, therefore, that the distributions portrayed herein reflect only those of species actually recorded and do not necessarily preclude the oc-*

currence of any species within a given block with appropriate habitat, given additional coverage. In no block is it assumed that the species recorded constitute the entire set of species breeding within the block during the survey period, although in several priority and a few non-priority blocks the percentage of species that escaped detection must have been extremely small.

While a more intensive analysis based on the environmental parameters of each block surveyed would have been desirable, the Atlas Project analyses are restricted to overall distributional patterns as evidenced in each physiographic region. Future researchers are urged to make further in-depth analyses of individual species' distribution, based on the environmental features—available water, community types, elevation, topography, land uses—of given survey blocks.

RECORDING CODES USED BY THE VERMONT BREEDING BIRD ATLAS PROJECT

POSSIBLE BREEDING (PO) Used only for a bird recorded in the breeding season in possible nesting habitat, but with no other indication of breeding noted. Summering and non-breeding adults (e.g., gulls in a dump, migrant shorebirds and warblers) not counted

PROBABLE BREEDING (PR)

S Singing male present (or breeding calls heard) on more than one date in the same place. A good indication that a bird has taken up residence if the dates are a week or more apart

T Bird (or pair) apparently holding territory. In addition to singing, chasing of other individuals of the same species often marks a territory

D Courtship and display, or agitated behavior or anxiety calls from adults suggesting the probable presence of a nearby nest or young; brood-patch or cloacal protuberance on trapped adult

N Bird visiting probable nest site

B Nest building by wrens and woodpeckers. Wrens may build many nests, and woodpeckers, although they usually drill only one nesting cavity, drill roosting holes

CONFIRMED BREEDING (CO)

DD Distraction display or injury feigning; coition. (Agitated behavior and/or anxiety calls, D only)

NB Nest building by any species except wrens and woodpeckers

UN Used nest found. These must be carefully identified if they are to be used for confirmation. Some nests (e.g., that of the Northern Oriole) last through the winter and are very characteristic. Most are difficult to identify correctly.

FE Female with egg in the oviduct

FL Recently fledged young (including downy young of waterfowl, etc.). This code used with caution for species such as blackbirds and swallows, which may move some distance soon after fledging. Recently fledged passerines are still dependent on their parents and are fed by them

FS Adult carrying fecal sac

FY Adult(s) with food for young. Some birds (gulls, terns, and birds of prey) continue to feed their young long after they've fledged, and may move considerable distances. Also, some birds (e.g., terns) may carry food long distances to young in a neighboring survey block. Care especially needed on the edge of a block. Care needed to avoid confusion with courtship feeding (D)

ON Adult(s) entering or leaving nest site in circumstances indicating occupied nest. *Not generally used for open-nesting birds.* Used for hole nesters only when a bird enters a hole and remains inside; when the male and female exchange places while incubating the eggs; or when a bird leaves a hole after having been inside for some time

NE Nest and eggs, or bird sitting on nest, or egg shells found below nest. If a cowbird egg is found in a nest, NE used for both cowbird and the host nest

NY Nest with young or downy young of waterfowl, quail, waders, etc. If a young cowbird is found with young of other species, NY used for both cowbird and the host species. Since precocial downy young may be led considerable distances by their parents, care needed when such records are made close to the edge of a block

TERMS AND ABBREVIATIONS

Nomenclature for birds used throughout the text follows the sixth edition of American Ornithologists' Union *Check-list of North American Birds* (1983). In many cases, this newly accepted nomenclature revises long-standing common names. In the species accounts and in the index of bird names the old name is also given.

a — acre

AOU — American Ornithologists' Union

ASR — Asterisked Species Report. The documentation collected during the Vermont Breeding Bird Atlas Project to verify reports on little-known or hypothetical breeding species (see p. 6). Asterisked Species Reports are cited as supporting data for this book by the abbreviation ASR, followed by the name of the fieldworker who filed the report

BBC — Breeding bird censuses, coordinated by the National Audubon Society and published in *American Birds* (formerly *Bird-Lore* and *Audubon Field Notes*). In the text, references to BBC data are by author's name and date of publication where appropriate

BBS — U.S. Fish and Wildlife Service Breeding Bird Survey route. Roadside surveys carried out yearly. Statistical analyses of Vermont routes were made by Chandler S. Robbins for the Atlas Project, and are on file at the Vermont Institute of Natural Science, Woodstock

Blue List — *American Birds*' Blue List identifies species perceived by experienced fieldworkers to be exhibiting a long-term decline, at least in portions of their ranges. It has been published annually since 1971

BNEBL — *Bulletin of New England Bird Life*

BVR — Vermont Bird Verification Report. Reports required by the Vermont Bird Records Committee to document sightings of rare or unusual species and nesting of species that are rare breeders in Vermont; acceptance is by vote of the committee. Bird Verification Reports are cited in the text by the abbreviation BVR followed by the name of the observer who filed the report

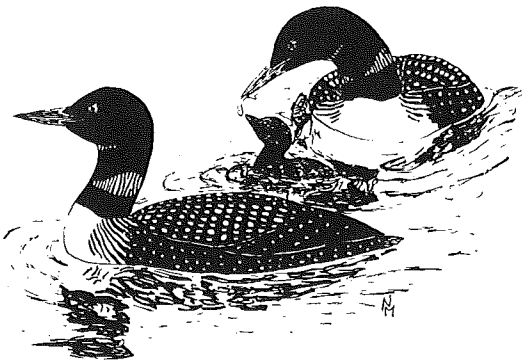
CBC — Christmas Bird Count data, from the annual survey conducted since 1900 and coordinated by the National Au-

	dubon Society, and published in *Bird-Lore* from 1901 to 1940, *Audubon Magazine* from 1941 to 1947, *Audubon Field Notes* from 1948 to 1970, and *American Birds* from 1971 to 1984. Cited in text as CBC followed by count year being referenced. Refer to appropriate journal for year cited.
cm	centimeter
DBH	diameter at breast height; standard measurement of tree diameter
ft	foot
GMAS records	Green Mountain Audubon Society's accumulated historical bird records, located at the Huntington Nature Center, Huntington, Vermont. Microfiche copy at the Vermont Institute of Natural Science. Cited in text as "GMAS records" followed by the name of the person who made the report
ha	hectare
in	inch
km	kilometer
m	meter
mi	mile
RNEB	*Records of New England Birds*
RVB	*Records of Vermont Birds*, identified in the publication by the year of the season that it describes rather than the year published, and therefore cited in the text as RVB followed by the year and season. Inclusive dates indicate publication of data through the years cited
UFA	Area of unique and fragile habitat, surveyed for the Atlas Project (see p. 7); data sheets on file at the Vermont Institute of Natural Science
VDFG	The Vermont Department of Fish and Game; in 1984, the department's name was changed to the Vermont Department of Fish and Wildlife.
VINS	Vermont Institute of Natural Science, Woodstock

Species Confirmed as Breeders in Vermont

Common Loon

Gavia immer



Vermont is along the southern fringe of the Common Loon's breeding range, which formerly extended south to Connecticut and northeastern Pennsylvania (Palmer 1962). For the past several years concern over the loon's status across the northern tier of states has been growing. Common Loons are listed as Threatened in New Hampshire and of Special Concern in New York, and proposed for Endangered Species status in Vermont.

The Common Loon's breeding habitat is freshwater lakes, particularly those containing small islands or coves (Palmer 1962). McIntyre (1983) concluded that the habitat should have adequate food and clear water for finding prey, suitable nest sites, and a nursery area for rearing the young. In Vermont the loon's range is closely linked with zones of boreal forest. During the Atlas Project, lakes used for nesting were in spruce-fir or in spruce-fir-northern hardwood transition zones.

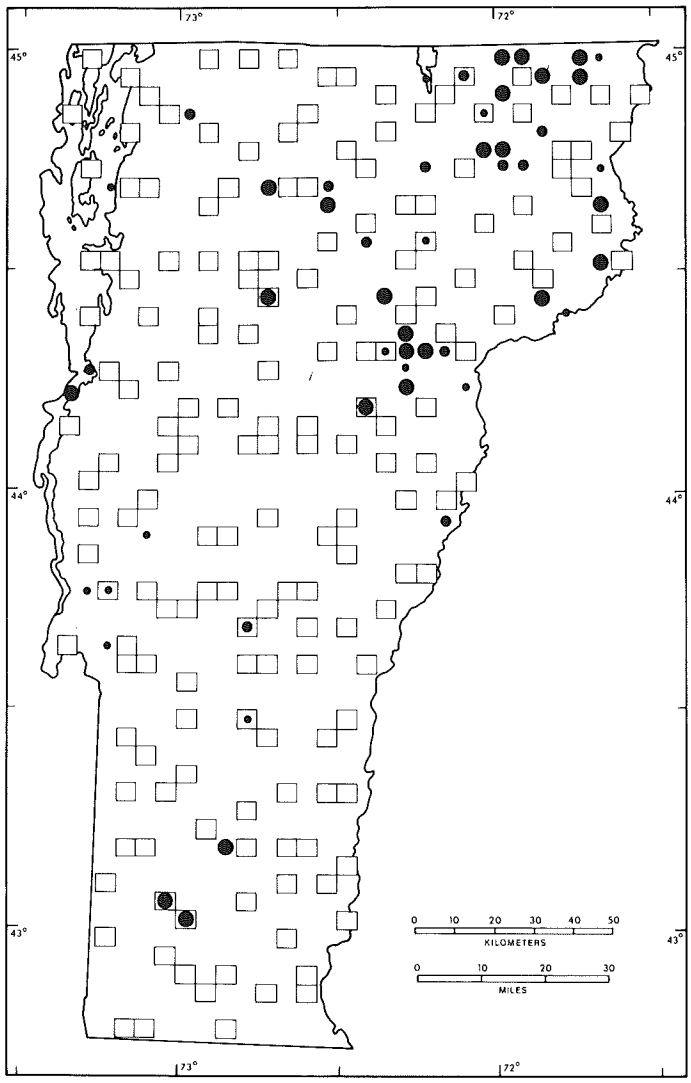
Undisturbed islands or marshy shoreline, adequate fish and crayfish, and clear water to a depth of at least 3 m (10 ft) appear to delimit breeding distribution for Common Loons in Vermont, according to data collected by the Vermont Institute of Natural Science's Loon Project Surveys, 1977–84. Of 24 lakes used for nesting in Vermont, 11 had islands and loon pairs nesting on islands. Of these 11 lakes, 10 had successful nestings while only 3 of the 13 lakes without islands had successful nestings.

From 1977 through 1983 the number of Common Loon pairs attempting to nest each year varied from 7 to 19. Only 50% to 71% of attempted nestings were successful; the number of chicks hatched ranged from 11 to 15. Those lakes where the most consistent nesting success was found were East Long Pond (Woodbury), Green River Reservoir (Hyde Park), Long Pond (Westmore), Maidstone Lake (Maidstone), Norton Pond (Norton and Warren Gore), Peacham Pond (Peacham), Somerset Reservoir (Somerset and Stratton), and Thurman Dix Reservoir (Orange).

Scanty historical information makes charting any long-term trends in the Common Loon's population difficult. Five nesting sites that are no longer used were documented (Metcalf 1978), but nesting on Somerset, Green River, and Waterbury reservoirs has only recently been documented. Other studies indicate declines in populations ranging from 35% to 75% in the Northeast (Sutcliffe 1979).

Common Loons generally return to Vermont lakes from coastal wintering waters after ice-out in mid April or early May. Courtship rituals are comparatively simple (McIntyre 1975). The vocal repertoire of the Common Loon, perhaps its most well-known behavioral trait, consists of three highly audible calls given among family or flock members.

Nest sites are often near the previous year's nest site and territorial boundaries are often similar (S. Sutcliffe, pers. comm.), suggesting that the same loon pair occupies a particular lake each year. McIntyre (1975) stated, "The ultimate factor in selecting a nest site is its suitability as a location protected from wind and waves and its safety from predators." Nests are of three types—a hummock on an old stump or grass mound; a scrape in the sand; or a mound constructed of mud, weeds, and dead vegetation—and are placed close to the water's edge. Generally 2 eggs are laid between mid May and early June. Both parents share the incubation duties; incubation lasts from 25 to 33 days (with 28 days the



No. of priority blocks in which recorded

TOTAL 11 (6%)

Possible breeding:	5 (46% of total)
Probable breeding:	2 (18% of total)
Confirmed breeding:	4 (36% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	5	9	46
North Central	4	21	36
Northeast Highlands	0	0	0
East Central	1	5	9
Taconic Mountains	1	6	9
Eastern Foothills	0	0	0

average). In Vermont, 14 dates for nests with eggs ranged from May 21 to June 29.

Adults may renest if the first nest is destroyed. Almost immediately after hatching chicks take to the water. At 2 to 3 weeks the young begin catching their own food; by 8 weeks they are independent; and by the 11th week they are flying. Immatures may spend several years on the ocean before returning inland to breed.

The loon's diet consists of fish, crustaceans, mollusks, and aquatic insects. In Vermont, adult loons were observed feeding fingerling-sized fish and crayfish to juveniles. After locating their prey in the water, loons secure it by diving.

Among the northeastern states currently within the Common Loon's breeding range, Vermont has one of the lowest populations of nesting loons. Shoreline development, recreational use of lakes, water-level fluctuation, and water quality can limit the loon's nesting success.

CHRISTOPHER FICHTEL

Pied-billed Grebe

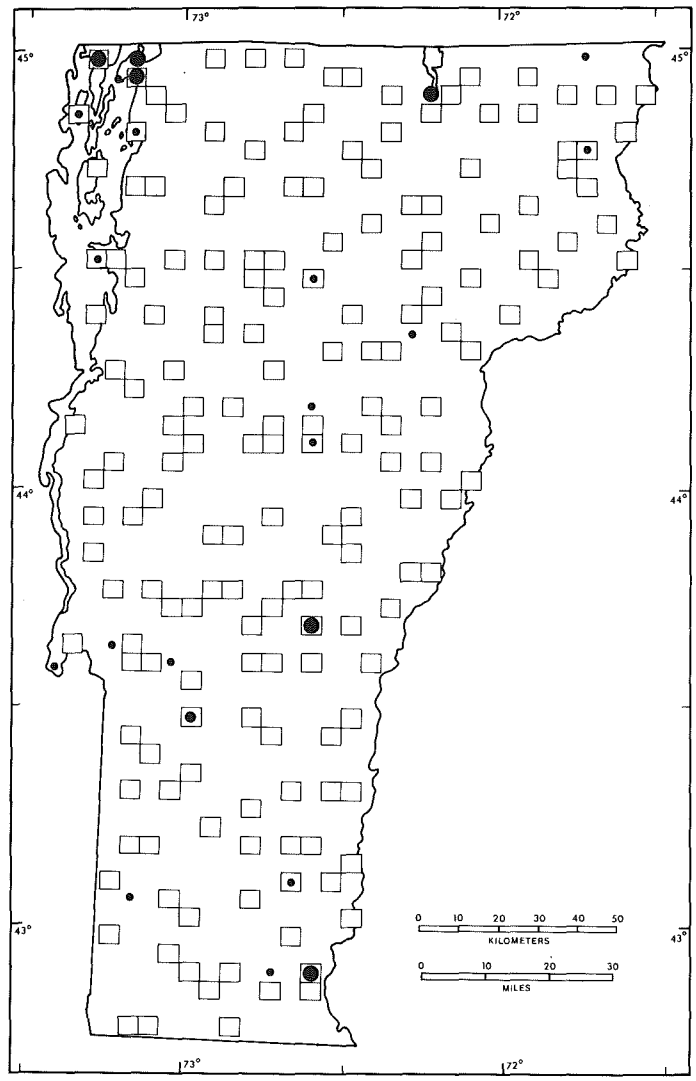
Podilymbus podiceps

The Pied-billed Grebe is the most widespread Nearctic breeder in its family, occurring across most of the U.S. and Canada south to temperate South America. It was once considered a fairly common summer resident in Vermont marshes (Perkins and Howe 1901). Today it is relatively rare even in the state's most suitable habitats. This decline has been evident in other portions of the Northeast as well, and the Pied-billed Grebe is currently proposed for Vermont's list of Species of Special Concern. One of the most remarkable findings of the Atlas Project was the dearth of sightings of this species from the vast Lake Champlain and Lake Memphremagog marshes. In fact, the distribution of this species bears virtually no resemblance to that of other marsh dwellers, such as the Least Bittern and Common Moorhen. The scattering of observations from central and southeastern Vermont presumably reflects the grebe's ability to nest successfully in small patches of suitable habitat (e.g., beaver ponds), but an explanation for its apparent scarcity in prime habitats in the Champlain Valley is lacking.

Pied-billed Grebes typically occur on lakes, ponds, and sluggish streams, wherever dense marsh vegetation is available as cover. The birds feed on aquatic insects, crustaceans, and fish, which they obtain by diving. The pairs are secretive, sinking silently beneath the surface at an intrusion and then resurfacing out of sight among reeds or cattails. The loud, disharmonious call, usually given only during the breeding season, can be easily mistaken for, and is sometimes given in response to, a Common Moorhen's. The breeding territory is usually the area within 48 m (150 ft) of the nest; it is defended by the male and sometimes the female against intruders, including American Coots, Common Moorhens, and waterfowl.

Pied-billed Grebes arrive at Vermont breeding grounds in late March, frequently already paired, though courtship displays (e.g., chasing, circling, diving and chasing, and bill touching) at the breeding grounds may reinforce pair bonds. Nesting probably commences in late April. The nest, constructed of debris by both members of the pair, is placed in dense vegetation near open water so that the birds may approach and leave under water (Palmer 1962). The nest may be floating or anchored in shallow water. Ancillary platforms are also constructed within the territory. Copulation may occur on the nest or in the water. Four to 7 whitish-blue to buff eggs are laid, 1 per day, with incubation starting before completion of the clutch. The male assists to a limited degree in the 23-day incubation. Both birds may add material to the nest during incubation to counteract settling and compression, which otherwise might submerge the nest. Eggs are deliberately covered with debris when both parents are away from the nest.

The young are precocial, readily following the adults onto the water. Boldly banded in a circus pattern of black and white stripes and reddish-brown spots that belie their relationship to their drab parents, the downy young spend a considerable portion of their time riding on one of the parents' backs. The adults occasionally dive below the surface while the young remain nestled under their wings. Insects make up the principal diet of the young, who may even be fed



No. of priority blocks in which recorded

TOTAL 12 (7%)

Possible breeding:	7 (58.3% of total)
Probable breeding:	1 (8.3% of total)
Confirmed breeding:	4 (33.3% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	5	16	41.7
Green Mountains	1	2	8.3
North Central	0	0	0
Northeast Highlands	1	6	8.3
East Central	1	5	8.3
Taconic Mountains	1	6	8.3
Eastern Foothills	3	12	25

while still aboard the parent's back. The young gain independence rapidly, possibly within 3 weeks (Palmer 1962), leaving the parents free to initiate a second clutch. Downy young have been reported in Vermont from June 1 to August 19 (four records). Although second broods are raised regularly in some regions, it is not clear whether this occurs frequently in Vermont or elsewhere in the Northeast.

Once the young hatch, the behavior of the parents becomes less secretive than during incubation, and someone approaching the nest may be treated to a distraction display. The easiest way to confirm breeding is by observing the young, for they remain with the adults for several weeks and are probably flightless for nearly a month.

Pied-billed Grebes are far less secretive in the nonbreeding seasons. Hardy birds are found wherever quiet open water exists, and frequently can be seen in Vermont until late November. Given the fragmentary historical data, it is uncertain whether any population decline has occurred. Since the species can occupy a wide range of shallow water habitats, there appears to be no major threat to its continued presence in Vermont.

DOUGLAS P. KIBBE

American Bittern

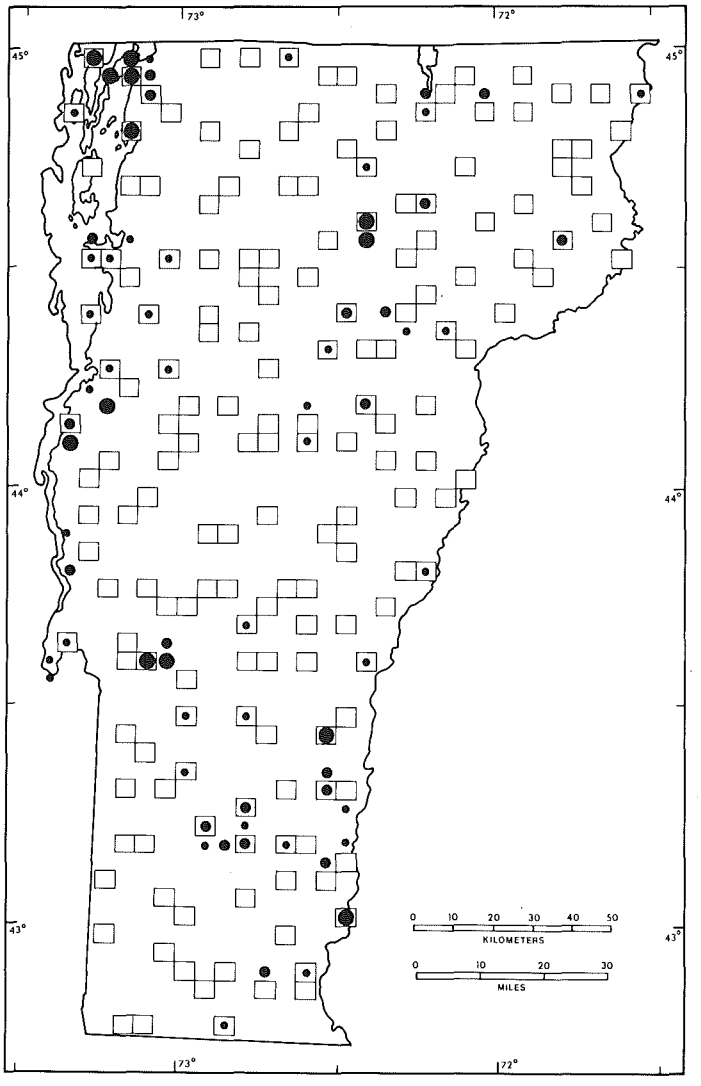
Botaurus lentiginosus

Although rarely seen, the American Bittern is one of the best known North American marshbirds. The species is widely known for its habit of trying to elude detection by freezing in position with its head and neck pointed skyward; observers have even seen birds swaying from side to side to match the movement of the windswept marsh grass. Its "pump-handle" territorial song characterizes marshes throughout its range, which extends from coast to coast across the middle states and north to Hudson Bay. Although freshwater marshes are its preferred haunts, the species is flexible in its choice of nest sites and will even accept dense, grassy upland fields provided water is nearby. Spear (1976) mentioned that wet fields were used for feeding by American Bitterns in Vermont. American Bitterns return early to Vermont's marshes, frequently appearing the third week of April. By early May, the "pile-driver" call of the males can be heard at dusk near many of the state's wetlands. The males appear to be territorial throughout the breeding season, and some evidence suggests that they may be polygynous (Palmer 1962).

Males may also "pump" while on spring migration; caution is advised before concluding that a bird heard early in the breeding season is on territory. While intraspecific aggression has not been documented, males frequently call in response to Yellow and Virginia Rail and Sora calls. Courtship behavior, though not well known, includes aerial and ground chases and a slow stalk by the male, who moves forward in a "retching" position while holding the white nuptial plumes on his shoulders erect (Johnsgard 1980).

Nesting invariably occurs on the ground, although a myriad of sites may be accepted. Cattail stands, islands, and even dry fields may be used. The nest, apparently constructed by the female, is a haphazard structure, sometimes little more than a scrape, always in dense vegetation. A series of paths frequently connects the nest site with platforms constructed by the birds. Although their function has not been documented, it is interesting to note that similar structures are built by other, unrelated marsh nesters (e.g., Pied-billed Grebes, Black Terns, and Common Moorhens), who use them for resting and brooding of the young. The female lays 3 to 5 olive-buff eggs, commencing incubation with the initiation of the clutch. Consequently, the length of the incubation period is dependent on the number of eggs in the clutch, each egg requiring 24 days to hatch. Vermont egg dates range from May 21 to June 18 (three records). Although the male remains in the vicinity, he apparently does not assist in either incubating or caring for the young. He may continue to call throughout the breeding season, presumably seeking to lure new females to his territory. The young are fed by regurgitation at the nest for about 2 weeks, and remain dependent on the parent for an undetermined period of time thereafter. Age at first flight is also unknown. Reports of fledged young in Vermont range from June 30 to July 25 (three reports).

American Bitterns feed by waiting for or slowly stalking their prey through the marsh. Virtually any form of animal life small enough to be swallowed is taken. Dietary staples include fish, crustaceans, insects, rodents, amphibians, and reptiles, all



No. of priority blocks in which recorded

TOTAL 42 (23%)

Possible breeding:	25 (59% of total)
Probable breeding:	10 (24% of total)
Confirmed breeding:	7 (17% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	14	45	33
Green Mountains	9	17	21
North Central	5	26	12
Northeast Highlands	2	12	5
East Central	3	16	7
Taconic Mountains	2	12	5
Eastern Foothills	7	29	17

of which are usually swallowed on the spot and brought to the nest to be regurgitated to the young partly digested. Although more active at low light intensities, birds may forage throughout the day and night.

The American Bittern was considered a fairly common summer resident in Vermont's marshlands by Perkins and Howe (1901), who wrote that it nested in "meadow and swampy land." Fortner et al. (1933) noted that American Bitterns were "uncommon to rare summer residents." While the majority of sightings during the Atlas Project came from the Champlain Lowlands, where most of the large marshes are located, a scattering of sightings from throughout the state affirm this species' ability to occupy small wetlands. The Taconic Mountains, North and East Central regions, and Northeast Highlands had the fewest sightings, because of a paucity of wetlands. Extra effort is required to locate this marsh denizen, which is extremely difficult to confirm because of its stealth and its practice of swallowing food before taking it to the young, and because nests are hidden in inhospitable cover.

DOUGLAS P. KIBBE

Least Bittern

Ixobrychus exilis

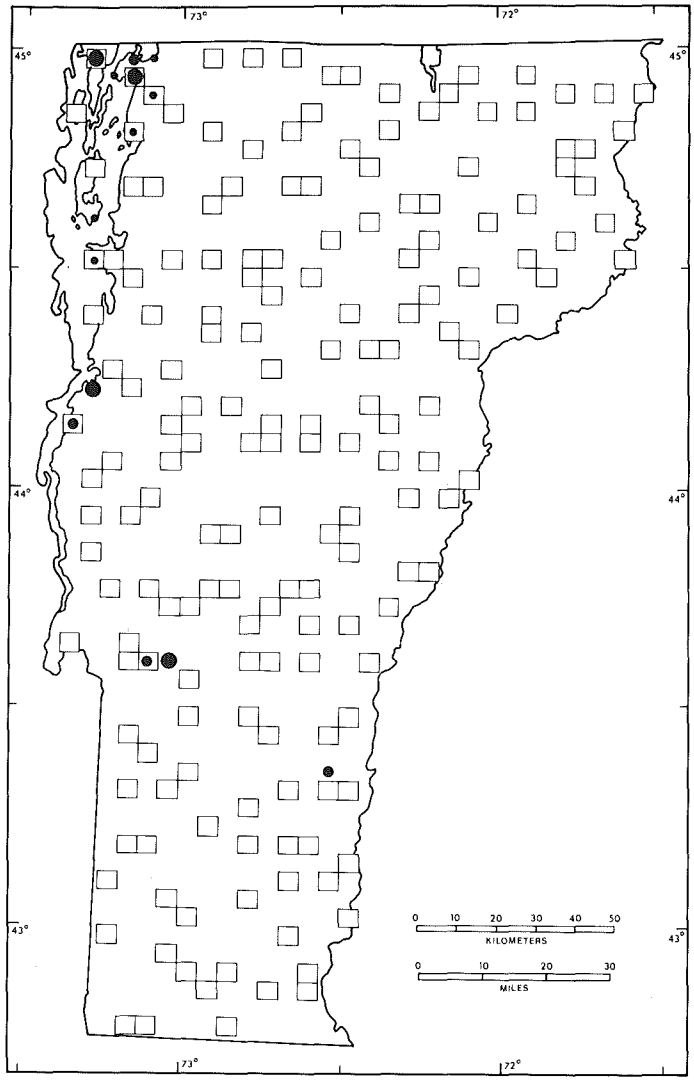
The Least Bittern is the smallest and most secretive heron to breed in Vermont. Although often regular in its preferred habitat—extensive cattail and sedge marshes—it is rarely seen even by the most determined or fortunate observers, and then often is only drawn to the open by tape recordings of its call. A weak flier, the Least Bittern seldom flushes, preferring instead to slip stealthily away, or, if alarmed, to freeze with head and neck upright in the characteristic hiding position of the larger American Bittern. It migrates long distances, wintering from southern Florida and Texas south to Colombia. Migration dates are poorly defined because of the species' retiring nature, but it apparently arrives in Vermont nesting areas in mid May and departs in late August.

Although the Least Bittern's breeding range includes much of central North America and extends south through subtropical South America, it is locally distributed; it is most common in regions with extensive marshes, and may be rare or absent from large blocks of the overall range. This pattern is maintained in Vermont, with nearly all records coming from the marshes of the Champlain Lowlands and the West Rutland Marsh. Whether Least Bitterns are as restricted in distribution in eastern Vermont as the single Atlas Project record indicates remains to be seen. Certainly the Lake Memphremagog and the Connecticut River marshes seem to offer suitable habitat, and the species is regularly recorded farther south in the Connecticut River valley.

Least Bitterns prefer to nest in emergent vegetation, usually near the open-water side of a marsh (Weller 1961). Although technically waders, Least Bitterns are adept at climbing about on emergent vegetation and therefore frequently nest and forage over water considerably deeper than would be accessible through wading. The nest is little more than a platform of coarse sticks and stems gathered from the immediate vicinity and placed on a clump of the previous year's vegetation. Overhanging vegetation is pulled down and incorporated into the nest, with the more resilient stems forming a canopy. The male performs most of the nest building, but both sexes continue to add to the structure throughout incubation. Courtship and territoriality have been inadequately studied; copulation occurs at least occasionally at the nest. The sexes are dimorphic, the male exhibiting a much darker mantle, but the significance of this dimorphism is unknown. A rare dark color morph known as Cory's Least Bittern was sighted in Vermont in July 1975 at the West Rutland Marsh (W. J. Norse, pers. comm.).

Four to 6 pale blue to pale green eggs are typically laid, with incubation commencing early in the nesting cycle. Incubation extends 17 to 18 days from the laying of the last egg, with hatching occurring over a 3-day period. Although the female performs a greater portion of the actual incubation (Weller 1961), parental ties to the nest are strong in both sexes; there are numerous references to incubating birds being lifted from the nest by researchers. This attentiveness limits the chance of locating a nest by flushing the adult.

Perkins and Howe (1901) indicated that the Least Bittern was rare in Vermont by 1900, although it had once been more



No. of priority blocks in which recorded

TOTAL 7 (4%)

Possible breeding:	3 (43% of total)
Probable breeding:	2 (28.5% of total)
Confirmed breeding:	2 (28.5% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	6	19	86
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	1	6	14
Eastern Foothills	0	0	0

common. Data are insufficient to indicate whether there has been a real change in the species' status in the past century. The species is considered fairly common in the Champlain marshes by state waterfowl biologists (J. Stewart, pers. comm.), but is rarely found by most observers. The Least Bittern is proposed for Species of Special Concern status in Vermont, and the Nature Conservancy reports a decline in its population throughout the Northeast. Because of its restrictive habitat requirements the species is vulnerable to any alteration in the state's marshland; other factors that may influence its statewide distribution are unknown. The Least Bittern has been regularly reported in the West Rutland Marsh since the early 1900s (L. H. Potter, pers. comm.); 3 birds at once were seen there in the air during a Vermont Bird Conference field trip on June 17, 1973.

DOUGLAS P. KIBBE

Great Blue Heron

Ardea herodias

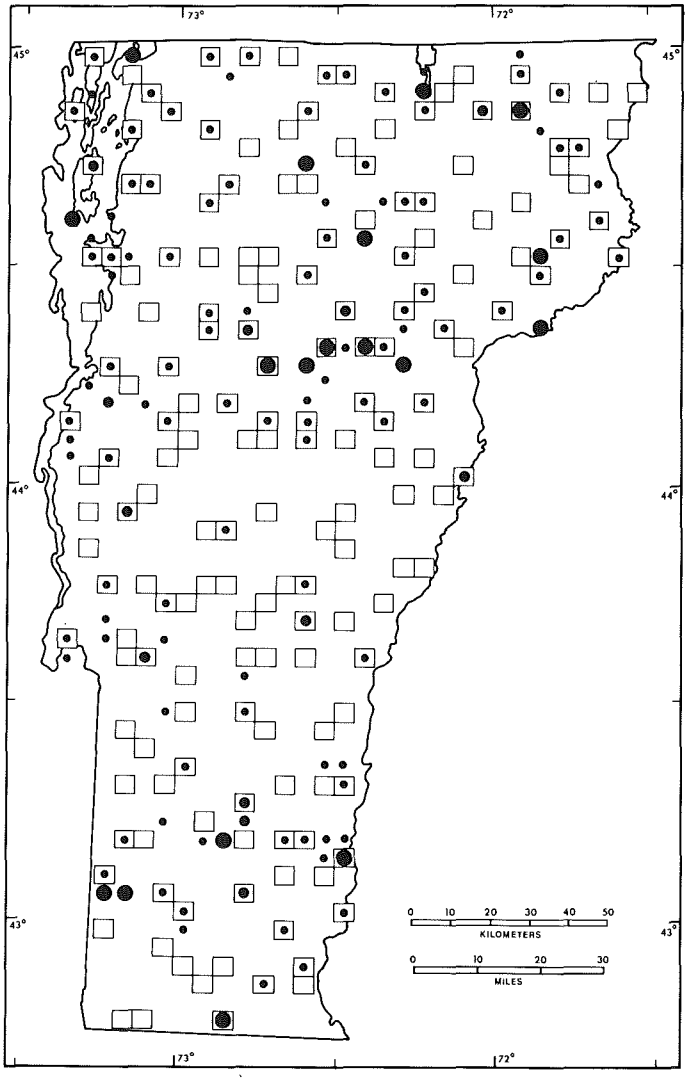
The Great Blue Heron is widely distributed in North America, breeding from southern Canada to Mexico. Most Great Blue Herons winter in the southern half of the U.S. (particularly along the coast), throughout the Caribbean, and in northern South America. They winter in large numbers along the Atlantic Coast as far north as Massachusetts. Some birds linger into the early winter in Vermont, and recently there have been reports of birds wintering or attempting to do so in the western part of the state along rivers such as the Batten Kill, which often remain partly open (RVB, Winter 1976–77). The first northbound Great Blue Herons arrive in Vermont in mid March, and most have departed southward by mid November, although in most years some linger into December at the Missisquoi National Wildlife Refuge (RVB 1973–83; T. Mountain, pers. comm.).

Historically, little has been written about the species in Vermont. Perkins and Howe (1901) stated that "it is not an uncommon bird in the wilder parts of the state, especially in the vicinity of Lake Champlain." Spear (1976) referred to a rookery on Valcour Island in Lake Champlain (in New York State) and mentioned that Great Blues nest in different regions of the state, not necessarily near water.

This bird inhabits waterways—marshes, swamps, streams, and lake shores—and is widely distributed in Vermont. Great Blues are local breeders and will not tolerate much disturbance, particularly during initiation of breeding. The rookeries are generally situated in wooded swamps; the nests are platforms of sticks, usually located in tall, deciduous trees. Some nests may be found a good distance from water, on wooded hillsides or cliffs.

Vermont nesting data are scant, as heronries are frequently in remote places and difficult to locate. Confirmations, though reported from all seven physiographic regions, were relatively few. Most reports were of possibles, many of which undoubtedly were nonbreeding individuals, late or early migrants, postbreeding wanderers, or breeding birds flying between feeding grounds and the rookery, which are occasionally up to 16 km (10 mi) apart (Krebs 1974). The distribution of nesting Great Blue Herons shows no particular pattern, although there was an absence of confirmations across central Vermont. Suitable feeding habitats, such as lakes, beaver ponds, marshes, swamps, and rivers, are abundant statewide.

Nesting sites included Brighton, where a nest was discovered being built on a mountainside at about 518 m (1,700 ft) on May 10; Groton State Forest, where 6 to 10 pairs with nestlings were located at about 610 m (2,000 ft) on June 20; and Victory, where 27 nests contained 57 nestlings. Vermont nesting dates range from June 15 to July 30 (three dates). Fledglings out of the nest were seen in early July 1981 at Cobb's Marsh, South Londonderry. The largest Vermont Great Blue Heron rookery is on Shad Island in the Missisquoi National Wildlife Refuge. This rookery, first discovered in 1943, has been active intermittently since then. Systematic nest and nestling counts began in 1979. The number of active nests increased from approximately 160 in 1979 to 290 in 1983; the average number of nestlings per nest ranged from 2.2 (1979) to 2.7 (1983); and estimates of the total number of young



No. of priority blocks in which recorded

TOTAL 88 (49%)

Possible breeding:	72 (82% of total)
Probable breeding:	10 (11% of total)
Confirmed breeding:	6 (7% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	22	71	25
Green Mountains	22	41	25
North Central	12	63	14
Northeast Highlands	9	56	10
East Central	8	42	9
Taconic Mountains	5	31	6
Eastern Foothills	10	42	11

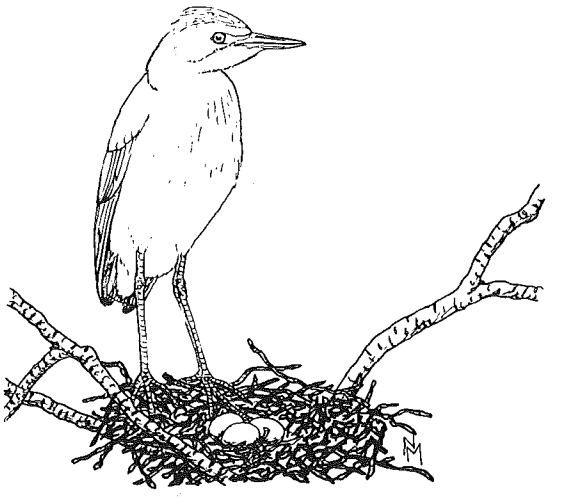
herons produced each year ranged from 360 (1979) to 785 (1983) (Nissen, unpubl. rept.). Bull (1974) reported New York nesting data: egg dates range from April 15 to June 9, and nestling dates from May 24 to July 17. Of 75 New York nests, 40 contained 5 eggs; the range was 3 to 6 eggs per nest.

These herons, like all wildlife species, will suffer if their breeding and feeding areas are not protected. Firewood cutting could threaten woodland heron rookeries; maintenance of wetland habitat is crucial. This species was on *American Birds*' Blue List in 1980 (Arbib 1979) and in 1981 (Tate 1981); in 1982 the *American Birds* report considered Great Blue Heron populations stable, but human disturbance at or near nest sites poses a constant threat, and the species is still listed on *American Birds*' Blue List as a Species of Special Concern (Tate and Tate 1982). McCrimmon (1982) suggested that reforestation of agricultural land increases the available nesting habitat for nesting Great Blue Herons. At this time Great Blue Heron populations appear to be stable in Vermont.

WILLIAM J. NORSE
CHRISTOPHER FICHTEL

Cattle Egret

Bubulcus ibis



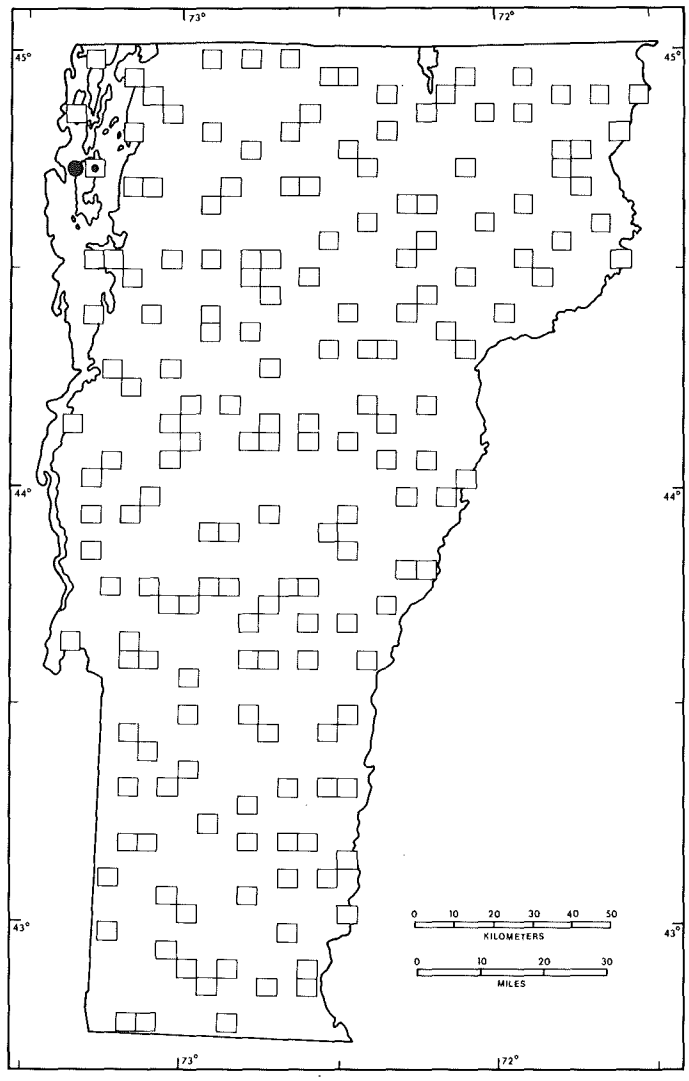
Unknown in North America before the 1940s, the Cattle Egret has colonized a vast New World breeding range in less than half a century. Sight records of the species in South America reach back to the late nineteenth century (Palmer 1962); in Florida, into the 1940s (Rice 1956; Palmer 1962). However, the first South American specimen was not collected until 1937 (Crosby 1972). The first U.S. nest was found on Lake Okeechobee in Florida in 1953 (Crosby 1972). Since then, the Cattle Egret has been recorded throughout the continental U.S. In 1975, approximately 155,000 pairs were reported to have nested between Florida and Maine (Ogden 1978).

The first record of the Cattle Egret for Vermont occurred on May 6, 1961 at Ferrisburg (Carleton 1961). The first nesting for Lake Champlain was established in May 1973, when several Cattle Egret nests were located on Island D of the Four Brothers Islands, Essex County, New York (Carleton 1980). On May 13, 1975, Vermont Fish and Game Department personnel found 3 nests on Young Island, Grand Isle County—the first nesting record for Vermont. In 1979 J. D. Stewart counted 22 Cattle Egret nests there. In 1982 the High Peaks Audubon survey reported no Cattle Egrets present on the Four Brothers Islands (Peterson 1982). Thirteen nests were counted on Young Island in June 1983 (S. B. Laughlin, pers. comm.).

The Cattle Egret forages for insects in damp, short-grass meadows, often in association with large grazing animals (Siegfried 1978). The species nests communally with other heron species in established rookeries (Palmer 1962). On Lake Champlain, the Cattle Egret breeds in Black-crowned Night-Heron colonies. The principal foods of the Cattle Egret are orthopteran insects (grasshoppers) and frogs (Fogarty and Hetrick 1973; Siegfried 1978); during the breeding season the species sometimes feeds its young a high proportion of frogs, implying dependence on wetland habitats at that time (Siegfried 1978). These egrets have been observed following haying equipment to feed on meadow voles, which they toss in the air and swallow whole (A. Pistorius, pers. comm.). The combination of existing Black-crowned Night-Heron rookeries and intensive dairy farming, and the presence of sizeable wetlands make the Champlain Lowlands the only suitable breeding area for Cattle Egrets in Vermont.

Cattle Egrets arrive in the Champlain Lowlands in late April and early May. On Young Island, their sturdy stick and twig nests are built in side branches and trunk forks of poplar at heights of 3–6 m (10–20 ft). Six dates for eggs from Lake Champlain colonies range from May 13 to June 26. The pale bluish eggs number from 2 to 5. Incubation starts with the first egg and lasts an average of 24 days (Blaker 1969; Weber 1975). The young hatch asynchronously, and vary greatly in size. Younger chicks that must compete with their older siblings for food often die in the nest (Weber 1975). The young climb away from the nest after 14 days, and begin to fly well at 5 to 6 weeks (Palmer 1962; Weber 1975).

How the Cattle Egret gained its New World foothold remains a mystery. It seems likely that a wandering flock was displaced by strong trade winds to the north coast of South America from Africa (Crosby 1972). The species' colonization of the rest of the New World has also been the subject of



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	1 (100% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

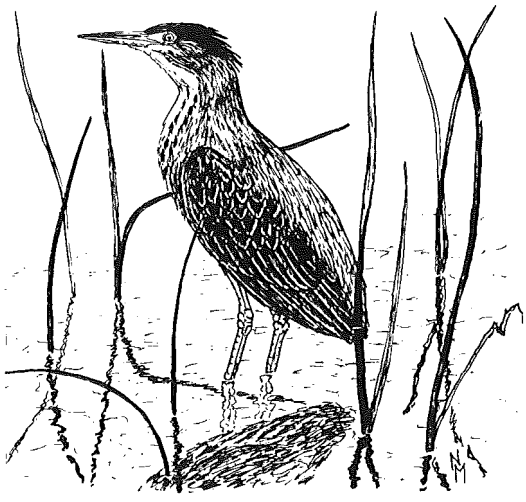
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	1	3	100
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

speculation. Rice (1956) suggested that the egrets arrived in northern Florida with other migratory herons. This explanation of dispersal seems plausible, as most early records of the species in the Northeast were of adults in spring, not of wandering autumn juveniles. Vermont birds may have reached the Champlain Lowlands by traveling north with Black-crowned Night-Herons. In Vermont, the Cattle Egret population has grown very slowly, with breeding birds varying in numbers and success in the decade since their arrival.

WALTER G. ELLISON

Green-backed Heron

Butorides striatus



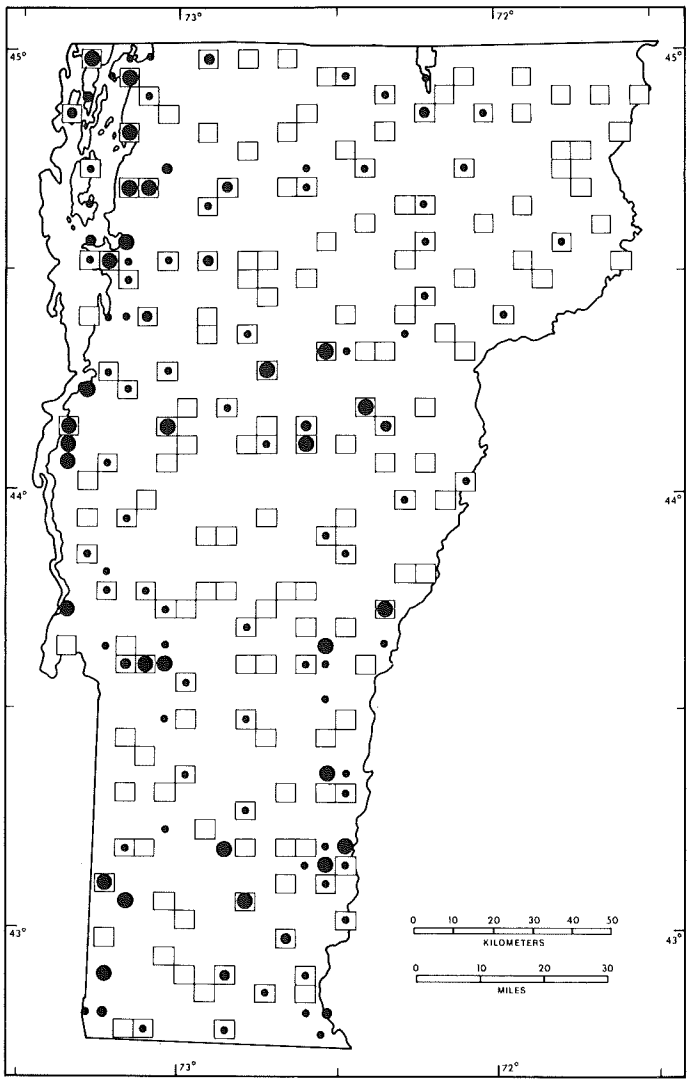
The Green-backed Heron (formerly called the Green Heron) ranges widely from the northwestern U.S. across southeastern Canada and south to the West Indies, Panama, and northern South America (AOU 1983). In Vermont, the species is near the northern limit of its range. Consequently, its distribution is somewhat spotty, and it is absent or very irregular at higher elevations and in the northeastern corner of the state. Palmer (1962) believed the species to be extending its range to the north. Green-backed Herons arrive around the third week in April and depart early in the fall, becoming scarce after early September (a late date is October 10). The species winters from the southern U.S. south through the Caribbean to Trinidad and northern South America (AOU 1983).

This heron inhabits a variety of habitats including marshes, margins of slow-moving streams and rivers, swamps, shrubby wet meadows, beaver ponds, and, occasionally, upland areas such as orchards (Palmer 1962). Foraging birds occur in wetlands of most sizes and types. The sharp *skeow* call of the Green-backed Heron is a clue to its presence. Nest sites are in trees, shrubs, or, occasionally, on the ground. A nest found in Winhall was 5 m (15 ft) high in a red maple; another, found in Rockingham, was about 3 m (10 ft) high in a deciduous tree. In Arlington, a nest was discovered at 11 m (35 ft) in a white pine. Forbush (1925) considered the white pine a preferred species for Green-backed Heron nests. Nests are built on the ground or at heights up to 9 m (30 ft) (Palmer 1962), but are commonly at 5–6 m (15–20 ft) (Forbush 1925).

Pairs of Green-backed Herons often nest alone, although occasionally they nest in small colonies. Small numbers of Green-backed Herons may nest in association with other species of herons. The nest is a stick platform, often so flimsy that the 4 to 5 bluish green eggs are easily seen from underneath (Forbush 1925). Vermont egg dates are May 23 to June 24 (five records), with clutches of 4 or 5 eggs. Bull (1974) reported April 29 to August 4 as the range for egg dates in New York, and an incubation period of 20 days. The only nestling date for Vermont is June 12, when young Green-backs were observed just beginning to climb (W. G. Ellison and N. L. Martin, pers. comm.). Nestling dates in New York are May 22 to August 24; the nestling period there lasts 16 to 17 days (Bull 1974). Bull reported fledgling dates of July 4 to September 19 and an average of 3 fledglings per nest. Green-backed Herons will raise a second brood, but possibly only along the coast or in the South (Forbush 1925; Bull 1974). Adverse weather conditions such as gusty winds, drenching rains, and low temperatures will curb breeding activities (Palmer 1962).

Like others in the heron family the Green-backed eats primarily aquatic animal prey, including small fish, crayfish, snails, leeches, frogs, and aquatic insect larvae and adults (Palmer 1962). These herons also eat orthopteran prey (grasshoppers, katydids, and crickets). The reader is referred to the intensive behavior study of the Green-backed by Meyerriecks (1960).

Green-backed Herons were recorded in all of Vermont's seven physiographic regions but were not confirmed as breeding in the



No. of priority blocks in which recorded

TOTAL 75 (42%)

Possible breeding:	48 (64% of total)
Probable breeding:	11 (15% of total)
Confirmed breeding:	16 (21% of total)

Physiographic regions in which recorded

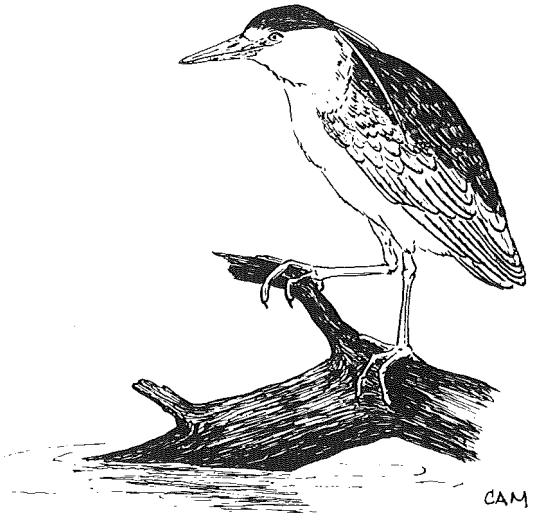
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	24	77	32
Green Mountains	16	30	22
North Central	7	37	9
Northeast Highlands	1	6	1
East Central	9	47	12
Taconic Mountains	8	50	11
Eastern Foothills	10	42	13

North Central region or Northeast Highlands. The greater number of records in the Champlain Lowlands region is to be expected because of the extensive wetlands there. Because Green-backed Herons will occupy even small wetlands, it is not surprising that they were found throughout Vermont.

WILLIAM J. NORSE
CHRISTOPHER FICHTEL

Black-crowned Night-Heron

Nycticorax nycticorax

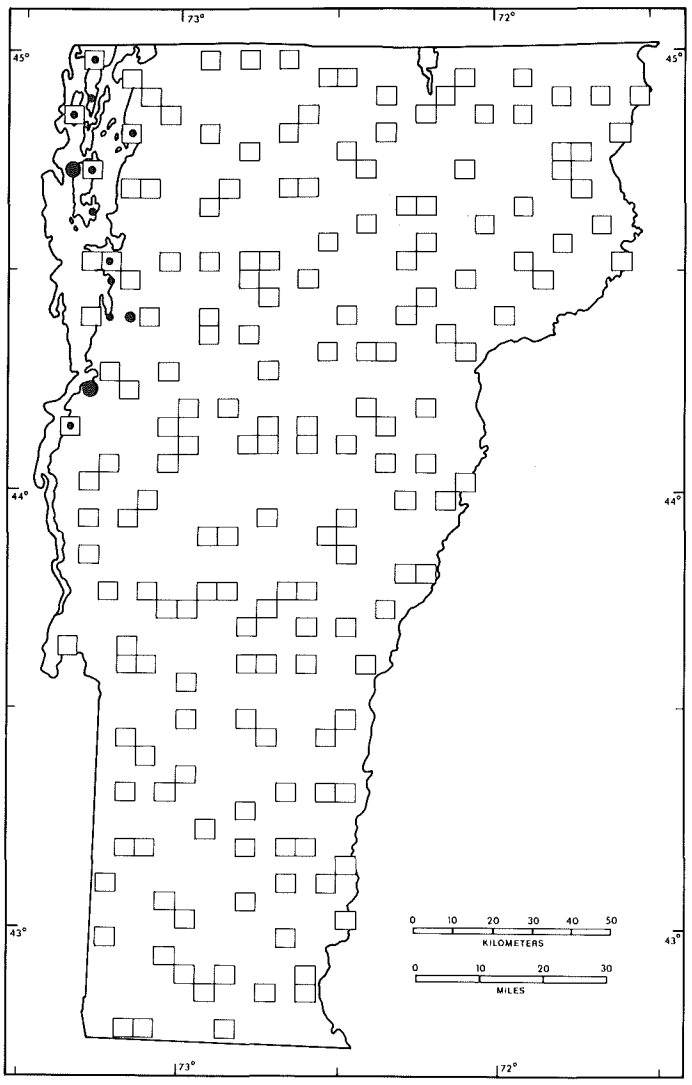


Although the Black-crowned Night-Heron breeds throughout most of the continental U.S., its distribution in Vermont is very restricted. Seldom observed outside the Champlain Valley, it is known to breed in only two locations within that area. It was widely observed in the Champlain Lowlands, and a few additional nesting colonies may have gone undiscovered.

Black-crowned Night-Herons begin returning to Vermont breeding areas from their Caribbean wintering grounds during the second week of April. Both sexes arrive at nearly the same time. Most active on its feeding grounds at dusk and after dark, the night-heron is also a nocturnal migrant (Cramp and Simmons 1977). Pair formation, courtship, and copulation occur on or near the nesting grounds (Palmer 1962). Courting birds may remain active around the clock except for a midday lull. Egg laying may be initiated only 4 to 5 days after pairing (Allen and Mangles 1940).

A colony nester, the species accepts a range of nest sites. It appears to prefer islands and wooded swamps for colony sites in the Northeast, but nest placement is highly variable. Sites include dry ground, cattail marshes, low pines, snags, and tall deciduous trees. Vermont's primary nesting colony, on Young Island, nested in tall cottonwoods until 1983, when the newly established Double-crested Cormorant colony began using those trees; the night-herons moved to lower sites, nesting in quaking aspens at an elevation of about 5 m (15 ft) (S. B. Laughlin, pers. observ.). The female constructs the nest from materials the male brings. New construction may take a week or more, but old nests may also be reused. Champlain Island egg dates range from April 24 to June 1. Although from 3 to 5 or more pale bluish green eggs are laid, more than 2 or 3 young rarely fledge in a successful nest (Tremblay and Ellison 1980). Disturbances during the laying cycle are particularly disruptive to this species (Tremblay and Ellison 1979). Both sexes share responsibilities during the 24- to 26-day incubation period that commences with the laying of the first egg. Young are fed by regurgitation, mostly at dawn and dusk. Their slow development is typical of most herons. The young may venture onto branches surrounding the nest at 12 to 18 days, but do not try to fly until 4 weeks of age; sustained flight is attempted some days later (Tremblay and Ellison 1979). Free-flying young accompany the parents to feeding areas, where they continue to beg. In streaked brown plumage, the young are easily mistaken for American Bitterns unless the stocky bill and gray flight feathers are noted. Drab-plumaged 1-year-old birds may breed, but most nesters are older.

Although the Black-crowned Night-Heron is gregarious throughout the year (Palmer 1962), most sightings in Vermont are of solitary birds at or on their way to or from the feeding areas. Active mostly after sundown, their location call, a loud *qwok*, is frequently heard overhead along Lake Champlain. The birds may forage miles from their nesting or roosting areas. More than half the diet is fish, taken by still fishing or stalking, but a myriad of other prey are taken, including amphibians, reptiles, mollusks, crustaceans, insects, vegetative matter, small mammals, and even other marshbirds.



No. of priority blocks in which recorded

TOTAL 6 (3%)

Possible breeding:	6 (100% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	6	19	100
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

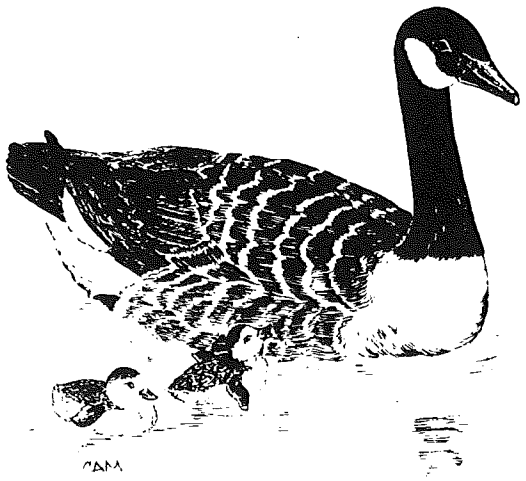
The Black-crowned Night-Heron has apparently always been considered uncommon and local in Vermont. Although generally a common species in New England, it has been more abundant near the seacoast, seeming to prefer foraging in extensive marshlands rather than in streams and rivers like the more ubiquitous Great Blue and Green-backed herons. Few areas in Vermont provide the habitat features desired by Black-crowned Night-Herons. The extensive wetlands bordering Lake Champlain are excellent foraging grounds, but lakeshore homes and agricultural development may preclude nesting in many areas, as an undisturbed nest site is essential. The majority of the birds known to nest at Lake Champlain are on islands.

Birds nesting on New York's Four Brothers Islands undoubtedly forage regularly in Vermont and may have contributed to the sightings in that vicinity. Surprisingly, no Black-crowned Night-Heron nests were reported at the heronry in the Missisquoi National Wildlife Refuge. Additional fieldwork on both ends of Lake Champlain may reveal at least occasional breeding in those areas.

DOUGLAS P. KIBBE

Canada Goose

Branta canadensis



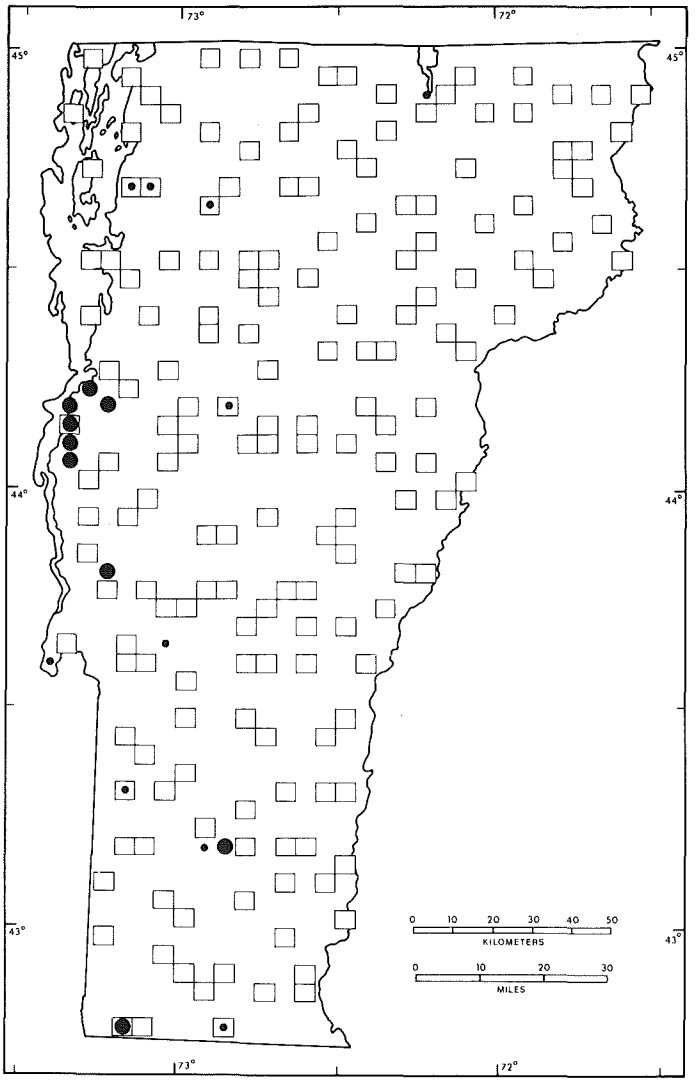
The Canada Goose occurs in Vermont as two distinct and independent populations. The transient population, which breeds in Canada north of the St. Lawrence and winters on the East Coast from New Jersey to North Carolina, passes through Vermont in March and April (earlier if the weather is moderate) on its way north, and returns south each fall in October and November. Vermont's breeding population exhibits similar arrival and departure patterns, although local birds may tarry longer before departing and not fly as far south.

The breeding population originated from 44 birds released by the Vermont Fish and Game Department at the Dead Creek Wildlife Management Area in 1956. There was no nesting by Canada Geese known in the state before that time. Under the protection and management of the Vermont Fish and Game Department the feral flock flourished, spreading slowly from Dead Creek into other marshes along Lake Champlain. Canada Geese, though long-distance migrants, have strong homing instincts, and fidelity to their natal grounds may have slowed their spread to other, more isolated potential breeding areas. Nonbreeding subadults, however, may wander far from the breeding grounds during the summer. While the origin of breeders along Lake Champlain almost certainly can be traced to the Dead Creek Wildlife Management Area, the origins of pairs nesting at Gale Meadows Pond and Bennington are less certain. Feral flocks that are now common in southern New England and New York are another possible source. Significantly, breeding has not yet been confirmed in the Missisquoi or Lake Memphremagog marshes at the northern end of the state.

Large, long-lived birds, with a life span that may exceed two decades, Canada Geese are noted for fidelity to their mates. Although Canada's normally do not nest until they are 2 or (more often) 3 years old, they may pair on the summering grounds when only 1 year old. Often this bond remains unbroken until the death of one member of the pair.

Canada Geese—particularly those that have lost their usual timidity—may select a variety of nesting situations. Golf courses or farm ponds, natural or elevated platforms, islands or muskrat houses all seem acceptable. Sites surrounded by water are preferred, but with a 4–5 kg (8–10 lb) gander on guard even urban pondside nests stand a good chance of success. Predators bold enough to ignore the gander's hiss of alarm may be dealt stout blows from his bill and wings. The nest, a scrape lined with nearby vegetation and down, is often exposed, but even with the female sitting on it, head and neck pressed to the ground, only the most cognizant observer is likely to spot it unless the gander is nearby. Average clutch size is about 5 eggs. Large clutches or broods that are occasionally reported (e.g., a brood of 16 in the Lake Champlain islands) could be the merger of two or more broods. Incubation, the female's task, takes 25 to 28 days, during which period she usually only leaves the nest for brief early morning and late afternoon breaks (Bellrose 1976).

Canada Geese are among Vermont's earliest nesting waterfowl. Goslings may be seen as early as mid May, and downy young have been reported in the Champlain Lowlands on dates ranging from May 19 to June 15. The young are very precocial and within a



No. of priority blocks in which recorded

TOTAL 8 (4%)

Possible breeding:	6 (75% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	2 (25% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	4	13	50.0
Green Mountains	3	5	37.5
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	1	6	12.5
Eastern Foothills	0	0	0

day are taken to water, where they can swim and dive readily and forage for themselves. They are, however, closely guarded by the parents. Although they grow rapidly, the young may not be able to fly until more than 2 months old. The adults are also flightless for a month of the rearing period since they lose all their flight feathers at once during the postbreeding molt.

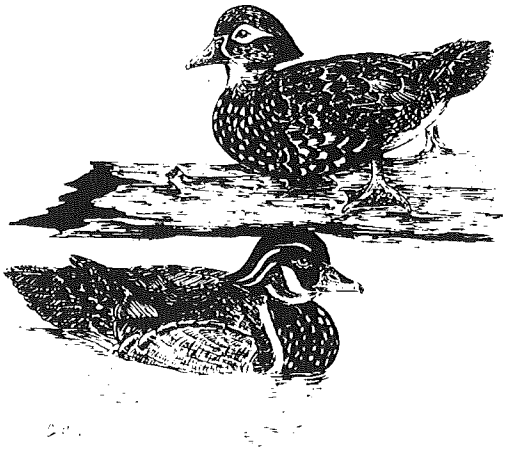
Although both transient and local breeding populations are subject to hunting, particularly in the Champlain Lowlands, Canada Geese now frequently linger into early winter. Large flocks of several hundred to several thousand birds may be seen on Lake Champlain, where they rest when not foraging in adjacent agricultural fields. Adult geese are principally herbivorous and granivorous, feeding on waste grain, winter wheat, and volunteer grasses and herbs.

The arrival of V-shaped skeins of geese heralds the changing of the seasons. Management of waterfowl areas like the state's Dead Creek wildlife refuge and the Missisquoi National Wildlife Refuge for the benefit of Canada Geese as well as other wildlife has brought recreation and enjoyment to sportsmen and nature enthusiasts alike.

DOUGLAS P. KIBBE

Wood Duck

Aix sponsa



Strictly a North American species, the Wood Duck breeds in North America east of the Rocky Mountains and south of the taiga of Canada, and along the Pacific Coast from British Columbia to southern California. Breeding habitat requirements include natural or man-made cavities for nest sites, persistent shallow waters, an adequate supply of food (acorns, aquatic plants, and invertebrates), and some form of brushy cover to serve as a retreat (McGilvrey 1968). In Vermont, Wood Ducks resort to drowned trees fringing man-made ponds, beaver ponds, swamps, marshes, and slow-moving stretches of rivers. Distance from water appears to be unimportant in the selection of a nest site (Grice and Rogers 1965).

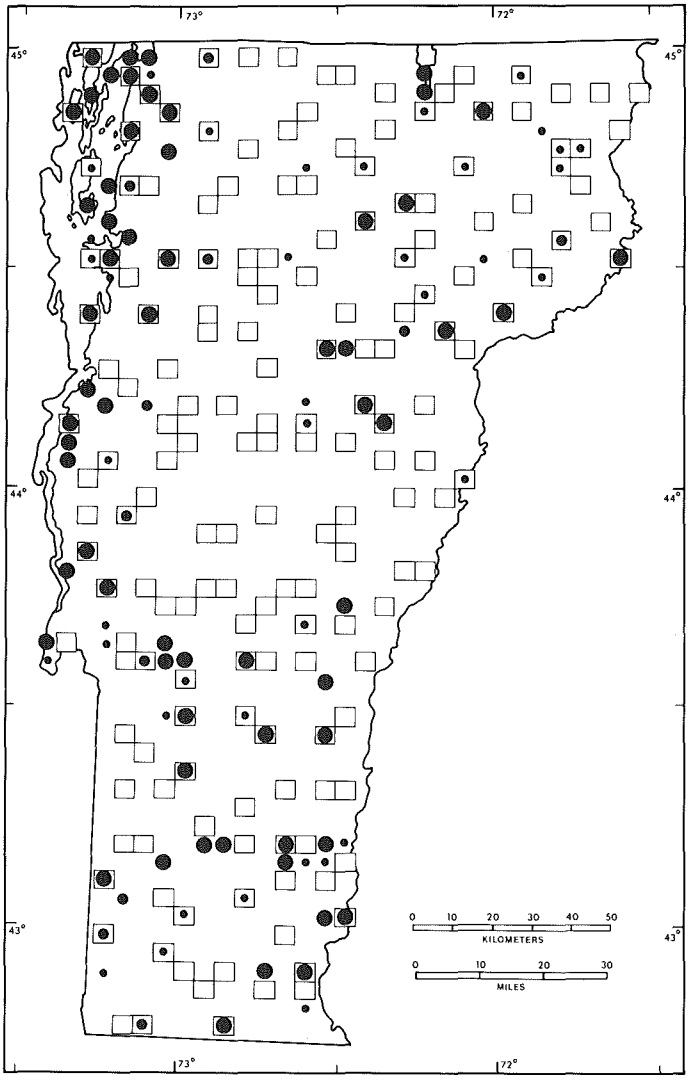
An early spring migrant, the Wood Duck generally arrives in Vermont from late March on; an extreme early date of March 10 was recorded in 1984 (RVB, Spring 1975–84). Migration peaks in April. Pair bonds are formed on the wintering grounds, and the drake returns with the hen to the area where she bred during the preceding year (Bellrose 1980).

Courtship occurs on the water: the male, resplendent in the "bridal array" to which the species' Latin name refers, raises his head and crest high, and swims in a circle around his mate. Both birds engage in bill dipping and mutual preening (Johnsgard 1975).

The drake accompanies the hen as she searches for a nesting cavity. Minimal nesting requirements include trees of at least 41 cm (16 in) DBH, possessing cavities with entrances of at least 8–13 cm (3–5 in) wide and interiors at least 20 cm (8 in) in diameter. The optimum natural cavity is 6–15 m (20–50 ft) high, with an entrance 10 cm (4 in) in diameter and a cavity depth of 61 cm (24 in) (McGilvrey 1968). The species will readily accept man-made nesting boxes. The eggs are laid on the wood chips or debris already in the cavity, to which the hen adds large quantities of down plucked from her underparts. Eggs number from 10 to 15; the average clutch is 12 (Bellrose 1980). Eggs are laid at a rate of 1 per day until the clutch is complete. Atlas Project workers recorded an egg date of May 28. Beginning about 3 to 4 days before the onset of incubation, down is added to the nest. The down insulates the eggs when the hen leaves the nest, and is formed into such a tight mat that it can be lifted in one piece. The off-white eggs, which are dull when laid, attain a high gloss as incubation progresses. An incubation period of 28 to 37 days, with an average of 30 days, has been reported (Bellrose 1955).

The young are equipped with sharp nails for climbing out of the cavity, and leave the nest within 24 hours of hatching; with much peeping, they leap to the ground in response to calls from their mother, regardless of the height of the nest. She leads them as quickly as possible to the concealing vegetation of the nearest water. Atlas Project workers recorded downy young on dates ranging from May 18 to July 25 (nine records), and recently fledged young on dates from June 23 to August 3 (eight records).

At the turn of the century there was concern among some that the Wood Duck might become extinct because of eight-month duck hunting seasons, which put little restriction on the number of Wood Ducks a hunter could take, and extensive habitat destruction (Bellrose 1980). The Migratory Bird Treaty Act of 1918 led to more careful management of waterfowl including the



No. of priority blocks in which recorded

TOTAL 62 (35%)

Possible breeding:	22 (35% of total)
Probable breeding:	28 (13% of total)
Confirmed breeding:	32 (52% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	20	65	32
Green Mountains	9	17	15
North Central	8	42	13
Northeast Highlands	7	44	11
East Central	5	26	8
Taconic Mountains	6	38	10
Eastern Foothills	7	29	11

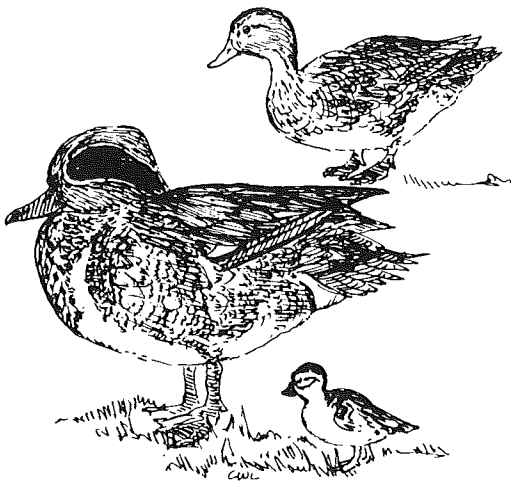
"woodie." Restricted seasons during the 1920s and 1930s led to a dramatic recovery in the number of Wood Ducks. By 1941, 14 states allowed a limit of 1 Wood Duck per bag (Bellrose 1980). Between 1964 and 1971 the average yearly adult population of the Wood Duck in the eastern United States and Ontario was 1.3 million (Bellrose 1980). In Vermont, Davenport (1907) listed the Wood Duck as a "rare summer resident," and Fortner et al. (1933) indicated that while the species was still rare, it "probably increased somewhat under protection." Sutherland (1971) estimated the species' breeding population in Vermont in 1965 to be on the order of 15,000.

During the Atlas Project the Wood Duck was recorded in a little more than a third of the 179 priority blocks. The highest frequency of occurrence was in the Champlain Lowlands, and the lowest was in the Green Mountains. The species was confirmed in just over 50% of the priority blocks in which it was located. The majority of records referred to the sighting of a brood attended by a hen.

ELEANOR ELLIS
WALTER ELLISON

Green-winged Teal

Anas crecca



The smallest North American duck, the Green-winged Teal is essentially of boreal and western distribution. The American Green-winged Teal is now considered a race of a species with a broad holarctic distribution; until 1973 it was often treated as a separate species—*Anas carolinensis* (AOU 1973). The Green-winged Teal's breeding range extends across northern North America; in the East the species' distribution extends southward to upstate New York and northern New England. Breeding appears to be only sporadic further to the south (Johnsgard 1975).

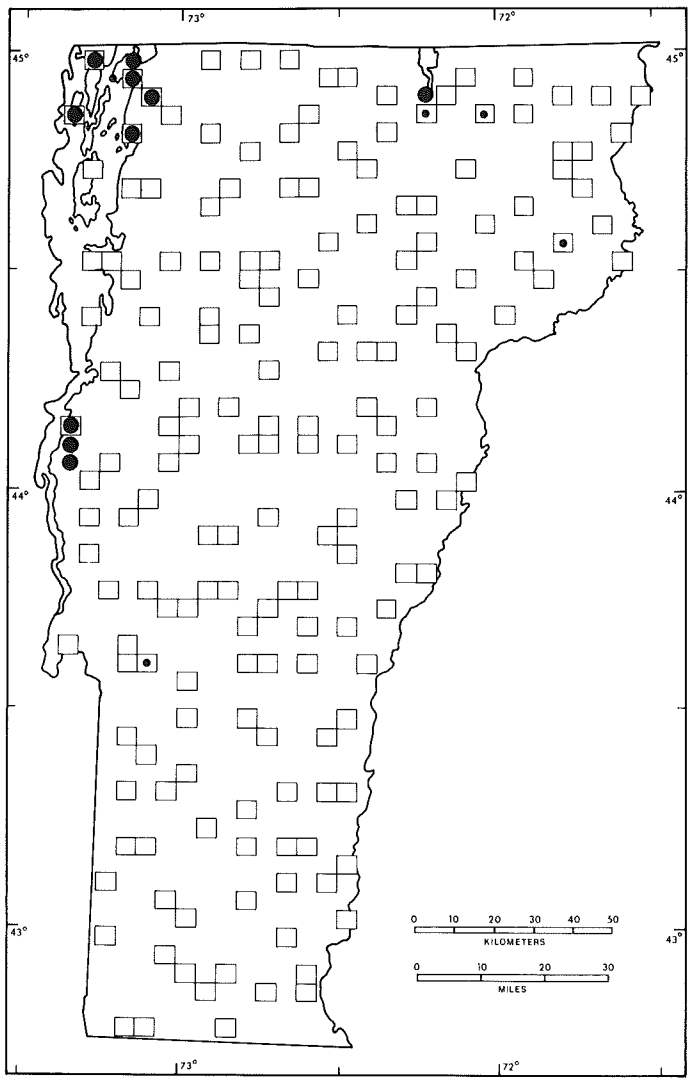
The species begins arriving in Vermont in mid to late March and early April, reaching peak numbers from late April to early May (RVB, Spring 1973–83). In the fall, the largest numbers are encountered during September and early October; most Green-winged Teals depart by early November. A few may be seen in December and occasional birds attempt to over-winter (RVB, Winter 1975–83). A hardy species, the Green-winged winters from southern British Columbia throughout most of the U.S.—wherever open water is available—south to the Bahamas and West Indies (Terres 1980).

Pair formation occurs on the winter range, and continues during the protracted spring migration, extending sometimes until after arrival on the breeding grounds (Johnsgard 1975; Palmer 1976). Marshy ponds and shallow lakes are favored habitat. Courtship displays are animated: two or more drakes perform around a female, often mirroring each other's movements; they turn, bob their heads, and vocalize loudly as they circle the hen (Johnsgard 1975).

The Green-winged Teal generally nests in dry upland sites adjacent to small ponds, lakes, and wetlands (Bellrose 1980). The nest is in a depression in the ground, extremely well hidden in dense vegetation. The hen lines the hollow with dry grass and other plant material, adding her own down. The eggs are dull white, creamy, or pale olive-buff (Bent 1923). The average of 91 sets examined by Bellrose (1980) was 8.6 per clutch, within a range of 5 to 16. Incubation is reported by Bent (1923) and Delacour (1956) as 21 to 23 days. The drake deserts the hen as soon as incubation has begun, and joins other males in large wetlands for wing-molt from mid-June to July (Bellrose 1980). The young follow the hen from the nest to adjacent ponds and wetlands within a day of hatching, and first fly at about 34–35 days (Bellrose 1980).

Like the Blue-winged Teal, the Green-winged is a swift flier, with speeds estimated at 49–69 km per hour (30–40 mi per hour) (Cottam et al. 1942). The Green-winged Teal travels well over land, often for long distances in search of food.

A dabbling duck, the species prefers to feed on mudflats and in the very shallow water of ponds and slow streams (Bellrose 1980) by probing the mud for the seeds of aquatic and semi-aquatic plants such as pond-weeds (*Potamogenton*), smartweeds (*Polygonum*), and sedges; they will also take crustaceans; tadpoles; and aquatic insects (Johnsgard 1975). When it visits upland areas and woods it eats berries, wild grapes, and acorns. In migration and on the wintering grounds, the species sometimes visits grainfields for waste corn, wheat, oats, barley, or buckwheat.



No. of priority blocks in which recorded

TOTAL 10 (2%)

Possible breeding:	4 (40% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	6 (60% of total)

Physiographic regions in which recorded

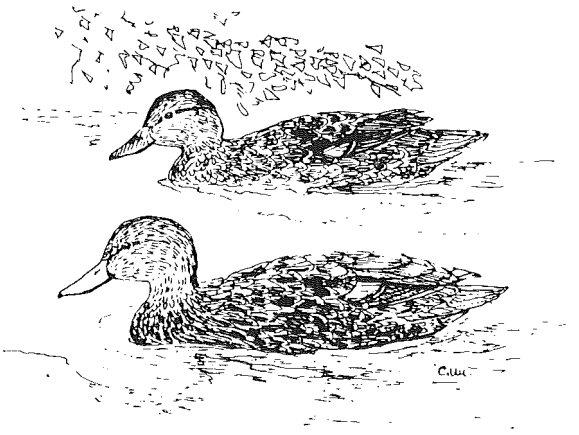
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	6	19	60
Green Mountains	0	0	0
North Central	2	11	20
Northeast Highlands	1	6	10
East Central	0	0	0
Taconic Mountains	1	6	10
Eastern Foothills	0	0	0

Historical references to the species in Vermont are practically nonexistent. Fortner et al. (1933) referred to the Green-winged Teal as a "rare migrant and summer resident"; Spear (1976) indicated that the species was common only during migration periods, considering it "rare" during the summer months. Atlas Project workers located the bird in 15 survey blocks, 10 of them priority blocks. More than half of the records (those for 6 priority blocks) were from the Champlain Lowlands. With the exception of a single record from the Taconics, all records were from northern Vermont. It is possible that the species may be more widespread in the North Central and Northeast Highlands areas than is indicated by Atlas Project data, since in the more thickly settled Champlain Lowlands coverage was more exhaustive than in those less heavily populated areas. Confirmation in most cases referred to the observation of a hen accompanied by a brood.

ELEANOR ELLIS

American Black Duck

Anas rubripes



The American Black Duck is an eastern Nearctic species that breeds from Labrador and northern Quebec west to the Great Lakes, northwest to Hudson's Bay, south to Illinois and Ohio, and along the Atlantic Coast to North Carolina.

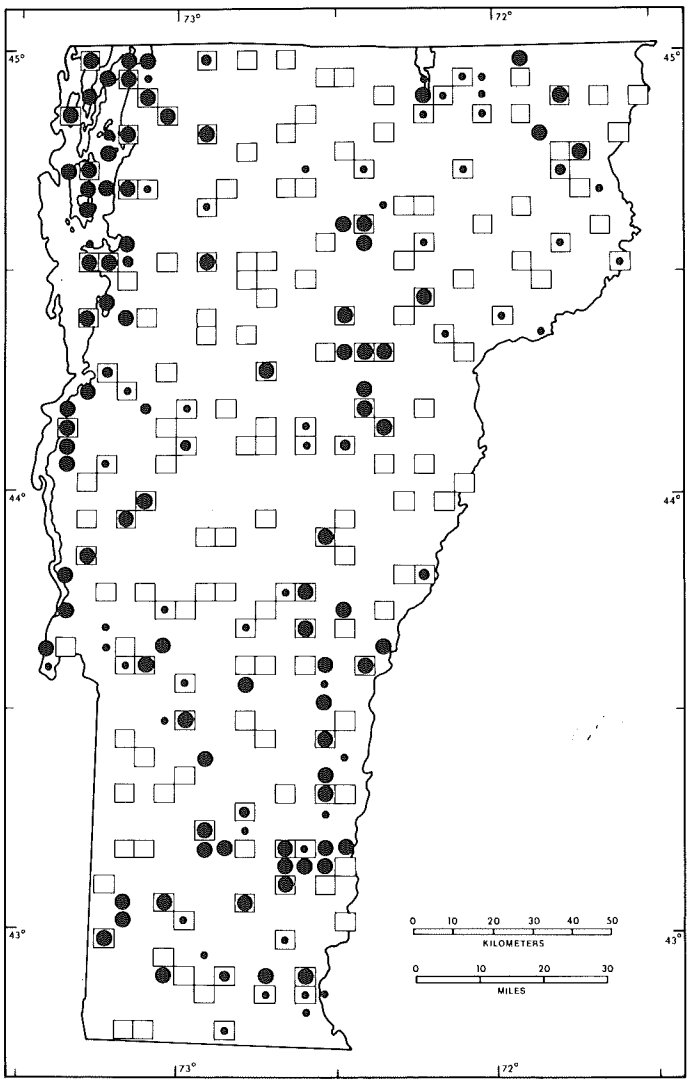
The American Black Duck is capable of inhabiting nearly as wide an array of freshwater habitats as the Mallard. In Vermont the black duck is found on beaver ponds, in glacial kettles surrounded by bog mats, along creeks and rivers, on lakes, in swamps, and in extensive sedge or cattail marshland. The species may prefer more wooded habitats to open marshland; Stotts and Davis (1960) found 60% of 731 nests in Maryland in wooded situations and only 17% in marshes. Coulter and Miller (1968) noted that while high numbers of black ducks nest on islands in Lake Champlain, the species shunned islands at study sites in Maine when sedge-shrub marshland was available.

American Black Ducks place nests in a wide variety of situations wherever there is thick concealing cover. On islands in Lake Champlain black ducks placed nests under live conifers (18.6% of nests studied), under logs, dead tree tops, and fallen limbs (10.5%), under low dead vegetation, in particular raspberry and nettle (27.9%), in hollow tree boles, crotches, and stubs (10.5%), and in young herbaceous growth, mostly nettle (10.5%) (Coulter and Miller 1968). The hen digs a nest bowl and adds litter to it during early stages of egg laying; down is added from about the 4th or 5th egg on (Coulter and Miller 1968). The average clutch for 620 incubated sets of eggs in northern New England studied by Coulter and Miller (1968) was 9.5, with the range being 4–15. The eggs are smooth shelled and creamy white to green-buff. The incubation period for 19 clutches studied in Quebec averaged 29 days (Reed 1968).

Coulter and Miller (1968) recorded nest starts as early as April 3 on Lake Champlain; the average date of initiation was April 6, and clutches were initiated as late as June 14 and 15. Vermont egg dates range from April 30 to June 30 (22 records), and dates for broods range from May 14 to July 24 (18 broods). Young black ducks first fly at 58 to 63 days (Gollop and Marshall 1954).

In Vermont, the autumn migration peaks in October; however large numbers linger well into December. American Black Ducks winter as far north as they can find open water. The species will stay on Lake Champlain until it freezes, and utilizes fast-moving creeks and rivers. American Black Ducks winter in the Otter Creek valley at least as far south as Rutland, on the Connecticut River and the lower reaches of its tributaries, in large numbers on the Winooski River in South Burlington, and occasionally along the Lamoille River in Milton (RVB, Winter 1973–83). The spring migration commences in late February in some years, but may be delayed until mid March if rivers are still frozen. In spring, returning migrants peak in late March and early April.

The American Black Duck is declining over its entire range, including Vermont. Bellrose (1980) cited an alarming 40% decline over the years 1955–74 in winter inventory data gathered by the U.S. Fish and Wildlife Service. Reasons for the black duck's decline are obscure and controversial (Bellrose 1980), and may involve competition from the genetically and ecologically similar Mallard, hunting pressure, habitat destruction, and/or chemical pollution of



No. of priority blocks in which recorded

TOTAL 79 (44%)

Possible breeding:	29 (37% of total)
Probable breeding:	8 (10% of total)
Confirmed breeding:	42 (53% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	22	71	28
Green Mountains	14	26	18
North Central	12	63	15
Northeast Highlands	5	31	6
East Central	9	47	11
Taconic Mountains	6	38	8
Eastern Foothills	11	46	14

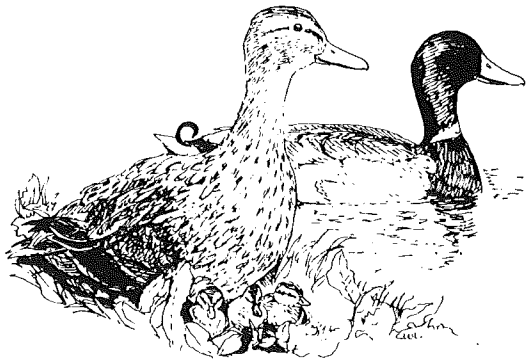
the species' favorite winter food (estuarine mollusks) (Hubbard 1984). Bellrose (1980) pointed out that the decline is not related to a comparable loss of habitat. There has been an increase in the Mallard population in the East during the period of the decline. The ratio of American Black Ducks to Mallards went from 5.4 to 1.0 on Vermont Christmas Bird Counts in 1975–76 (CBC 1975–76), to 1.0 to 1.1 in Christmas Bird Count data for 1982–83 (CBC 1982–83).

According to Atlas Project data, the American Black Duck is still widespread in Vermont. The species was found breeding in all physiographic regions. The Champlain Lowlands contain the most productive wetlands in the state, much of which is managed by the Vermont Department of Fish and Wildlife or is in the Missisquoi National Wildlife Refuge; this region yielded the largest number of records. The second highest level of occurrence was in the North Central Region, reflecting the presence of large wetlands around Lake Memphremagog and its inlet streams, and the large number of lakes and ponds within the region.

WALTER G. ELLISON
ELEANOR ELLIS

Mallard

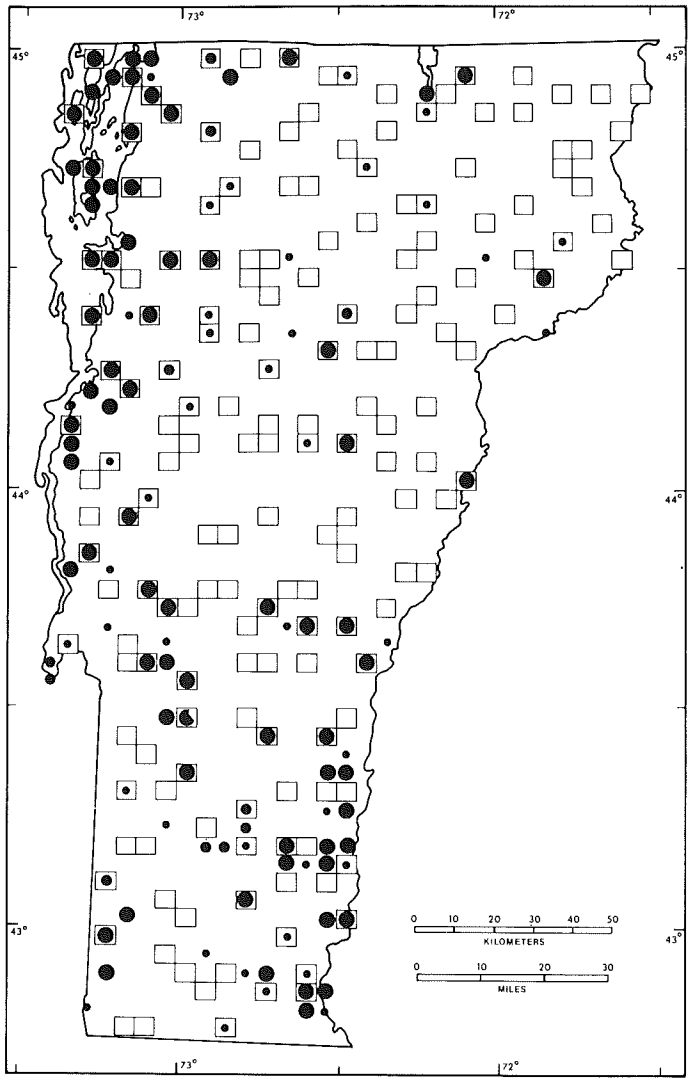
Anas platyrhynchos



The Mallard is probably the most well-known of all wild waterfowl, and the one of greatest economic importance to man. All domestic duck breeds, with the exception of the Muscovy Duck, have been developed from the Mallard, including the well-known white Peking duck. The most widely distributed duck in the Northern Hemisphere, the species ranges from the Arctic to the subtropics in Europe, Asia, and North America. In the U.S., its breeding range encompasses the northern third of the country (Bellrose 1980). Occupying a tremendous variety of habitats and adjusting well to humans, the Mallard is one of the most successful of all avian species and is the most abundant duck almost everywhere (Todd 1979). Documenting its success, Kortright (1942) called it the most abundant species in North America and noted that it is "more prevalent in the western portion, giving place in the East to the Black Duck." A 1933 Vermont bird list (Fortner et al. 1933) called the species a "rare summer resident" and "not common." In 1976, Spear (1976) considered its status as common from mid April to mid October and limited for the balance of the year. In 1978 (RVB, Fall, 1978) Ellison stated that "over the last 20 years the species has become the commonest duck in western Vermont, remaining uncommon in eastern and central portions of the state."

In Vermont, most Mallards arrive in early spring; migration peaks in late March and early April. Extreme early dates are inconclusive as some birds overwinter. The Mallard utilizes a variety of breeding habitats in New England—ponds, lakes, rivers, streams, marshes, wet meadows, wooded swamps—but seems to require water less than 41 cm (16 in) deep in order to feed from the bottom by tipping up (Pough 1951) Courtship often begins on the wing, with sometimes as many as three drakes in pursuit of a single hen, circling in rapid and vocal flight. On the water, the drake rears up, displaying his breast and uttering a wheezy whistle. Copulation is preceded by mutual bowing, usually initiated by the drake but sometimes by the hen.

Much has been written about unusual nesting sites of Mallards; Harrison (1975) stated that "perhaps more than any other waterfowl, Mallards seek unnatural nesting sites," from rooftops to old hawk nests in trees. More typically the nest is located within 91 m (100 yd) of water, in cover on the ground, where a bowl is scraped in the ground litter. Coulter and Miller (1968), studying Mallard nest sites on Lake Champlain's islands, concluded that ground litter may be as important in the choice of a nest site as the surrounding cover. Some hens start more than one nest and form the bowls 2 to 3 days before laying. The hen gradually pulls sticks, leaves, and grasses into the chosen nest as egg laying progresses, adding down after the 4th or 5th egg is laid (Coulter and Miller 1968). Generally, 1 egg a day is laid until the clutch of 8 to 12 greenish buff to grayish buff eggs is complete. Incubation periods vary from 21 to 30 days (Harrison 1975; Harrison 1978); it is typically 27 days in Weathersfield, Vermont (E. Ellis, pers. observ.). Coulter and Miller's studies (1968) found the average first egg date to be April 12, with no known eggs laid after June 16. The percentage of new clutches started peaked during the last 15 days of April. Most hens that had lost clutches renested, though their persistence varied. Vermont egg dates range from April 19 to May 23 (four dates). The Mallard's eggs are indistinguishable from those of the Black



No. of priority blocks in which recorded

TOTAL 70 (39%)

Possible breeding:	22 (31% of total)
Probable breeding:	6 (9% of total)
Confirmed breeding:	42 (60% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	26	84	37
Green Mountains	14	26	20
North Central	4	21	6
Northeast Highlands	2	13	3
East Central	4	21	6
Taconic Mountains	8	50	11
Eastern Foothills	12	50	17

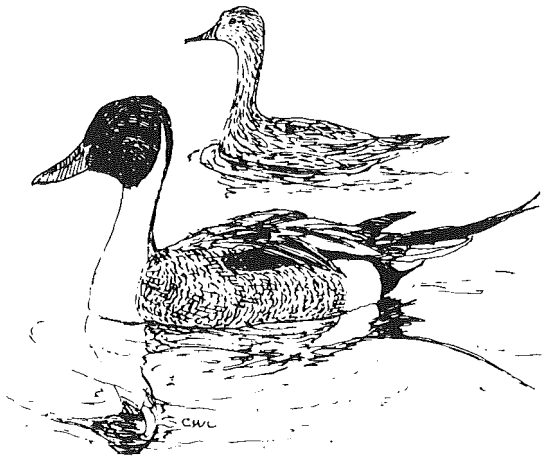
Duck (Harrison 1975). Drakes take no interest in the nest and desert the hens soon after incubation has begun, gathering together in small flocks while molting into eclipse plumage. Dates for downy young for Vermont range from May 26 to June 22 (four dates). Fledged young have been reported from Vermont on four dates from June 22 to July 31. Mallards are normally single-brooded, but records of second broods do exist.

Considered a "principal nesting species" in Vermont by Spear (1976), the Mallard was located by Atlas Project workers in all seven physiographic regions of the state, with the greatest abundance in the Champlain Lowlands, Eastern Foothills, and Taconic Mountains. Confirmed in 70 priority blocks, the most commonly used codes were FL (37 records) and NY (18 records), both of which refer to downy young. Confirmation was achieved most easily by locating a hen with her brood on the water.

ELEANOR ELLIS

Northern Pintail

Anas acuta



Circumpolar in its breeding range, the Northern Pintail is among the most abundant of the world's waterfowl. From 1955 to 1973 the species' North American population averaged about 6.2 million (Bellrose 1980). Most pintails nest in the arctic, with the prairies of the interior second in preference. However, the species is tolerant of a wide array of climates and may be found breeding across the entire continent (Bellrose 1980).

According to Hildén (1964) the Northern Pintail appears to prefer open terrain, thriving best in treeless areas with shallow, slow-moving waters, such as lakes, ponds, and placid rivers. In Vermont the species is associated with the larger wetlands of the Champlain Lowlands, and has been known to utilize islands in Lake Champlain for nesting. Unlike the American Black Duck, this species' habitat preferences tend to restrict it geographically to the open Champlain Lowlands.

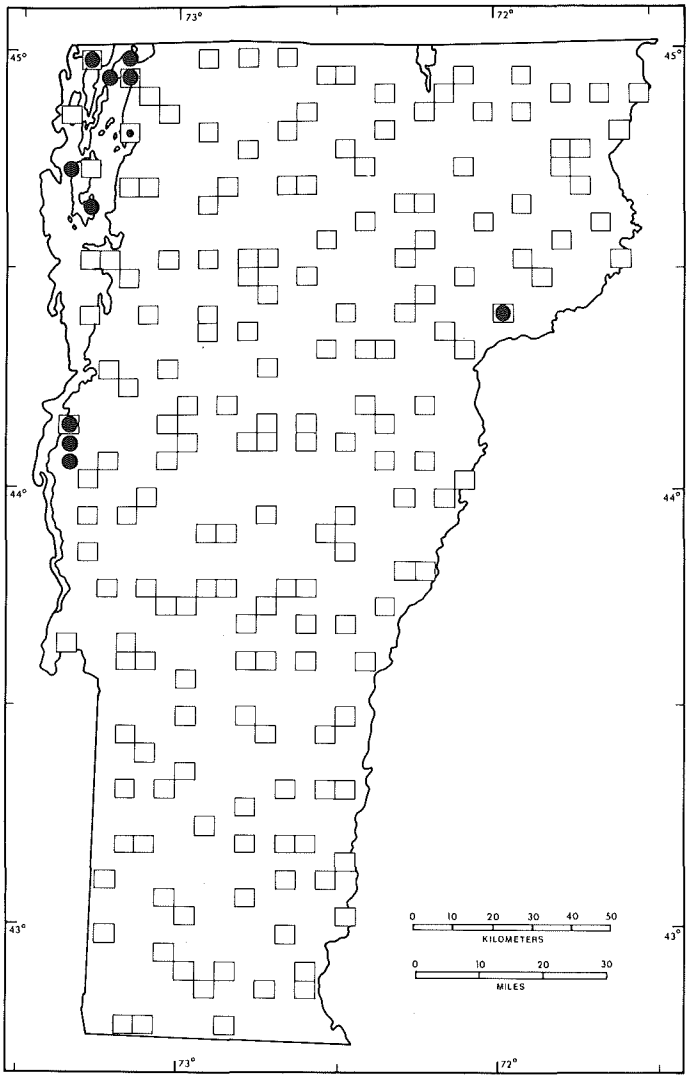
The earliest spring migrant Northern Pintails return to Vermont in mid March, or even by late February if ice is out of the state's major rivers. Numbers usually peak late in March or in early April. Pintails are less common during the autumn migration; however, they occur throughout the season, and often remain in small numbers into the winter. Occasional Northern Pintails may overwinter with American Black Ducks and Mallards on stretches of open water on Vermont's major rivers.

Given the sleek shape of Northern Pintails on the wing, aerial courtship chases involving several drakes and a single hen may be spectacular, with twisting high-speed manoeuvres. On the water, several drakes will swim closely around a hen, crowding her and vying with each other, standing erect in the water, their long necks arched so that their bills touch their breasts, and their long tails pointing upward (Kortright 1942). Pairing begins in late December and January, and continues into the spring migration during February and March. Most returning Northern Pintails are already paired (Bellrose 1980; Johnsgard 1975).

Northern Pintails tend to locate their nests farther from water than other ground-nesting ducks. Distance from the water averaged 50 m (164 ft) in one study (Keith 1961), and nests may be found up to 1.6 km (1 m) or more from water (Bellrose 1980). Nests are more exposed than those of most other ducks. The species often selects sites in open areas where vegetation is either low or sparse (Bellrose 1980). Miller and Collins (1954) found that 70% of the nests of the Northern Pintail were in vegetation no more than 30 cm (12 in) high, and that more than half were not hidden on one or both sides. Northern Pintails nested within the large Ring-billed Gull colony on Young Island on Lake Champlain during the Atlas Project. Vermeer (1968) reported on pintails nesting under similar circumstances in Alberta.

The nest is usually a hollow scraped in the ground, scantily lined with surrounding vegetation to which some down is added. Clutch size may range from 3 to 14 eggs, and averages about 8 (Bellrose 1980). An egg date of May 17 was recorded by Vermont Atlas Project workers for two nests in 1977; clutch sizes in these nests were 9 and 10 eggs respectively. The eggs range from yellow-green to creamy white in color. The incubation period is 22 to 23 days (Fuller 1953).

The Northern Pintail is not mentioned in



No. of priority blocks in which recorded

TOTAL 5 (3%)

Possible breeding:	1 (20% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	4 (80% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	4	13	80
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	1	5	20
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

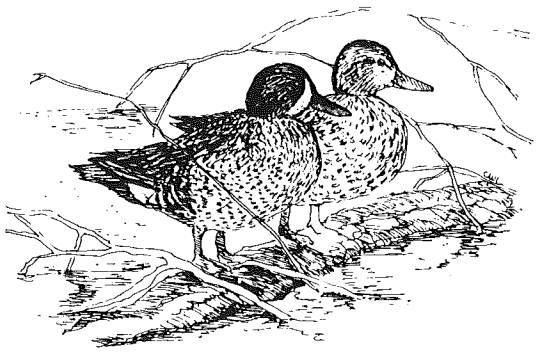
early Vermont bird lists (Perkins and Howe 1901; Fortner et al. 1933). In 1976, Spear considered it an "uncommon to limited" migrant and rare in summer, with breeding occurring only irregularly. Bull (1974) cited releases of Northern Pintails by the New York State Department of Environmental Conservation at three wildlife refuges in 1959, an event that may have had some bearing on the establishment of Vermont's subsequent breeding population. Another potential source for the Vermont population may be the small population in the St. Lawrence valley of Quebec.

The species was observed in 5 priority and 6 non-priority blocks during the Atlas Project. The majority of these blocks were in the Champlain Lowlands, where all but 3 of the blocks in which the species was located were in or near state or federal wildlife refuges. The record of nesting from Stiles Pond in Waterford appears to have been an isolated incident, as there has been no subsequent breeding reported from there. All but one record of confirmed breeding referred to the sighting of a brood accompanied by a hen.

ELEANOR ELLIS
WALTER G. ELLISON

Blue-winged Teal

Anas discors



An exclusively North American dabbling duck, the Blue-winged Teal's breeding range extends across the continent, and especially into the prairie regions of the central U.S. and southern Canada. Bent (1923) believed it to be more or less restricted to these prairies, "with only a few scattered pairs left in the eastern and southern portions of its breeding range." Its population has obviously recovered: DeGraaf et al. (1980) called it locally common in the breeding season in the Northeast, and Spear (1976) listed it as a Vermont nesting species. Its preferred breeding habitat in the Northeast is along the marshy edges of freshwater areas.

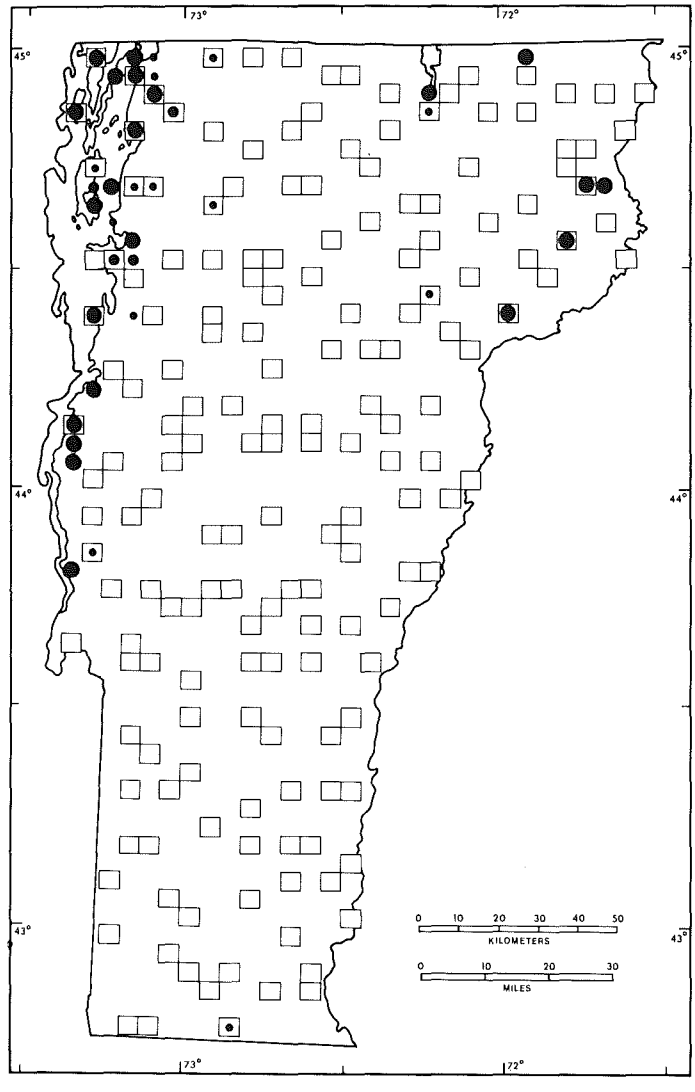
Sensitive to cold, Blue-wings arrive late and depart early. Spring migration peaks in Vermont from late April to early May; an extreme early arrival date of March 4 was recorded in 1978. Birds start south in August; most have left Vermont by October, although there are occasional sightings in the Lake Champlain area into December (RVB 1975–81). Blue-wings winter from the Chesapeake Bay area south through Central America to Peru.

Pair bonds begin forming in early winter; active courtship continues through spring migration. Much of the courtship occurs in the air, with small groups of drakes flying in close pursuit of a hen. Drakes will chase each other, and aerial combat is frequent (Palmer 1976). On the water, pairs rapidly bow their heads while swimming around each other, often for hours at a time, with interruptions for feeding and resting periods (Kortright 1942). Blue-winged Teals may not return to the same breeding area year after year; Bellrose (1980) calls them "poor homers but great pioneers."

The nest, placed in fairly tall coarse grasses up to 1.6 km (1 mi) from water, is a well-built basketlike structure composed of the dead grass within reach of the hen, and lined with a thick blanket of down (Bellrose 1980). Eggs are dull white or creamy, sometimes pale olive. Clutch size ranges from 6 to 16 eggs, but is typically 8 to 12. Incubation is given as 21 to 27 days, with most authors agreeing that 23 to 24 days is the average. Bull (1974) gave New York egg dates of May 3 to July 4. Vermont Atlas Project workers recorded an egg date of May 31 for a nest containing 11 eggs. As is typical with waterfowl, Blue-wings raise only one brood a year, although the hen will probably renest if the eggs are destroyed during incubation. The hen leads the young from the nest within 24 hours of hatching. In Vermont, downy young have been reported between June 1 and June 19 (three records).

Blue-winged Teals are surface feeders whose preferred feeding areas are shallow, muddy ponds overgrown with aquatic vegetation, marshes, mudflats, and even flooded fields. Unlike the other dabbling ducks, they usually reach below the surface with their heads and necks or skim the water with their bills rather than tipping up with their feet and tails exposed above the water. Their diet is primarily plant foods: aquatic plants and the seeds of sedges, pondweeds, and grasses; this diet is supplemented with aquatic insects, small mollusks, and worms (Bent 1923; Terres 1980).

Blue-wings were considered abundant in the northeastern portion of their range until about 1880, when they declined drastically (Palmer 1976). In the 1950s a considerable population recovery began among Blue-winged Teals, and Spear (1976) called them



No. of priority blocks in which recorded

TOTAL 21 (12%)

Possible breeding:	9 (42% of total)
Probable breeding:	2 (10% of total)
Confirmed breeding:	10 (48% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	15	48	71.0
Green Mountains	1	2	5.0
North Central	2	11	9.5
Northeast Highlands	2	13	9.5
East Central	1	5	5.0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

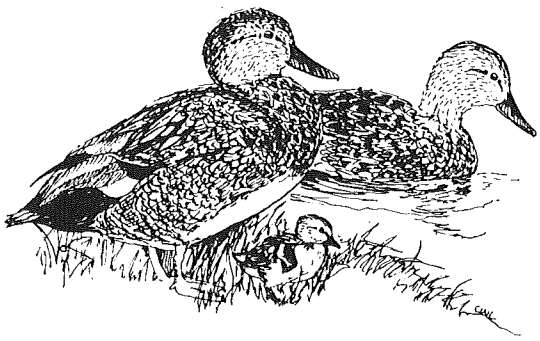
common in Vermont from mid April to late September. Bellrose (1980) referred to the species as the most abundant duck in North America "next to the mallard, the scaups and the pintail."

Although Blue-winged Teals usually conceal their nests extremely well, several of the Atlas Project confirmations were for nests with eggs (NE). The most frequent method of confirmation was observation of a hen with her brood.

ELEANOR P. ELLIS

Gadwall

Anas strepera



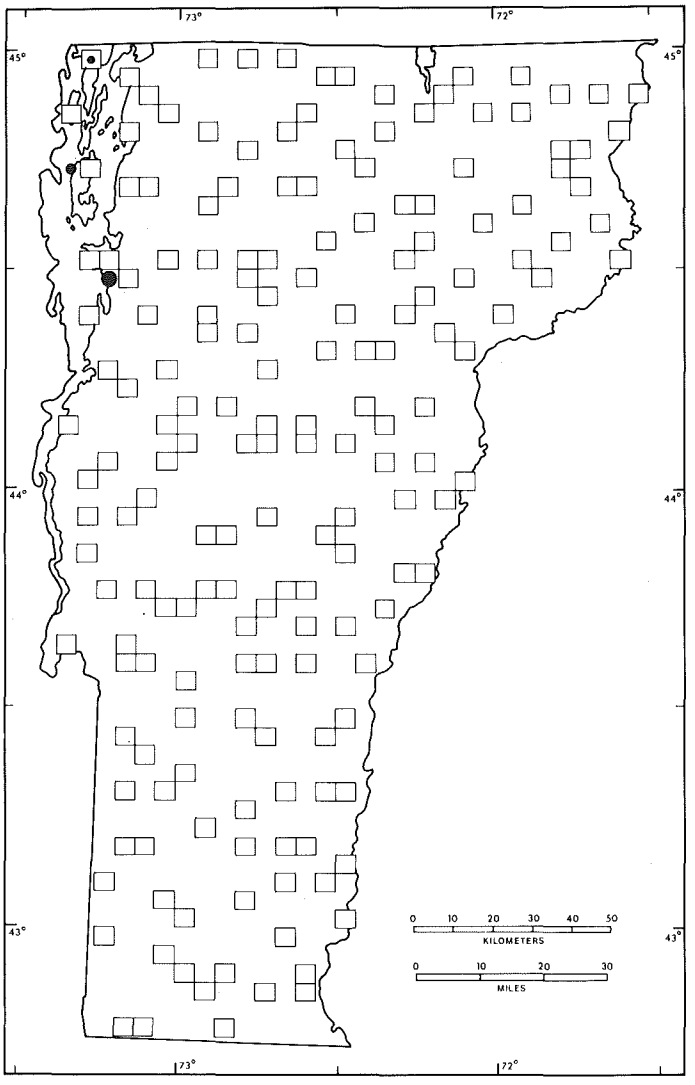
The Gadwall occurs primarily as a migrant in Vermont, and is among the least common of our regularly occurring dabbling ducks. Only the Northern Shoveler is reported in fewer numbers each year. Nonetheless, the species has established a recent foothold as a regular breeding bird in the northern Champlain Lowlands.

The Gadwall inhabits temperate, lowland regions which are largely unforested and flat. Being dabblers, Gadwalls prefer shallow, eutrophic waters, especially in marshes. Nests are placed on the ground, usually in thick, often thorny, vegetation. Dry sites are preferred over wetter locations, and the species prefers island nesting sites. Vermeer (1968) found the Gadwall and Lesser Scaup the most common nesters of several species of ducks nesting among gulls and terns on islands in Alberta. He postulated that where there were Larid species not dangerous to ducklings, nesting among gulls and terns might be beneficial. The Gadwall's habit of nesting among Larids is also noted by Cramp and Simmons (1977). Two of the known nesting areas for the Gadwall on Lake Champlain are in large gull colonies (the Four Brothers and Young islands).

Sharrock (1976) noted that because Gadwall nests are situated on relatively dry ground close to water, their nests are easier to locate than nests of other ducks. Nonetheless, the first Gadwall nest for Lake Champlain was not located until 1983. All other reported confirmations of breeding on Lake Champlain were of broods sighted with the hen.

The spring arrival of the Gadwall in Vermont ranges from late March to mid April, with peak numbers in late April. The autumn migration commences in September and is most evident in mid to late October. The Gadwall is a late-breeding duck, nesting about a month after its arrival on the breeding grounds. Nesting is apparently delayed by the species' requirement for fairly tall, dense vegetation at the nest site. The single Vermont nest date is June 1, and broods have been seen from mid to late July; in nearby Quebec, laying occurs in late May and early June and hatching takes place in the first half of July (Cantin et al. 1976). The nest, built in a hollow in the ground, is lined with materials from the immediate vicinity, and down from the hen's breast is added during incubation. The eggs are creamy white, and number from 6 to 13. Bellrose (1980) summarized data from 2,445 clutches and concluded that the average clutch size was 10.04 eggs. Oring (1969) found an average incubation period of 24 days with an incubator and 25.7 days with hens. The young leave the nest within 24 hours after hatching. Hens generally lead their broods a considerable distance from the nest site to suitable waters that are surrounded with sufficient cover for the ducklings to hide in while feeding.

Early in this century the Gadwall was a scarce migrant in New England (Forbush 1925). The Gadwall first bred on the East Coast in 1939 and since has spread to more than thirty localities on the Atlantic seaboard, generally in coastal national wildlife refuges and state wildlife management areas (Henny and Holgerson 1973). A population in Concord, Massachusetts was apparently fostered by the introduction of flightless juveniles from Manitoba (Borden and Hochbaum 1980). The species has recently become established in the St. Lawrence River valley of Quebec and is increasing rapidly, suggesting a source for Lake Champlain nesters (Cantin et al. 1976); recent stocking



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	1 (100% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	1	3	100
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

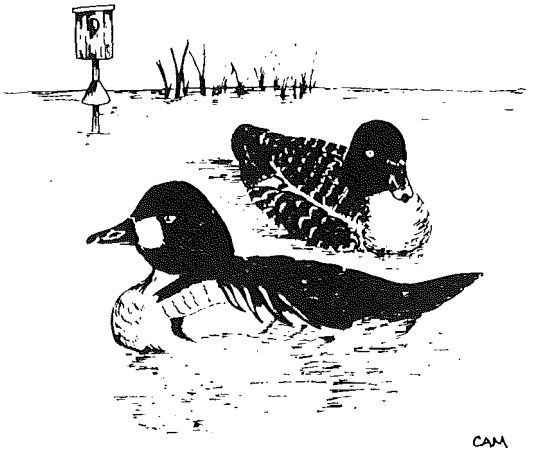
in New York State has doubtless contributed to the Champlain population. The first nesting on Lake Champlain was recorded in 1977 when a brood was located in the vicinity of the Four Brothers Islands, Essex County, New York (Carleton 1980).

The Gadwall was first confirmed breeding in Vermont in 1980 when a brood of downy young was observed on the Burlington waterfront (ASR, B. and O. Eastman); the species has bred there in most subsequent years. The species has been seen in some numbers and has been flushed from possible nest sites on Young Island, Grand Isle County, and was finally confirmed there on June 1, 1983 when a nest containing 11 eggs was found (BVR, R. M. Lavallee, S. B. Laughlin, A. L. Gosnell). It is too early in the Gadwall's colonization of Vermont to speculate on the species' fate or impact, but considering the species' recent history in the St. Lawrence River valley and along the Atlantic coast, it may increase during the next decade.

WALTER G. ELLISON

Common Goldeneye

Bucephala clangula



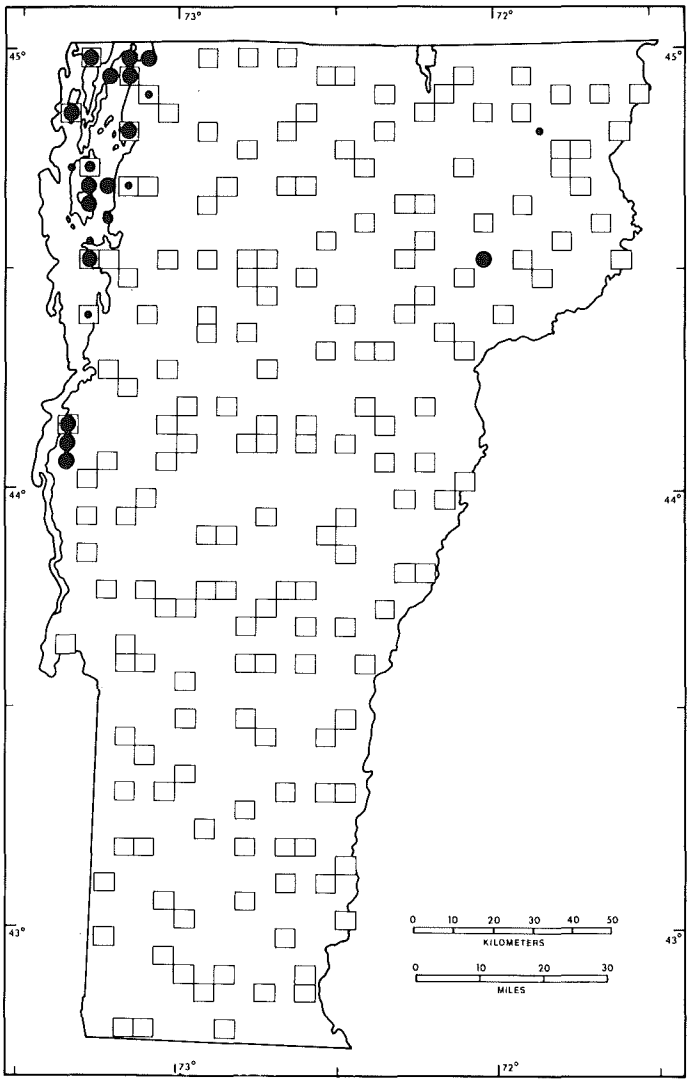
As a cavity-nesting duck, the Common Goldeneye is limited by the availability of suitable nest sites and the abundance of potential competitors for those sites. The goldeneye's major habitat requirements are large bodies of water near open wooded areas that contain cavities for nest sites. The species will readily occupy duck-nest boxes and has apparently benefited from the proliferation of nesting structures intended for Wood Ducks.

Unless an observer regularly surveys duck boxes, nests are very difficult to locate. More than 80% of confirmed breedings in Vermont during the Atlas Project refer to the observation of broods with hens.

Goldeneyes occur throughout the year in Vermont; a few winter on the state's larger rivers in ice-free areas and on the few unfrozen portions of Lake Champlain. Courtship activity may begin among wintering birds as early as late January, and peak in March. The male executes a variety of displays involving forward head stretching, snapping the head onto the back with the bill in a vertical position, and kicking vigorously rearward with the legs. The displays are accompanied by a buzzing call somewhat similar to that of the Common Nighthawk. Since goldeneyes pair before arrival on the breeding ground, display behavior is not useful for ascertaining breeding status.

Paired goldeneyes return to breeding areas in late March and early April in Vermont. In two New Brunswick studies, nests were initiated as early as April 7 (Carter 1958), with a peak in laying indicated for May 11–20 (Prince 1968); the last clutches were started in late May (Carter 1958; Prince 1968). Gibbs (1961) indicated a peak in nest starts for late April in Maine. The nest is built in a natural cavity or nest box. Goldeneyes showed a distinct preference for nest boxes at 5.5–6.1 m (18–20 ft) heights in a Minnesota study (Johnson 1967), indicating a predilection for high nest entrances. Prince (1968) found that natural cavities selected by goldeneyes often possessed an opening to the sky. Clutch size ranges from 5 to 17 eggs; reports of larger clutches refer to nests in which more than one female contributed to the clutch. The average clutch for 75 North American nests reported in Bellrose (1980) was 9.2. The eggs are elliptical or ovate, and range from pale green to olive in color. Vermont egg dates range from May 9 to June 30 (four records). Incubation lasts from 27 to 32 days, with an average of 30 days (Cramp and Simmons 1977; Bellrose 1980). Drakes leave the nesting area soon after the hens commence incubation (Carter 1958). After hatching, the young remain in the nest for another 1–1 1/2 days. Downy young have been reported in Vermont between June 7 and July 10 (three records). Goldeneyes can fly at 56 to 60 days of age (Gibbs 1961). Hens desert their broods at about 50 days (Cramp and Simmons 1977); 36.7% of all broods observed by Carter (1958) in New Brunswick were parentless.

Vermont is along the southern periphery of the Common Goldeneye's primarily boreal breeding distribution. Documentation of the species' breeding in Vermont dates back to 1915 when O. Durfee and F. H. Kennard located a nest in Averill. According to one report (GMAS records, F. J. Perry), the species was first recorded breeding in Milton, on Lake Champlain, in 1928. Surprisingly, the species is found in Vermont almost en-



No. of priority blocks in which recorded

TOTAL 10 (6%)

Possible breeding:	3 (30% of total)
Probable breeding:	1 (10% of total)
Confirmed breeding:	6 (60% of total)

Physiographic regions in which recorded

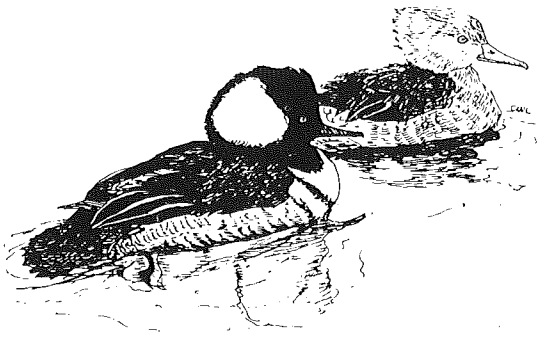
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	10	32	100
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

tirely in the Champlain Lowlands, rather than in the boreal Northeast Highlands. It has probably benefited from management for the Wood Duck in the Champlain Lowlands, especially at the Dead Creek Wildlife Management Area in Addison, where suitable trees are scarce but nest boxes are plentiful. All of the priority blocks in which this species occurred were in the Champlain Lowlands.

WALTER G. ELLISON

Hooded Merganser

Lophodytes cucullatus



The Hooded Merganser is a Nearctic species whose breeding range in the West is from southeastern Alaska south to Montana and Oregon, and in the East extends from southern Canada south to Louisiana and Georgia (AOU 1983). In the eastern U.S., Hooded Mergansers winter from southern New England to the Gulf Coast states. Small numbers have been recorded in Vermont during the winter months where open water persists. Northbound individuals arrive on open water in Vermont in late March and move to their breeding ponds as the ice disappears. Postbreeding dispersal occurs in September; most Hooded Mergansers are gone by mid November.

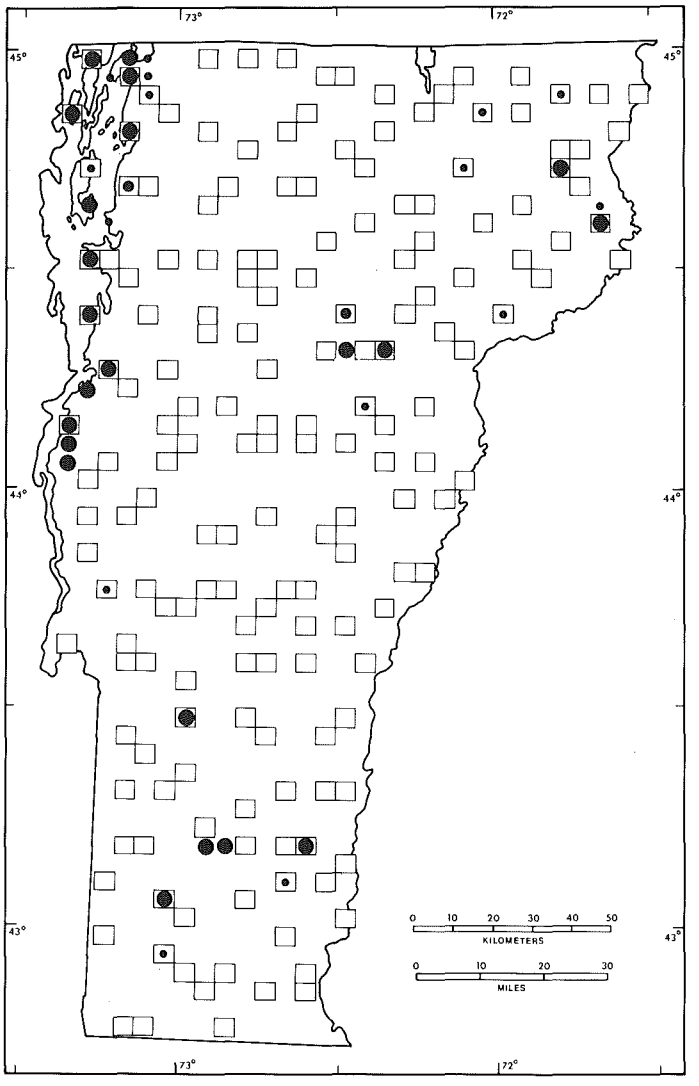
During the nesting season Hooded Mergansers frequent swamps, ponds with a plentiful supply of standing dead timber, and beaver ponds. Critical habitat seems to be flooded bottomlands or shorelines with numerous snags and stumps to serve as nest sites (Palmer 1976). The species prefers clear, quiet water, and streams and rivers with adequate prey (crayfish, fish, aquatic insects), wide, deep channels, cobbled bottoms, and swift currents. For raising broods, moderate to heavy forest cover is important (Kitchen and Hunt 1969). Increased forest cutting, particularly of snags, and draining or sedimentation of wetlands could pose threats to this merganser. Winter habitat includes inland freshwater lakes and rivers, estuaries, bays, and coastal marshes.

Hooded Mergansers' nesting requirements are similar to those of Wood Ducks. Nest sites are cavities in snags or stumps. Nest boxes are readily used, even those in open, wetland habitats (McGilvrey 1966). Nest snags or boxes adjacent to water are preferred (Morse et al. 1969). The only record of a Vermont nest is of a cavity about 6–8 m (20–25 ft) high in a dead sugar maple.

Breeding activity begins in the winter with courtship displays such as upward stretching, wing flapping, and rushing across the water, all performed by the male, with inciting behavior by the female. The male's crest, which is raised and lowered, is important during encounters with females or other males (Johnsgard 1975). During courtship the drake utters a guttural *crrrooooo* (Palmer 1976) that is similar to the call of a pickerel frog. The clutch of 7 to 12 pure white eggs are laid from late April to early June (Bull 1974). Two Vermont egg dates are May 22 and June 6. Hooded Mergansers are known to lay eggs in cavities shared with Wood Ducks (Bull 1974), as well as with Common Goldeneyes and other Hooded Mergansers (Palmer 1976). Incubation, lasting 32 or 33 days, is carried on by females, as males desert breeding areas at this time. The ducklings scramble from the cavity and drop to the ground or water about 1 day after hatching. Vermont dates for downy young are May 30 through July 11 (six records); broods number 8 to 11 ducklings. Fledged young were found on June 23 and August 14.

The estimated number of breeding pairs at the Missisquoi National Wildlife Refuge each year between 1979 and 1983 was 5 to 10, and the estimated number of young produced each year during that period was 15 to 27 (J. Nissen, pers. comm.). Morse et al. (1969) found that females do not breed until they are 2 years old, and that all breeding females in their study area returned to within 4.8 km (3 mi) of nesting sites used the previous year. Raccoons are predators at nest cavities, and northern pike are implicated in some predation losses of ducklings (Palmer 1976).

Like other mergansers, the diet of the Hooded is primarily fish or other aquatic



No. of priority blocks in which recorded

TOTAL 26 (15%)

Possible breeding:	10 (38% of total)
Probable breeding:	2 (8% of total)
Confirmed breeding:	14 (54% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	11	35	42.0
Green Mountains	2	4	8.0
North Central	4	21	15.0
Northeast Highlands	3	19	12.0
East Central	2	11	7.5
Taconic Mountains	2	13	7.5
Eastern Foothills	2	8	8.0

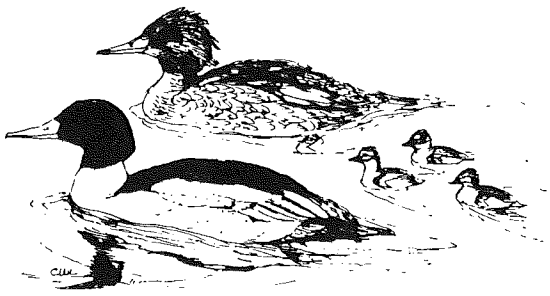
animal life. The Hooded's diet includes a smaller proportion of fish prey than do the diets of the other mergansers (Palmer 1976).

The Hooded Merganser was recorded in all seven physiographic regions, and was confirmed in all but the East Central region. Its occurrence was highest in the Champlain Lowlands, an area of abundant tracts of bottomland timber and swamps, with plentiful standing dead trees and stumps in or adjacent to water. Eight of the 14 confirmations (57%) were in this region, clustered adjacent to Lake Champlain. Comparing the occurrence of Hooded Mergansers with that of Wood Ducks, and taking into account the greater occurrence of Wood Ducks in all regions, the distribution patterns of these two species are similar, perhaps reflecting similar preferences for nesting habitat.

WILLIAM J. NORSE
CHRISTOPHER FICHTEL

Common Merganser

Mergus merganser



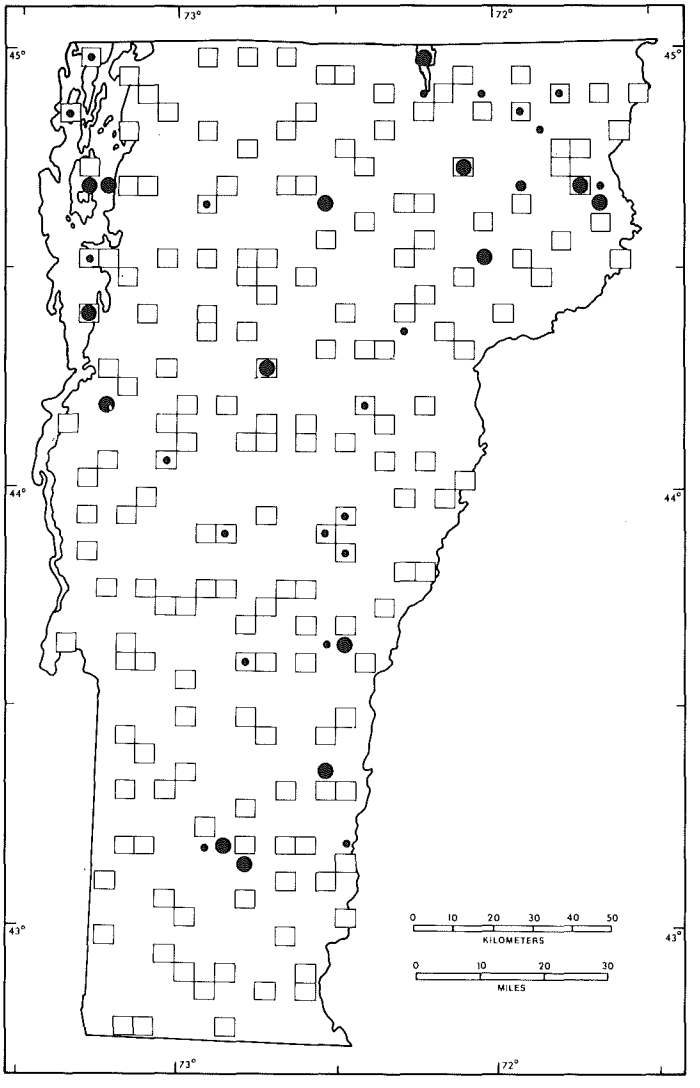
The Common Merganser is a Holarctic species that breeds from southern Alaska across Canada from the southern Yukon to northern Ontario and Newfoundland. East of the Rocky Mountains its breeding range extends south into the northern Great Plains, through the Great Lake states, and east into northeastern Pennsylvania, New York, and central and northern New England (AOU 1983). Local breeding occurs in Virginia and North Carolina. Common Mergansers winter throughout their breeding range, where open water persists, and south to Florida, the Gulf Coast, and Mexico (AOU 1983). Most Vermont lakes freeze over in winter, but small flocks of Common Mergansers winter on unfrozen portions of rivers throughout the state, utilizing the open water below dams and near rapids. On Christmas Bird Counts highest winter numbers are usually encountered along Lake Champlain. Because this species is regularly seen in all seasons in Vermont, migration patterns are difficult to discern. The spring movement appears to peak around the second or third week of April (RVB, Spring 1974–82).

This duck prefers forested areas where there are numerous ponds, lakes, streams, and rivers. Clear water is important for locating prey (Palmer 1976). A frequent associate of the Common Merganser is the Common Loon, although loons are known to chase and harass mergansers that feed on lakes where the loons are rearing their young (Palmer 1976). Common Mergansers, like loons, appear to suffer from human exploitation of lakeshore habitat and disturbance from recreational activity. One limiting factor in habitat selection that the Common Merganser does not share is the Common Loon's need for a large body of water for takeoff. In Vermont during the summer, Common Mergansers are frequently encountered on lakes in the North Central region and Northeastern Highlands, and are often confused with Common Loons.

The nest is in a tree cavity or in a down-lined hollow on the ground. The same nest site may be used for several years (Palmer 1976). A nest cavity was discovered at 9 m (30 ft) in a dead sugar maple in Vermont (W. J. Norse, pers. observ.). On one of the Four Brothers Islands in Lake Champlain two ground nests were discovered, one hidden among roots and under low-hanging cedar branches, the other beneath a stump (Harper 1914). Harper believed that these instances of ground-nesting by Common Mergansers were due to the lack of mammalian predators on the island.

Breeding displays include an upward stretch in which the drake pulls his upper body out of the water, lays his bill on his breast, and flaps his wings. Pair formation often occurs during the winter, and continues into the spring.

Eggs are pale buff or ivory yellow (Harrison 1975) and clutch size is generally 7 to 14 eggs (Bull 1974; Palmer 1976). Drakes abandon the females when incubation begins. Only two egg dates exist for Vermont—May 20 and June 25; Bull (1974) reported egg dates for 34 New York nests as May 5 through July 10. Incubation lasts about 32 days. Downy young were observed in Vermont on seven dates ranging from June 10 to July 30. Soon after hatching, the young scramble from the nest cavity and drop to the ground or water, where they join the hen. If danger is imminent, juveniles will often hide near shoreline vegetation. As the season progresses, broods mix and move to larger lakes (Palmer 1976). The hen may



No. of priority blocks in which recorded

TOTAL 17 (10%)

Possible breeding:	13 (76% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	4 (24% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	5	16	29.0
Green Mountains	3	6	17.5
North Central	1	5	6.0
Northeast Highlands	3	19	17.5
East Central	4	21	24.0
Taconic Mountains	0	0	0
Eastern Foothills	1	4	6.0

abandon her young before they learn to fly (Johnsgard 1975).

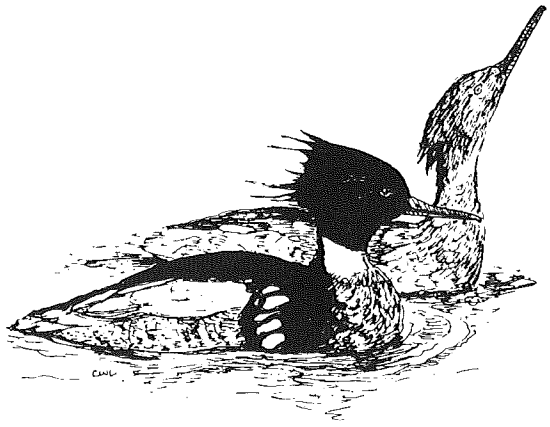
Fish is the predominant food in the diet of Common Mergansers. Although they are known to eat at least 50 species of fish, these mergansers tend to feed on the most abundant local fish (Palmer 1976).

Common Mergansers were not found in the Taconic Mountains, probably because of the lack of suitable wetland breeding habitat. The species was not found to be a common breeder anywhere in Vermont. The Champlain Lowlands and Northeast Highlands probably provide the most suitable habitat for the species, as both have abundant areas of open water and the Northeast Highlands are heavily forested. That the North Central region, an area of abundant lakes, streams, and forestland, had among the lowest occurrences is puzzling. Confirmations were most frequently of fledged young.

WILLIAM J. NORSE
CHRISTOPHER FICHTEL

Red-breasted Merganser

Mergus serrator



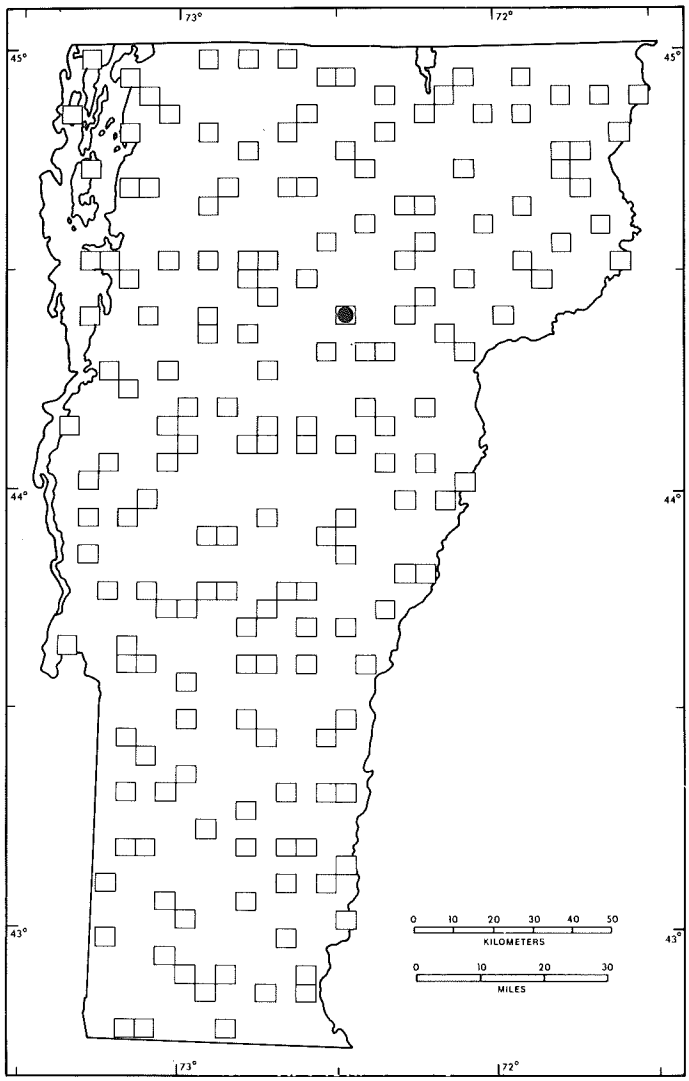
Only a local breeder south of Canada, the Red-breasted Merganser is most familiar in Vermont as a migrant. The Atlas Project established the first state breeding record for the species. A nest was located on the New York portion of Lake Champlain on the Four Brothers Islands in 1958; and a pair, but no nest, was found there in 1975 (Carleton 1980). Perkins and Howe (1901) and Fortner et al. (1933) claimed it as a rare migrant in Vermont but offered no references to breeding. The species tends to show a sporadic breeding distribution in the U.S. (Bellrose 1980).

Spring and fall migrations are the best times for observing Red-breasted Mergansers in Vermont. Migrants are found in spring from mid March to mid May and during the fall from mid September to early December. The species is found most commonly on Lake Champlain, but occurs elsewhere, including Lakes Memphremagog and Morey, Caspian Lake, the White River, and the Connecticut River (especially at Herrick's Cove). Seasonal totals are low, ranging from 7 to 70 birds. Peak daily counts range from 9 to 28, with peak dates in spring around the second or third week of April, and in fall from mid September to mid October. Wintering Red-breasted Mergansers are occasionally observed on Lake Champlain during Christmas Bird Counts, as well as in January.

Confirmed breeding for the Red-breasted Merganser has been documented only once in Vermont, on June 22, 1980, at Watson Pond (Calais, Washington County). Nine small ducklings and the hen were observed on what G. F. Oatman described as a "fairly large man-made pond surrounded by open fields but with woodland nearby" (ASR, G. F. Oatman). This area is characterized by irregular topography, numerous small lakes and swampy wetlands, and spruce-fir and northern hardwood transitional vegetation.

Red-breasted Mergansers generally do not breed until their second year, often staying in brackish or salt water as yearlings. The species winters mainly in estuaries and on sheltered bays. Courtship and pair formation begin on the wintering grounds. The courtship ritual is an intricate series of neck and body movements accompanied by a guttural song (Johnsgard 1965; Palmer 1976). The Red-breasted Merganser prefers inland lakes for breeding, particularly those with marshes, rocky islets, or vegetated islands (Bellrose 1980). This species demonstrates a marked tendency to nest on islands. Bengston (1970) and Palmer (1976) have both stated that ideal breeding habitat is a small island or islet having low or prostrate woody growth or other low overhead shelter, such as conifer limbs. The well-concealed ground nest is located amidst boulders or driftwood, or under dense shrubs near water. Forbush (1925) mentioned egg dates in Maine as falling between mid May and early June. Six to 12 eggs constitute a clutch; incubation by the hen lasts 29 to 35 days, with an average of 32 days. The drake abandons the hen soon after incubation begins. Assuming the ducklings at Watson Pond were 5 days old on June 22, and assuming 40 days from the laying of the first egg to the hatch (Bellrose 1980), initiation of egg laying probably occurred about May 8.

Red-breasted Mergansers consume a variety of prey, including fish, crayfish, shrimp, crabs, and aquatic insects. Although Red-



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	1 (100% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	1	5	100
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

breasted Mergansers usually capture prey by diving, they are known to herd prey into shallow water (Emlen and Ambrose 1970). They locate prey by partly submerging their heads and peering, a technique also practiced by the Common Loon.

No apparent population expansion or regular nesting pattern of Red-breasted Mergansers has been reported in the northeastern U.S. Vermont's single breeding record and the irregular nesting on the Four Brothers Islands substantiate a sporadic breeding distribution in the region.

CHRISTOPHER FICHTEL

Turkey Vulture

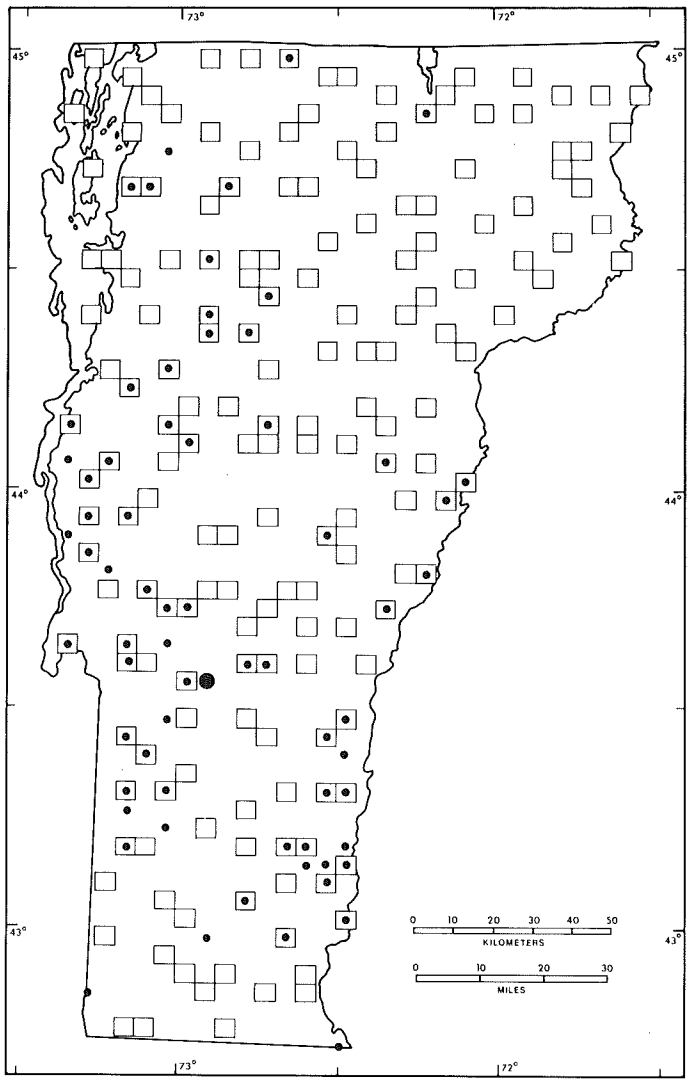
Cathartes aura

Since the 1950s the Turkey Vulture has shown one of the most dramatic population increases of any of Vermont's birds. The state's first breeding record was obtained during the Atlas Project period. The northward spread of Turkey Vultures into New England is a recent development. Forbush (1927) considered them accidental in Vermont and occasional in the rest of New England. Sight records from Vermont began appearing sporadically in the *Bulletin of New England Bird Life* in 1938, but Turkey Vultures were not reported regularly in Vermont until about 1960. Spear (1976) considered them uncommon in southern Vermont and in the southern Champlain Valley. Bagg and Parker (1951) ascribed the Turkey Vulture's successful northward expansion partly to a more reliable food supply in the form of increased numbers of road-killed animals and increased mortality among New England's deer herd as a result of overpopulation—both of which benefit a carrion-eating species.

Turkey Vultures spend extended periods of the day aloft, traveling long distances in search of food, and were fairly easy to locate in Atlas Project blocks. They forage primarily over open areas, either wet or dry, although openings in wooded habitats created by roads, logging, and bodies of water are also suitable (DeGraaf et al. 1980). In the South, where Black Vultures and Turkey Vultures coexist, they apparently divide the scavenging niche. Turkey Vultures feed singly or in small groups on smaller carcasses than those favored by Black Vultures; they locate carrion by sight and smell (Stewart 1978).

Turkey Vultures return in late March and early April after spending the winter in the southeastern U.S. Confirmation of breeding is extremely difficult, and nests are most often located by accident. The only Atlas Project confirmation was of a pair observed mating (DD) on a ledge on Bald Mountain, Mendon, on April 22, 1979 (ASR, N. L. Martin). A pair was present regularly at that location throughout the spring, but a search of accessible ledges did not locate a nest. Vermont's first recorded nest was located in June 1983 in a crevice in a cliff in northwestern Franklin County (RVB, Summer 1983).

Nest sites are varied: they include caves, ledges on cliffs, hollow logs or trees, dense shrubbery, abandoned hawk nests, and deserted farm buildings (Tyler 1937; Brown and Amadon 1968). Caves with two entrances were preferred nest sites in an Ohio study (Coles 1944). Females apparently choose the darkest part of the site in which to lay 2 dull white, brown-splotched eggs (Coles 1944; Brown and Amadon 1968). Both adults apparently incubate the eggs during the 38 to 41 days required for hatching (Coles 1944; Brown and Amadon 1968). Egg dates for New York State range from May 4 to June 20 (Bull 1974); Vermont's one nest on record contained 2 eggs in early June when it was discovered. The young are covered with white down upon hatching. They are fed by regurgitation. Turkey Vultures have a protracted nestling period of about 11 weeks, but during that time the young move about easily and may leave the cavity to sun, stretch, and preen (Brown and Amadon 1968). Nestling dates in New York are between June 15 and August 27 (Bull 1974), and are probably similar in Vermont. Young vultures can fly fairly well and



No. of priority blocks in which recorded

TOTAL 52 (29%)

Possible breeding:	52 (100% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	13	42	25
Green Mountains	13	24	25
North Central	1	5	2
Northeast Highlands	0	0	0
East Central	3	16	6
Taconic Mountains	10	62	19
Eastern Foothills	12	50	23

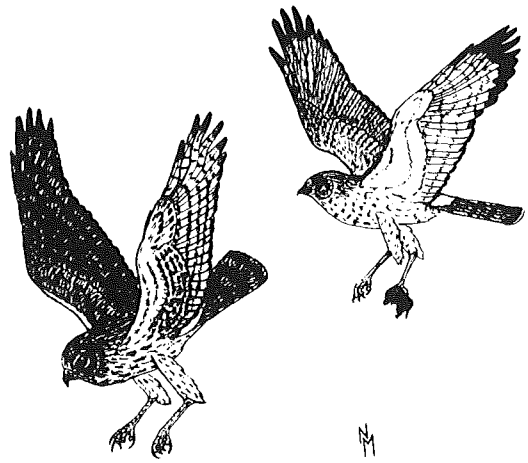
may travel long distances soon after fledging. The presence of immature vultures at two hawk-watch locations in Vermont (Bald Mountain, Mendon, September 1978 and 1980; Deer Leap, Bristol, September 4, 1981) raises the intriguing possibility that they had been raised in those areas (N. L. Martin, pers. observ.; J. J. Allen, pers. comm.). Turkey Vultures do not depart from Vermont until early October; a few may linger into November or later.

During the Atlas Project, Turkey Vultures were seen most often in the southern two-thirds of the Connecticut River valley, in the Taconic Mountains, and in the Champlain Valley north to Canada, with occasional sightings in other areas. Turkey Vultures in Vermont will probably continue to increase in numbers.

NANCY L. MARTIN

Northern Harrier

Circus cyaneus

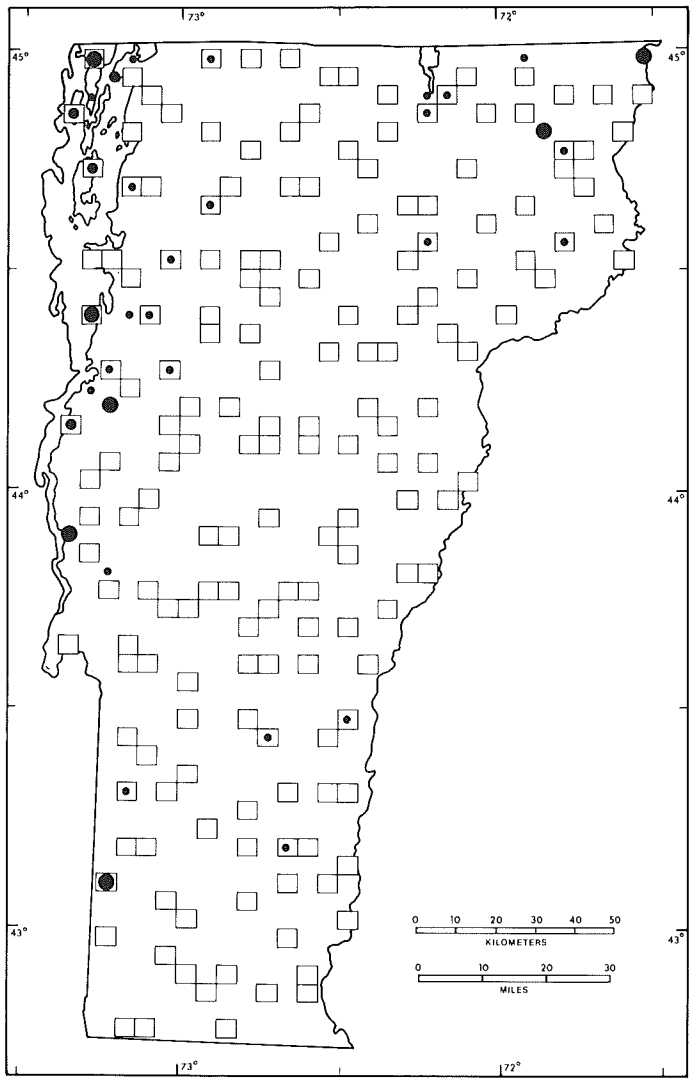


The Northern Harrier (formerly called the Marsh Hawk) is an elegant and graceful bird of prey that inhabits open country and wetlands. Harriers tend to nest in low, usually wet areas, such as marshes, heaths, shrubby swales, and sedge meadows, and occasionally use hayfields and fallow cropland. Some representative habitats in which harriers occur in Vermont include large cattail marshes, low, wet hayfields dominated by reed canary grass and sedge, and broad heath-sedge mats at the edges of boreal ponds. The harrier's nest is usually placed in dense, rather tall, brushy vegetation rather than in open locations (Brown and Amadon 1968).

Harriers are tireless aerial hunters and thus easy to locate. Their April courtship flights, which consist of a series of steep undulating climbs and dives over the nesting area (Bent 1937; Brown and Amadon 1968), also make them conspicuous. Nests may be located by watching for aerial food passes from the male to the female and noting from which point the female rises and descends; watching for females returning to the nest after early morning preening activity; and noting the defensive stooping behavior of pairs (Hamerstrom 1969; Sharrock 1976; ASR, S. B. Laughlin; ASR, L. N. Metcalf). The young are usually vocal and visible after fledging, and remain in the vicinity of the nest for several weeks (Hamerstrom 1969).

The species normally winters in the southern U.S., returning to Vermont from mid March to early April. Adult males arrive up to a week and a half ahead of adult females. Nesting commences in late April. Dates for five Vermont nests containing eggs are between May 14 and June 18. The incubation period is from 29 to 31 days (Brown and Amadon 1968). Nestlings have been reported in Vermont on three dates: June 23, July 16, and July 31. The nestling period generally lasts from 30 to 35 days (Brown and Amadon 1968). There is no information on dependent young for Vermont. Immature harriers begin departing southward in late August and early September; migration peaks during October, and by November many of the migrants seen are adult males (Nagy 1977; RVB, Fall 1981). In most years, a few harriers overwinter in the Champlain Lowlands.

The status of the Northern Harrier has changed significantly over the years in Vermont. The species has declined considerably in the course of the last 150 years, with the most notable drop during the last 100 years. Thompson (1853) found the Northern Harrier "very common," and in 1914 Ross considered it "the most common hawk" in Bennington County. At present, the species is rare over much of the state. The decline appears to be attributable to a combination of factors, foremost being the reforestation of Vermont over the last 50 years, together with the drainage of wetlands, especially outside of the Champlain Lowlands. Other factors include persecution by farmers early in the century; the effects of persistent pesticides on the wintering grounds (Hamerstrom 1969); and changes in agricultural practices, including earlier haying and harrowing (Kibbe 1975). During the Atlas Project, the harrier population appeared to be stable, if low. The species is presently carried on the *American Birds*' Blue List of species suffering declines over large portions of their ranges, and has



No. of priority blocks in which recorded

TOTAL 22 (12%)

Possible breeding:	16 (73.0% of total)
Probable breeding:	3 (13.5% of total)
Confirmed breeding:	3 (13.5% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	12	39	54.5
Green Mountains	0	0	0
North Central	3	16	14.0
Northeast Highlands	2	13	9.0
East Central	0	0	0
Taconic Mountains	2	13	9.0
Eastern Foothills	3	12.5	13.5

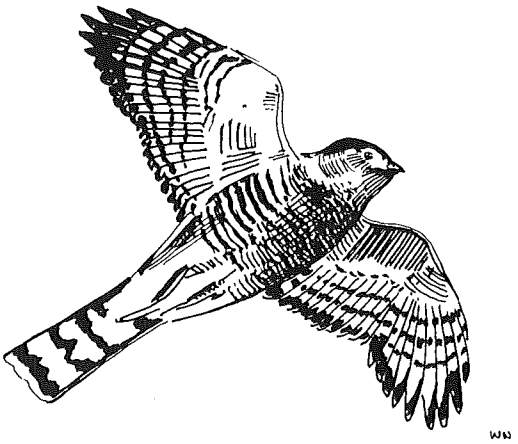
been recommended for Vermont's Species of Special Concern List.

The present Vermont distribution of the Northern Harrier has two major centers. The majority of breeding season records are from the Champlain Lowlands, where the largest agricultural acreage and extant wetlands are to be found. Approximately two thirds of the records from other regions are from the North Central region and the Northeast Highlands, where the species occupies extensive dairylands and the borders of northern ponds. The remaining records, most of which refer to possible breedings, are widely scattered, suggesting wandering, nonbreeding individuals. The one record of confirmed breeding outside of the major regions of occurrence, in the Batten Kill River valley, seems to represent an isolated incidence.

WALTER G. ELLISON

Sharp-shinned Hawk

Accipiter striatus

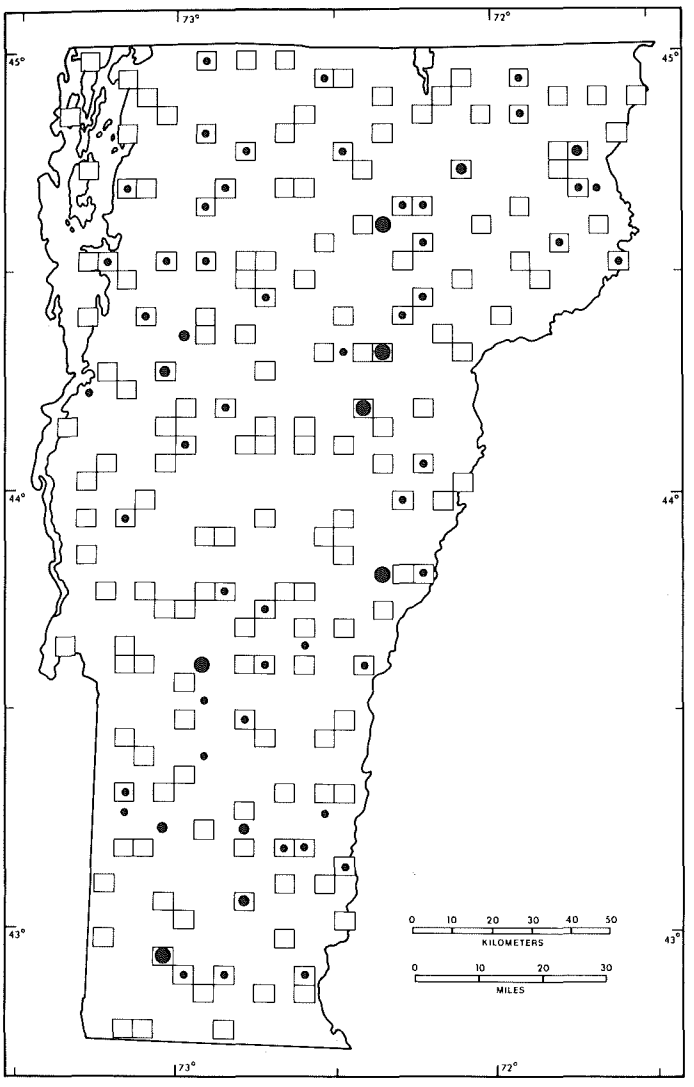


Sharp-shinned Hawks are found continent-wide, north to the tree limit, and their range extends into South America. Their center of abundance in North America seems to be the extensive forests of eastern Canada (Pough 1951). The species has apparently declined or disappeared as a breeding bird from many areas in the eastern part of its range during the last two decades. However, it continues to be a very common migrant in eastern North America, and concentrations may be found at coastal localities and along mountain ridges. Sharpies overwinter in a large portion of their nesting range south of Canada. In Vermont they are common migrants in spring and fall, and are best known at this time. In addition to their usual steady, quick-flapping flight followed by short intervals of rapid sailing, during migration they frequently soar gracefully in the open. Sharpies arrive in Vermont in early April and begin moving southward in mid September. Most birds have left Vermont by late October (RVB, 1973–84). They are rare and local in winter at lower elevations in the southern parts of the state. They frequently visit birdfeeders in search of prey.

Breeding Sharp-shinned Hawks are secretive, and require remote woodlands near clearings or borders of brushy meadows for nesting. They prefer the thick cover of evergreens in the midst of deciduous stands. The nest, which is built in a crotch of a tree or on a horizontal limb against a tree trunk, is well concealed. Only one nest with eggs was discovered during the Atlas Project. Of five nests found in Vermont at the turn of the century, two were placed in red spruce and three were found in hemlocks. The nest is a well-made, shallow, broad platform of interlaced twigs and small sticks that is often lined with strips of bark. It is large for the size of the bird, often measuring 0.6 m (2 ft) in diameter. Nests are placed 3–18 m (10–60 ft) above ground; average height is 9–11 m (30–35 ft). The nests found in Vermont were placed 6–14 m (18–45 ft) above ground. Sometimes Sharpies build in crannies along cliffs in or the cavities of hollow trees. A new nest is usually constructed each year. Sometimes the same nest is reused, with new material added. Occasionally abandoned crow or squirrel nests are adapted.

One brood is produced yearly. Four to 5 eggs, often 3 (rarely, 6 to 8), are placed in a slight depression in the nest. In Vermont, five nests had 5 eggs, and one nest had 3. The eggs are white to cream-colored, blotched with various shades of brown. Nests with eggs have been found in Vermont from May 15 to June 13. Incubation, performed primarily by the female, is begun when the clutch is completed (Rust 1914; Platt 1977), and takes 34 to 35 days. The young leave the nest when they are 23 days old. Nestling songbirds form a considerable part of the diet of these young hawks (Brown and Amadon 1968). As the young approach maturity they may each require at least three or four small birds or the equivalent each day (Forbush 1925).

Accipiters are bird hawks and Sharp-shinned Hawks are quintessential accipiters. They are fierce and skillful hunters, and are swift and bold. Sharp-shinned Hawks watch for prey from inconspicuous perches and surprise their victims by pouncing quickly. They glide low to the ground, skimming over bushes and darting under branches through clearings. Their short rounded wings and long tail are well adapted to



No. of priority blocks in which recorded

TOTAL 48 (27%)

Possible breeding:	41 (86% of total)
Probable breeding:	4 (8% of total)
Confirmed breeding:	3 (6% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	11	35	23.0
Green Mountains	14	26	29.0
North Central	7	37	15.0
Northeast Highlands	6	38	12.5
East Central	3	16	6.0
Taconic Mountains	1	6	2.0
Eastern Foothills	6	25	12.5

flight within forests. Males and females feed on different prey items (Storer 1966; Mueller and Berger 1970). Although they catch primarily small birds—warblers, sparrows, thrushes, and jays—the larger female is capable of securing quails, doves, and even young chickens. Sharp-shinned Hawks also take small mammals such as mice, shrews, bats, and squirrels, as well as frogs, grasshoppers, moths, and butterflies.

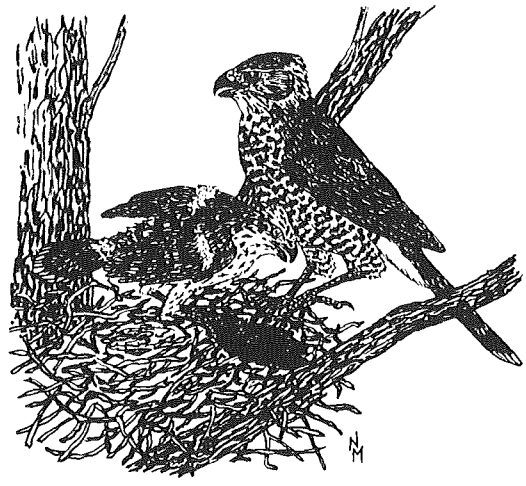
Because of their habits, Sharp-shinned Hawks have been among the most persecuted raptors. Early ornithologists regarded the species as harmful, and Eaton (1914) recommended that the species be "destroyed whenever more desirable song and game birds are to be preserved." Predators are an essential part of any ecosystem, and Sharp-shinned Hawks are highly efficient woodland hunters.

The Atlas Project established that the Sharp-shinned Hawk is a more widespread breeder in Vermont than was previously known, and that Vermont currently has a sufficient breeding population to remove the species from consideration for Vermont's proposed Threatened or Species of Special Concern lists.

WHITNEY NICHOLS

Cooper's Hawk

Accipiter cooperii



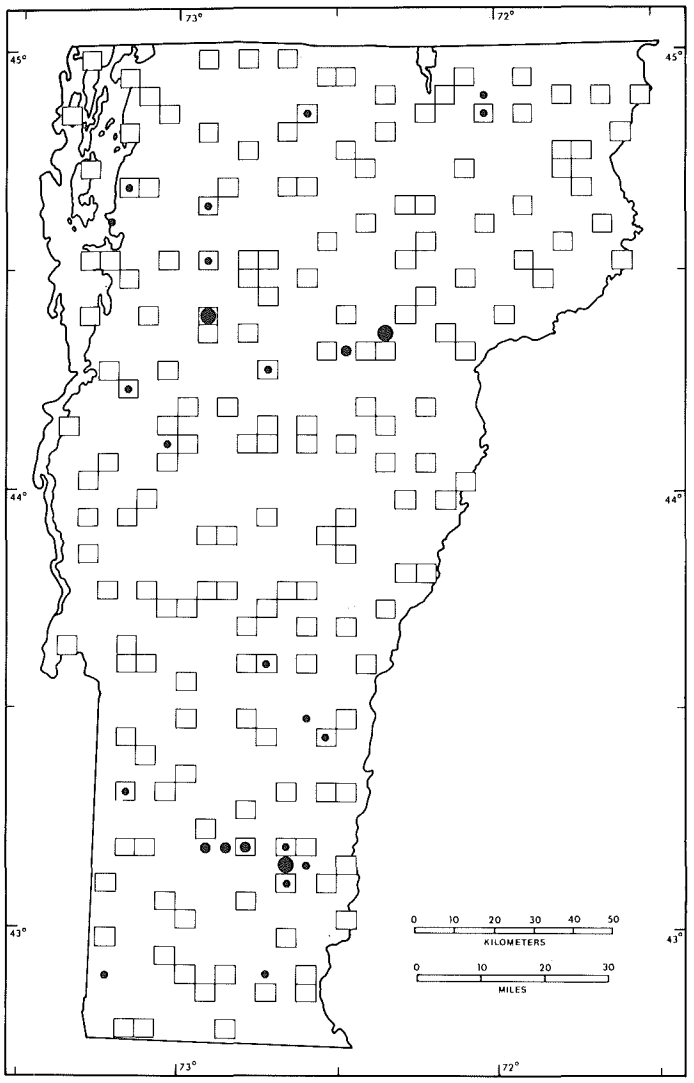
The Cooper's Hawk is the least numerous of Vermont's nesting accipiters. Intermediate in size between the Northern Goshawk and Sharp-shinned Hawk, it seems to prefer woodlands of intermediate character. Reynolds et al. (1982) found that in Oregon favored nest sites were 50- to 80-year-old stands with trees of intermediate height and density. Nests were commonly found in pine stands in eastern Massachusetts (Bent 1937), and in New York and Pennsylvania were located by Meng (1951) most frequently in northern hardwoods and oak-hickory stands.

The Cooper's Hawk is one of the raptors whose feeding habits made them particularly vulnerable to the effects of the buildup of chlorinated hydrocarbons (e.g., DDT and DDE) in their tissues. The Cooper's diet consists of small- to medium-sized birds and, to a lesser extent, squirrels (Meng 1959). The insectivorous diet of many of the Cooper's prey species produced concentrations of pesticides in the hawks, which eventually led to lowered calcium deposition in eggshells and the poisoning of embryos and young. Snyder et al. (1973) were able to correlate breeding failure in this species with high DDE concentrations in its eggs.

Population declines in this species commenced in the late 1940s, but were most evident during the 1960s. Henny and Wight (1972) believed there was a 25% annual rate of decline for this species from 1948 to 1967. Slower rates of decline before 1948 were mainly caused by hunting. The Cooper's reputation as a depredator of poultry made it a favorite target; however, this reputation, while admittedly not undeserved, was certainly exaggerated (Meng 1959). Since the banning of DDT in 1972, Cooper's Hawk populations appear to be recovering. The species has been tentatively removed from the National Audubon Society's Blue List, although it maintains its status as a Species of Special Concern (Tate and Tate 1982).

During the nineteenth century in Vermont the Cooper's Hawk seems to have been one of the most common raptors in the state (Perkins and Howe 1901). Samuels (1872), however, alluded to a previous period of scarcity in New England. In 1933 Fortner et al. reported that the species was uncommon, evidencing declines from hunting. Smith (1934b) called it uncommon to rare. Since the 1940s the species has become alarmingly scarce in Vermont, so scarce in fact that it has been proposed for Species of Special Concern status in the state. During the Atlas Project it was located in only 25 blocks, including 14 priority blocks.

Cooper's Hawks return to nesting areas in Vermont during mid March and early April. Early spring, before the trees leaf out, is the best time to search for nests. The adult's loud cackling can offer a clue to the nest's whereabouts. The nest is a fairly substantial structure of sticks built next to the trunk in conifers and in the crotches in deciduous trees (Bent 1937), usually just under the crown or in the lower portion of the crown (Reynolds and Wight 1978). The average height of 11 Vermont nests was 13 m (42 ft), out of a range of 9–21 m (30–71 ft). Egg dates for Vermont range from April 29 to June 15 for 10 nests. The average size of 12 Vermont clutches was 4.1 eggs, well within the recorded range of 3.8 to 4.3 (Reynolds and Wight 1978). The eggs are pale



No. of priority blocks in which recorded

TOTAL 14 (8%)

Possible breeding:	12 (86% of total)
Probable breeding:	1 (7% of total)
Confirmed breeding:	1 (7% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	4	13	29
Green Mountains	5	9	36
North Central	1	5	7
Northeast Highlands	0	0	0
East Central	1	5	7
Taconic Mountains	1	6	7
Eastern Foothills	2	8	14

blue when fresh, fading to dull white. The incubation period has been reported as 34 to 36 days (Meng 1951) and 30 to 32 days (Reynolds and Wight 1978). The young remain in the nest from 27 to 35 days (Meng 1951; Reynolds and Wight 1978). The flying young may remain in the vicinity of the nest for periods of up to 53 days (Reynolds and Wight 1978). The autumn migration of the Cooper's Hawk in Vermont peaks during early and mid October; a few may be seen at later dates, including rare overwintering birds.

WALTER G. ELLISON

Northern Goshawk

Accipiter gentilis

The Northern Goshawk, the largest of the accipiters, has traditionally been considered an inhabitant of the boreal forest in North America. Within the last three decades (1950–1980) the species has increased in numbers and apparently expanded its breeding range in northeastern North America.

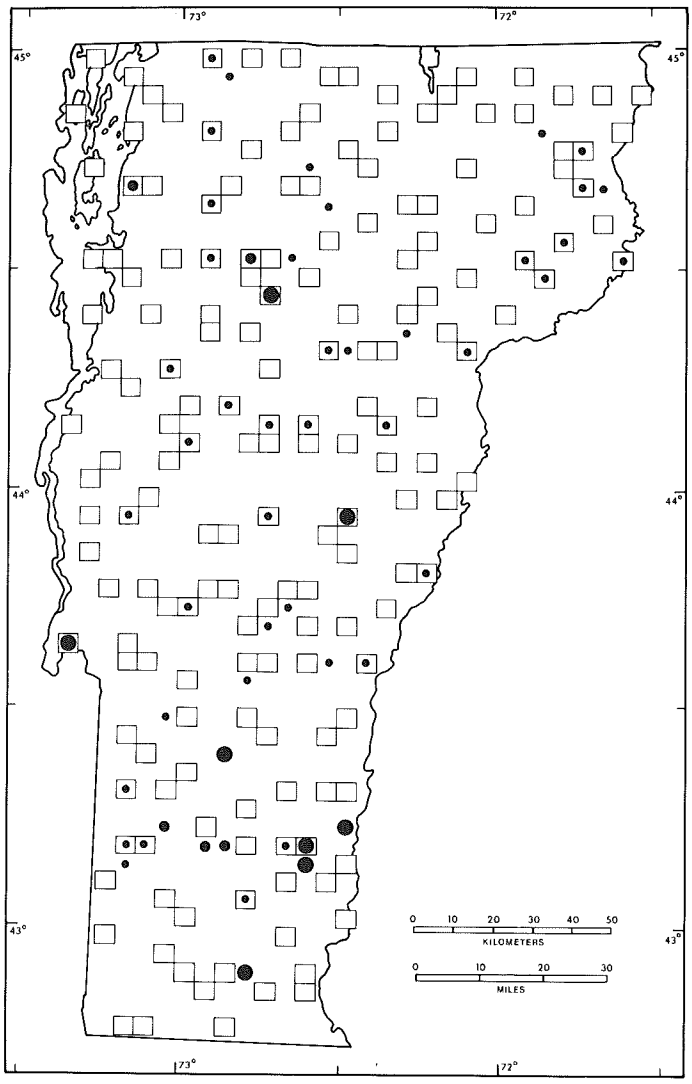
Goshawks inhabit extensive mature woodlands, either deciduous or coniferous. In the East, the species seems to prefer hardwoods for nest trees; only 17% of 102 nests cited in Bull (1974) and Bent (1937) were located in conifers. The Northern Goshawk is primarily a resident species in Vermont, but periodic invasions occur during the winter.

Adult goshawks may appear on breeding territories as early as late February, but most arrive in their territories from mid to late March. The nest is a substantial, rather untidy structure of sticks lined with bark chips and often decorated with evergreen sprigs. Nests are usually placed on large limbs next to the trunk or, occasionally, in a side fork (Reynolds et al. 1982). Nest heights vary; they averaged 16.2 m (53 ft) above ground in Oregon (Reynolds et al. 1982). The average height of four Vermont nests was 12.8 m (42 ft). Dates for six Vermont nests containing eggs range from April 16 to May 21. Clutch size, as summarized by Reynolds and Wight (1978), ranges from 2 to 4 eggs; the eggs are plain dull white, often with a bluish cast. Estimates of the incubation period range from 29 days (McGowan 1975) to 36 to 38 days (Brown and Amadon 1968). Six nestling dates for Vermont range from May 18 to June 18, and two dates for young out of the nest are June 27 and July 5. Young leave the nest at 34 to 37 days (Reynolds and Wight 1978), and are generally flying at about 45 days (Brown and Amadon 1968). Fledged young in Oregon remained with their parents for at least 42 days (Reynolds and Wight 1978).

At the turn of the century, the Northern Goshawk was rare as a nesting species in the Northeast (Forbush 1925). There were only three records of breeding for Vermont before 1933, all in Rutland County (Fortner et al. 1933). During the five years of the Atlas Project alone there were 8 confirmations of breeding, indicating how remarkably the population has grown since the 1930s. The expansion of Vermont's forest cover from 25% to 75% since 1900 has been a factor in this impressive increase.

Northern Goshawks eat a higher proportion (between 31% and 39%) of mammals than do other accipiters. Birds eaten are often largely granivorous or herbivorous (e.g., American Crow and Ruffed Grouse); thus goshawks do not accumulate the amount of toxic pesticide residues that their congeners do. Snyder et al. (1973) found that in Arizona goshawk eggs possessed half as much DDE as those of Cooper's Hawks. For these reasons the goshawk has maintained at least a stable population.

Presently the Northern Goshawk is distributed almost statewide in Vermont. Because most priority blocks were not covered in early spring, the species is probably underrepresented on the map, especially with regard to probable and confirmed breeding records. In general, however, the Atlas Project records probably give a reasonable outline of the goshawk's Vermont distribution. The distribution of records is largely confined to areas with medium to high land



No. of priority blocks in which recorded

TOTAL 34 (19%)

Possible breeding:	28 (82% of total)
Probable breeding:	2 (6% of total)
Confirmed breeding:	4 (12% of total)

Physiographic regions in which recorded

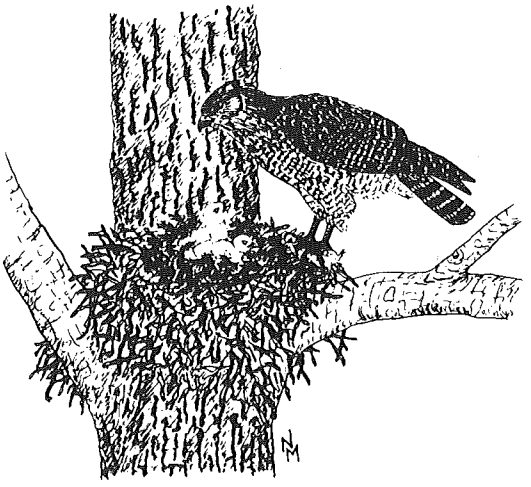
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	8	26	23
Green Mountains	8	15	23
North Central	0	0	0
Northeast Highlands	6	38	18
East Central	6	32	18
Taconic Mountains	3	19	9
Eastern Foothills	3	13	9

relief. Significantly, all but one of the records from the Champlain Lowlands are from the hilly eastern and southern peripheries of that region. There is a dearth of records from the North Central region, possibly because of poor coverage in the early spring.

WALTER G. ELLISON

Red-shouldered Hawk

Buteo lineatus



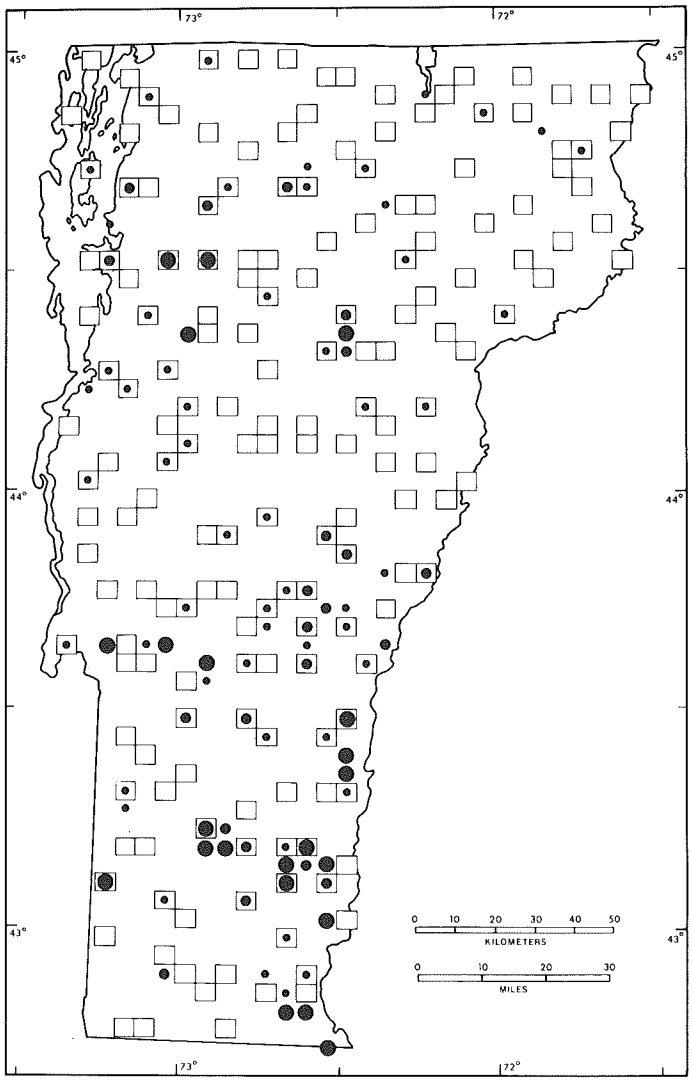
The Red-shouldered Hawk favors temperate climates and breeds from the north central states and southern Quebec south to Florida, the Gulf Coast states, and northern Mexico, with a separate population in California (AOU 1983). Vermont is near the northern limit of the species' range. Although the winter range does reach as far north as southern New England, most of these hawks winter farther south (AOU 1983). There are three records for Red-shouldered Hawks in Vermont in December, one in January, and three in February (RVB, Winter 1975–76, Winter 1980–81, Winter 1981–82).

Red-shouldered Hawks are among the earliest hawks to return to their nesting grounds in the spring. At Winhall, in 1976, following a mild period, a calling bird turned up on territory on February 25. These hawks are among the first to be seen from the ridges, and are usually moving northward by March 15. When breeding birds arrive, they waste no time in establishing territory. In the spring, territorial calls of these birds are one of the most familiar sounds in areas where they breed; their notes are frequently imitated by Blue Jays. The tumbling, erratic flight of the male is often observed by hawk watchers in the spring. Most fall migrants have left by early November, but two were reported on the Rutland Christmas Bird Count in 1981. Red-shouldered Hawks were observed more frequently on fall hawk watches in the Green Mountains than in the Eastern Foothills or Taconic Mountains. During migration, they are seen less frequently than either Broad-winged or Red-tailed Hawks.

Mature riparian and floodplain forests, or upland deciduous forests adjacent to floodplain forests, are most often used by nesting Red-shouldered Hawks (Portnoy and Dodge 1979; Bednarz and Dinsmore 1981; Morris and Lemon 1983). Quite often the largest deciduous trees in a forest tract are selected as nest trees (Portnoy and Dodge 1979). For feeding, small wetland or other natural openings are important (Bednarz and Dinsmore 1982). The only nesting density information comes from Maryland, where Stewart (1949) found 1 pair per 2.1 sq km (0.8 sq mi).

The nest, constructed in a large tree, is a platform of sticks, which may be decorated with sprays of conifer branches. Nest building was observed in West Brattleboro on April 24 (RVB, Spring 1976), and birds were beginning to nest on March 30 in Westford (RVB, Spring 1980). Thirty-six Vermont records for nest and egg dates range from April 15 to May 26; clutches varied from 1 to 4 eggs, 3 or 4 being the usual number. The nests were at heights of 8–18 m (25–60 ft), most often in deciduous trees; only two were in conifers. Two nestings occurred in old nests of other species—the Red-tailed Hawk and American Crow (Hartland, Windsor County, 1892). Nests with young were recorded on three dates: May 25, June 4, and July 2. Fledglings were seen on May 29 (in Winhall), June 28 (in Westford), and July 9 (in Topsham). A family group of four birds was observed in Ripton on June 1 (RVB, Summer 1982).

The Red-shouldered Hawk was reported during the Atlas Project from all seven physiographic regions, but was not confirmed in priority blocks in the Northeast Highlands, North Central, or East Central regions. Bottomland deciduous forest habitat is limited in north central and northeastern Vermont. Lower densities are expected toward the



No. of priority blocks in which recorded

TOTAL 62 (35%)

Possible breeding:	39 (63% of total)
Probable breeding:	16 (26% of total)
Confirmed breeding:	7 (11% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	15	48	24.0
Green Mountains	17	31	27.5
North Central	4	21	6.5
Northeast Highlands	1	6	2.0
East Central	7	37	11.0
Taconic Mountains	3	19	5.0
Eastern Foothills	15	63	24.0

limits of a species' range, and the scarcity of records for these regions may simply reflect Vermont's proximity to the fringe of the Red-shouldered's range.

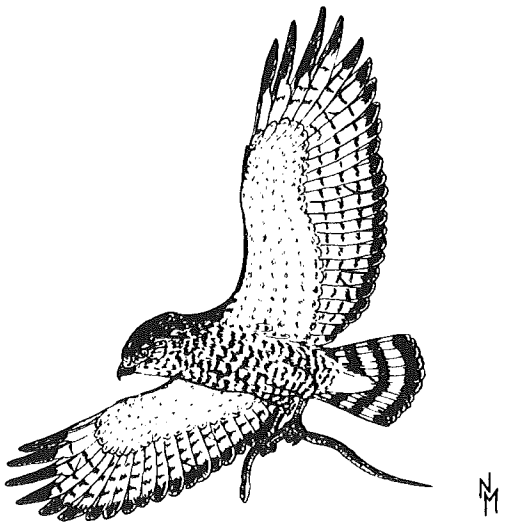
Red-shouldered Hawks have a varied diet; they will take birds, mammals, reptiles, or amphibians (Bent 1937). In the summer, in wetland feeding habitats, they will consume amphibians and reptiles.

The Red-shouldered Hawk is on the *American Birds*' Blue List throughout its range (Tate and Tate 1982), and is on lists of Threatened Species in New York and New Hampshire; it is not, however, currently being considered for such listing in Vermont. These hawks accumulate organochlorine pesticides and PCBs (Henny et al. 1973). Evidence suggests that Red-shouldered Hawks are vulnerable to habitat alteration, including forest fragmentation (Henny et al. 1973; Galli et al. 1976; Bednarz and Dinsmore 1981; Armstrong and Euler 1982). Large tracts of mature, deciduous forest with scattered wetland and other openings are important for this species.

WILLIAM J. NORSE
CHRISTOPHER FICHTEL

Broad-winged Hawk

Buteo platypterus



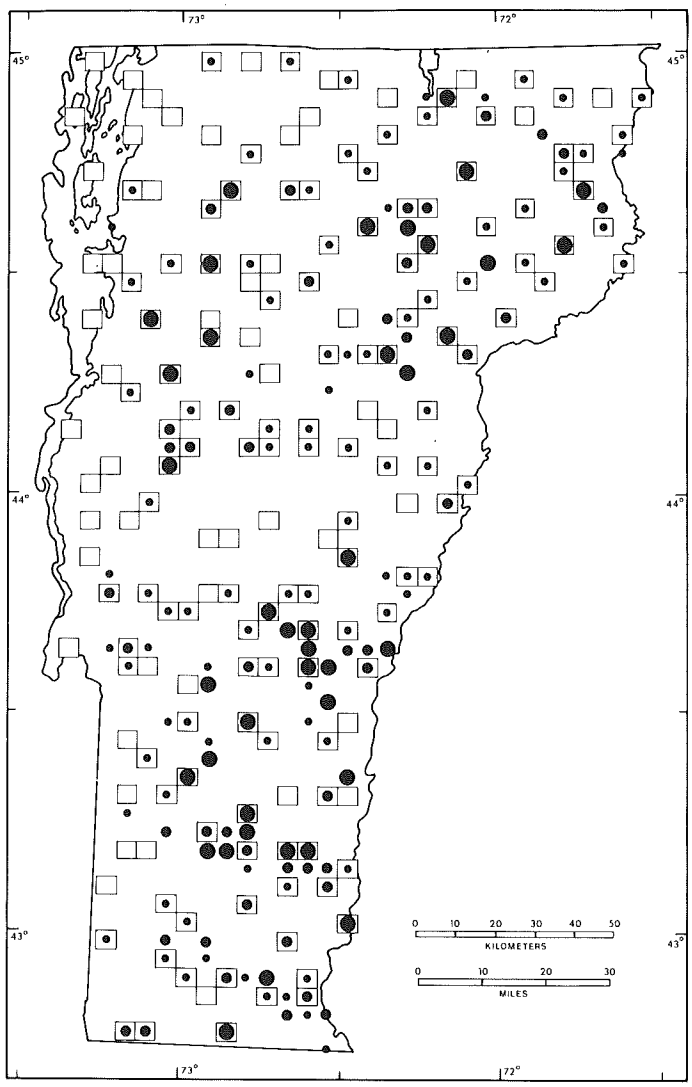
Broad-winged Hawks nest from central Alberta east through Canada to Nova Scotia, and south to eastern Texas and Florida; they usually winter from Guatemala south to southern Brazil and Bolivia (AOU 1983). Individuals will sometimes winter in parts of the breeding range. Winter records of Broad-wings in Vermont are rare. One bird spent the winter of 1974–75 in Chester; another was seen in late December in South Strafford; and yet another was found in Tinmouth in early March (RVB, Winter 1973–83). An individual was observed on the Ferrisburg Christmas Bird Count in 1979 (December 15). The first Broad-wings return to Vermont each spring in early April, though spring flight usually peaks during the last two weeks of April. The most common migrant hawk in the fall, the Broad-wing far outnumbers the other buteos. Peak fall flights occur between the first week of September and the first week of October, usually around the second and third weeks of September.

These hawks occur in deciduous or mixed deciduous-coniferous forest, and are found in large tracts of forest (Rusch and Doerr 1969) that border on weedy fields or other forest openings (Titus and Mosher 1981). Bull (1974) suggested that extent of woodland is more important than its stage of growth. In the Adirondacks, the Broad-wing is the most common breeding hawk, inhabiting continuous tracts of mostly northern hardwood forest interspersed with conifer stands, open water, and marshes (Matray 1974). The species seems to prefer nesting in or near wet sites (Matray 1974; Titus and Mosher 1981).

Although Broad-wings are sometimes observed soaring above the trees or woodland openings, they are most frequently located by their call, a high-pitched *ker-weeee* (Bent 1937), aimed especially at intruders near the nest.

Nest trees are often near forest openings or water (Titus and Mosher 1981). Matray (1974) found 12 of 14 Adirondack nests to be in yellow birches, which appear to be Broad-wings' favored species of nesting tree. Of five Vermont Broad-wing nests, three were in paper birches (VINS nest record data). The stick nest is built in the main crotch of a tree 3.7–16.8 m (12–55 ft) above ground (Bull 1974). Three Vermont nest heights were 8, 9, and 11 m (25, 30, and 37 ft). Leafy twigs are often used as a lining for the nest. The clutch of 2 to 3 creamy white eggs, which are splotched with various shades of brown, may be incubated for 21 to 25 days (Bent 1937), or 28 days (Matray 1974). Only the female incubates. There are no Vermont egg dates; Bull (1974) reports April 27 through June 26 as egg dates in New York. Mean hatching dates in two years of study of Adirondack nests were June 13 and June 23 (Matray 1974). Vermont nestling dates are from June 2 to July 17 (five records). Bull (1974) reported May 30 through July 27 as nestling dates, and July 4 through August 16 as fledgling dates, in New York. Young are brooded by the female and begin feeding themselves at 28 to 30 days (Matray 1974). Broad-wings fledge at 29 to 30 days and begin hunting at 37 to 46 days, but are fed by adults until 50 to 56 days old (Matray 1974).

The diet consists of a variety of mammals, birds, reptiles, amphibians, insects, and even crayfish. Mammal prey includes small ro-



No. of priority blocks in which recorded

TOTAL 126 (70%)

Possible breeding:	72 (57% of total)
Probable breeding:	29 (23% of total)
Confirmed breeding:	25 (20% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	10	32	8.0
Green Mountains	42	78	33.3
North Central	17	89	13.4
Northeast Highlands	14	88	11.0
East Central	13	68	10.3
Taconic Mountains	9	56	7.0
Eastern Foothills	21	88	17.0

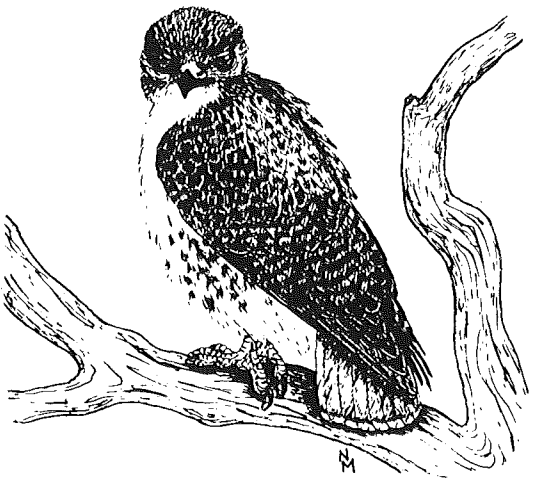
dents: chipmunks, red squirrels, mice, and shrews (Bent 1937). Errington and Breckenridge (1938) noted that Broad-wings feed on carrion. Grouse and snowshoe hare, mostly juveniles, were frequently taken by Broad-wings in Alberta (Rusch and Doerr 1969); these prey species were common in the study area, suggesting that Broad-wings select the most available prey. The contention that Broad-wings are opportunistic is also supported by the observation of Rusch and Doerr (1969) that fewer reptiles and amphibians are taken in more northerly regions where that prey base is smaller.

Broad-winged Hawks were found in all seven physiographic regions. Habitat studies show that Broad-wings seem to prefer large tracts of contiguous forest for nesting; thus the scarcity of records in the Champlain Lowlands is expected. One-third of the confirmations were of nests with young, and one-fourth were of fledged young.

CHRISTOPHER FICHTEL

Red-tailed Hawk

Buteo jamaicensis

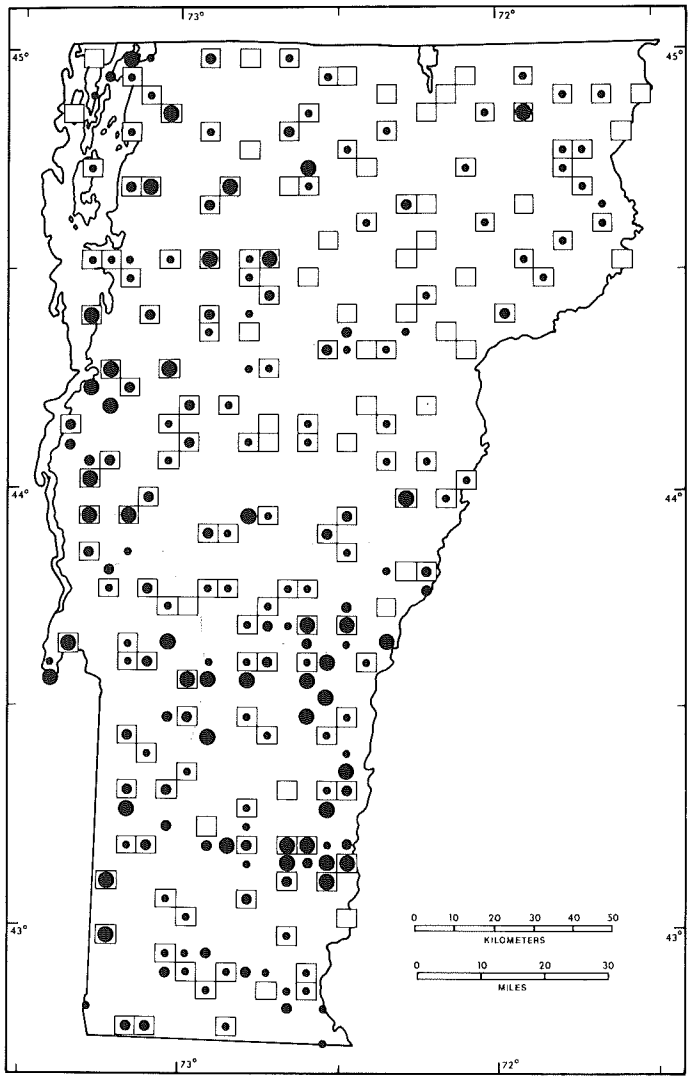


The Red-tailed Hawk occurs throughout North America, exhibiting a broad tolerance to a variety of ecological conditions. Major habitat requirements are open country with scattered forests in which to hunt and tall trees for nest sites and perches. In Vermont, these hawks particularly favor fallow pastures interspersed with open woodlots. Red-tailed Hawks will nest in a wide array of locations that meet their minimum requirements for hunting range and nest sites, including woodlots in suburban neighborhoods (Minor and Minor 1981) and heavily wooded ridges far from any opening (Titus and Mosher 1981). In western Maryland, Titus and Mosher (1981) found that Red-tails tended to nest away from clearings and water, on east-facing slopes near the tops of ridges.

Most observers detect Red-tailed Hawks by careful scanning of the skies. These birds are frequently seen soaring high overhead or in direct flight. The white breast of a perched Red-tail often contrasts sharply with its background. The nest, a large structure of sticks, is conspicuous before trees leaf out in May. Nests of this species are most easily found by surveying woodlots during the winter and early spring. More than 58% of the 43 Atlas Project confirmations were of active nests. Fledglings remain in the vicinity of the nest for at least 3 weeks and often call attention to themselves with their persistent begging. More than 30% of Atlas Project confirmations were of recently fledged young. Fieldwork for raptors could have raised the 16% confirmation rate in priority blocks.

Red-tailed Hawks are seen throughout the year in Vermont. During the winter, Red-tails are much less numerous in eastern Vermont than in the open Champlain Lowlands. Red-tails return to nesting territories in Vermont as early as mid February; most are back by early March. Nests are built or repaired in early March and egg laying commences late in the month. Nests are built high in the taller available trees on the home range, usually in dominant species such as beech or sugar maple. The average height of 17 Vermont nests was 16.9 m (55.5 ft). The eggs are plain white and number from 1 to 4; the average of 19 Vermont clutches was 2.7 eggs. Egg dates for 23 Vermont clutches range from April 12 to May 23. Calculations from notations on collected clutches place estimated dates for the initiation of clutches from March 20 to April 22 in Vermont. The incubation period, as calculated by Luttich et al. (1971) in Alberta, is 33 days. Estimated hatching dates for Vermont, determined from notes on collected clutches, range from April 25 to May 25. Six dates for nestlings in Vermont range from May 31 to June 20. Young Red-tails fledge at 43 to 48 days (Johnson 1975). There are three dates for fledged young in Vermont, ranging from June 22 to July 5.

The Red-tailed Hawk is the most widespread and well-known buteo in Vermont, and possibly the most common. The species was recorded in 78% of the Atlas Project's 179 priority blocks. The Red-tail is more common in western Vermont, where a large amount of land is in agricultural use, than it is in the more heavily forested eastern regions. According to most accounts, this hawk was less common in New England



No. of priority blocks in which recorded

TOTAL 140 (78%)

Possible breeding:	82 (59% of total)
Probable breeding:	35 (25% of total)
Confirmed breeding:	23 (16% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	28	90	20.0
Green Mountains	43	80	31.0
North Central	8	42	6.0
Northeast Highlands	12	75	8.5
East Central	14	74	10.0
Taconic Mountains	16	100	11.0
Eastern Foothills	19	79	13.5

early in the twentieth century. Forbush (1927) and Fortner et al. (1933) noted that the species had declined and was decreasing, apparently because of shooting. Legal protection, and increased awareness of the value of predators on the part of farmers, has allowed the species to increase and flourish. As long as the Vermont landscape remains diversified, with a mixture of open and closed habitats, this species should remain common.

WALTER G. ELLISON

American Kestrel

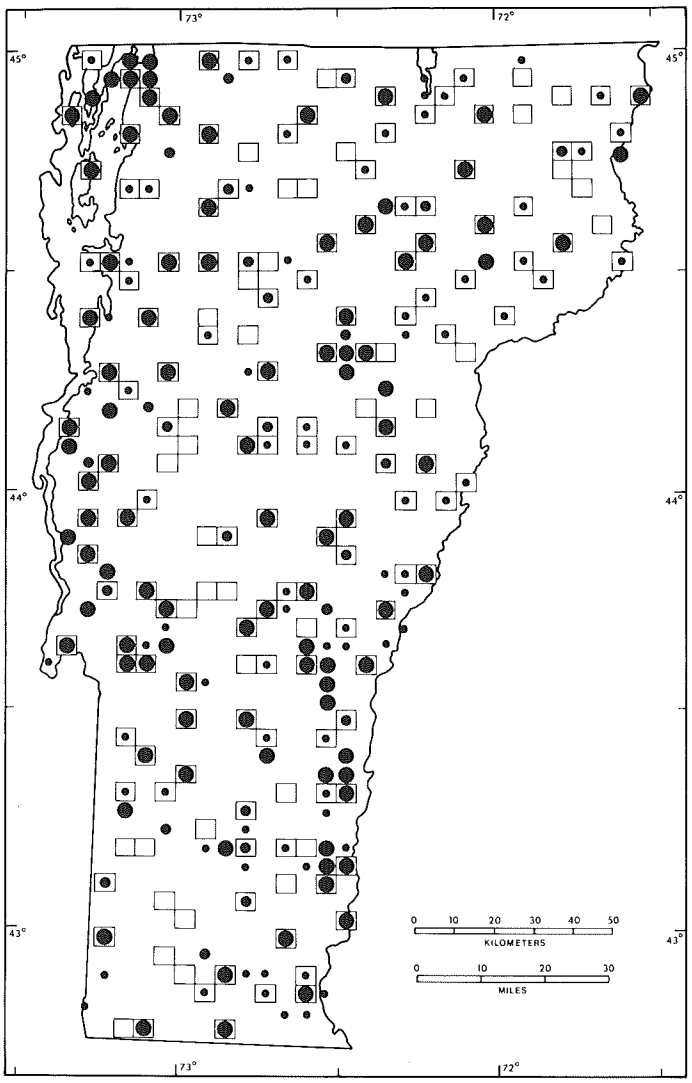
Falco sparverius

The American Kestrel is widely distributed in the Western Hemisphere in both North and South America. Birds from the colder northern portions of North America are migratory, and males apparently winter farther north than females (Willoughby and Cade 1964). Kestrels frequent farmlands (especially where large numbers of elms killed by Dutch elm disease have been left standing), woodland edges, suburban areas, and cities. Balgooyen (1976) cited four factors that limit kestrel populations: availability of hunting perches, of food, of nest sites, and of open, low vegetation for foraging. Because the species nests in cavities, nest sites constitute a major limiting factor among breeding populations. The species may be more common in Vermont now than it was in the early 1900s when Allen (1909) listed it as an uncommon resident.

American Kestrels are frequently seen perched on dead trees, fences, and power lines along roads, or in direct flight or hovering high over open areas. The nesting sites are generally cavities in dead trees; the species will frequently utilize cavities excavated by the Northern Flicker. Other sites that may be used include silos, birdhouses, and crevices in buildings. Because the nest is often in a conspicuous dead tree or around human habitation, it is much easier to locate than those of other birds of prey. About 43% of Vermont Atlas Project nesting confirmations for the species involved the observation of an active nest. The young, once fledged, may be very noisy, giving the characteristic treble whine of the species when begging for food. Thirty-nine percent of the confirmations referred to recently fledged young.

Kestrels winter at the lower elevations in Vermont, and are recorded regularly in small numbers in the Champlain Lowlands and occasionally in the Connecticut River valley. The species is not reported from the colder, more heavily wooded Green Mountains and Northeast Highlands, both of which are subject to deep snow cover that limits prey availability. In areas where kestrels do not winter they first appear in late March; the spring migration extends through April.

In Vermont American Kestrels are often seen mating and searching for nest holes by the first week of April. Sixteen Vermont dates for nests with eggs vary from April 28 to May 30. The eggs are white to pale pink with heavy rufous spotting that does not quite obscure the base color, as it does on the eggs of other falcons. Clutch size ranges from 3 to 7 eggs; the average of 14 Vermont sets was 5.1. Balgooyen (1976) reported that the average clutch size was 4 eggs. The incubation period lasts about 30 days, with a range of 29 to 31 days (Balgooyen 1976). Ten dates for nests with young for Vermont range from May 29 to July 4. The young remain in the nest from 29 to 31 days (Balgooyen 1976). Ten Vermont dates for dependent young range from June 19 to July 16. The young remain dependent on their parents for food for about 12 days after fledging (Balgooyen 1976). Family groups remain together until early autumn, when the young are the first to depart from the breeding territory (Balgooyen 1976). In Vermont the largest numbers of migratory kestrels are



No. of priority blocks in which recorded

TOTAL 140 (78%)

Possible breeding:	51 (36.5% of total)
Probable breeding:	17 (12.0% of total)
Confirmed breeding:	72 (51.5% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	22.1
Green Mountains	32	59	23.0
North Central	17	89	12.1
Northeast Highlands	10	63	7.1
East Central	16	84	11.4
Taconic Mountains	14	88	10.0
Eastern Foothills	20	83	14.3

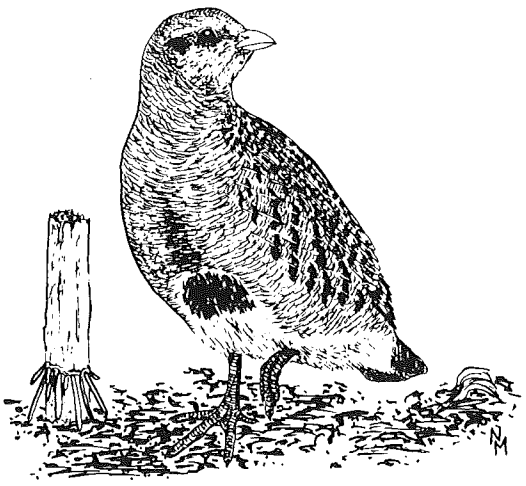
seen during the second and third weeks of September. The American Kestrel is usually the fourth most common hawk seen on Vermont watches.

The American Kestrel was found and confirmed in all seven physiographic regions of Vermont. It was recorded in more than 80% of the priority blocks in five regions, and 100% of the priority blocks in the Champlain Lowlands. As might be expected, it was recorded in fewer priority blocks in the Green Mountains and in the Northeast Highlands, where it is absent from large tracts of unbroken forest land. Recently the species has begun to invade some of the larger clear cuts (where loggers have left sizeable snags) in the Northeast Highlands and the Green Mountain National Forest.

WILLIAM J. NORSE
WALTER G. ELLISON

Gray Partridge

Perdix perdix



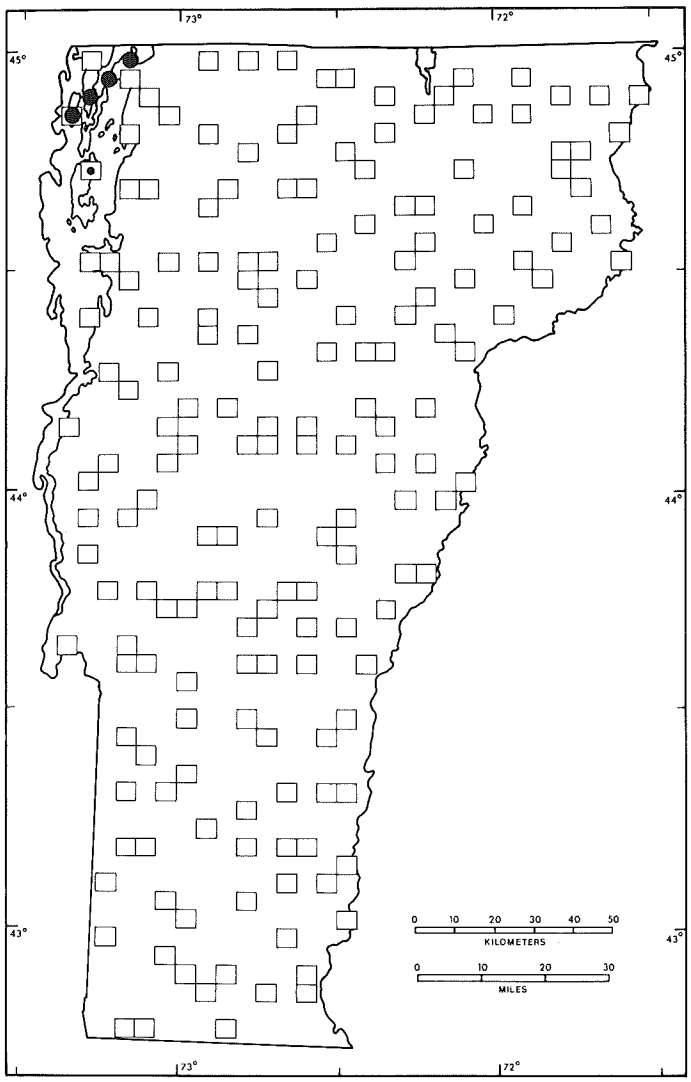
The Gray (formerly called the Hungarian) Partridge is perhaps the only non-native gamebird occurring in Vermont that successfully withstands even the severest of the state's winters. There is no open season on the species in the state, since the existing population is believed to be too small to support an annual harvest. A native of Europe and eastern Russia, the Gray Partridge was introduced to Vermont before 1893 without success, and disappeared following the severe winter of 1904–5 (Foote 1946). The species was introduced in large numbers in New York around 1930 (Wilson 1959) and gradually spread via the St. Lawrence River valley to the northern portion of the Champlain Valley, where it found the mosaic of flat, open grasslands and grainfields that it prefers. This spread may have been hastened by local releases by sportsmen anxious to establish a gamebird in agricultural areas too barren to support grouse. Today the "Hun" can be found locally throughout the northern U.S. and southern Canada, although the center of its abundance is the grainfields of the Great Plains.

Gray Partridge prefer large grainfields and permanent grassfields. The species requires relatively little shelter from the cold. Stubble provides all the protection necessary under all but the most austere conditions, when the Gray Partridge will utilize snow roosts, as does Vermont's native Ruffed Grouse. Heavy snowfall seldom causes significant mortality since barren fields are generally windswept; but ice and sleet storms that deprive the birds of food and shelter have been implicated in periodic population declines in New York (Bull 1974).

Although established in Vermont for more than 30 years (J. D. Stewart, pers. comm.), the Gray Partridge appears to be restricted in its distribution to the northern portion of the Champlain Valley. Most sightings come from Grand Isle and the vicinity of Missisquoi National Wildlife Refuge. The species' apparent failure to colonize similar habitats farther south in the Champlain Valley is inexplicable, since land-use patterns and topography appear to be similar.

Because of its secretive nature and proclivity for barren grasslands and grainfields, the Gray Partridge frequently eludes detection even in areas where it is relatively common. Birds are most conspicuous in winter when they concentrate in coveys on windswept knolls or manured croplands at times of limited food. During the spring, coveys break up into pairs that remain together throughout the breeding season. Pairs studied in South Dakota (Smith et al. 1982) occupied relatively small home ranges in spring—9.7–17 ha (24–42 a)—compared to the larger range—96 ha (237 a)—utilized during the rest of the year when the birds travel in coveys.

Pairing starts several months before actual nesting (Cramp and Simmons 1977; Weigand 1980). Calling activity before nesting may be used to locate pairs, and is usually heard before sunrise. Hayfields are preferred nesting areas, followed by field borders and roadsides. The nest, constructed by the female, consists of a shallow hollow lined with stems and grasses, with a fine inner lining of leaves, grass, and feathers (Edminster 1954). Fifteen eggs constitute an average clutch (the range is 5 to 20), which



No. of priority blocks in which recorded

TOTAL 2 (1%)

Possible breeding:	1 (50% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	1 (50% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	2	6	100
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

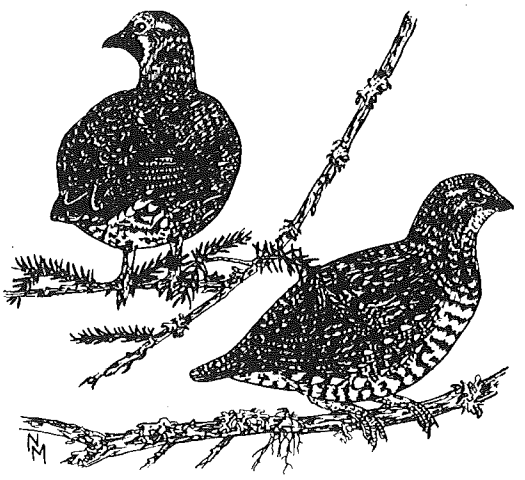
is incubated, mostly by the female, for 24 to 25 days (Gates 1973; Johnsgard 1973). A hen with 16 young was reported from North Hero (ASR, D. McNair). Renesting may occur if the first clutch of eggs fail to hatch, but second clutches are smaller (the average is 9 eggs). A brood of 6 found August 12 at West Swanton (G. O'Shea, pers. observ.), estimated to be 5 days old, probably represented a renesting effort. The precocial young leave the nest site shortly after hatching under the guardianship of both parents. Adults exhibit crippled-bird displays if their brood is disturbed, and may be easily confirmed as breeders during this period. Young begin to fly in 2 weeks, but the family unit may stay together through the following winter. As is true of many ground-nesting species, nest and juvenile losses are high; mowing and wet weather are the principal factors responsible for the high mortality rate.

Although extremely local in its distribution, the Gray Partridge may be more common within its limited Vermont range than most observers realize. The species is unobtrusive and seldom crosses paths with most bird watchers, since it occurs in large, open agricultural fields.

DOUGLAS P. KIBBE

Spruce Grouse

Dendragapus canadensis



The Spruce Grouse is one of Vermont's rarest resident birds, and is proposed for the state's Species of Special Concern List. Early accounts (Thompson 1842; Cutting 1884) indicate that the Spruce Grouse was once fairly widespread in Essex and Orleans counties. Now this boreal zone species is confined to a very small area of the Northeast Highlands. Since 1932 the Spruce Grouse has been reported only once outside its limited current range in northern Essex County: in the summer of 1977, 3 Spruce Grouse were observed on Wheeler Mountain, Sutton, on the northwestern edge of Caledonia County (ASR, E. Cronin).

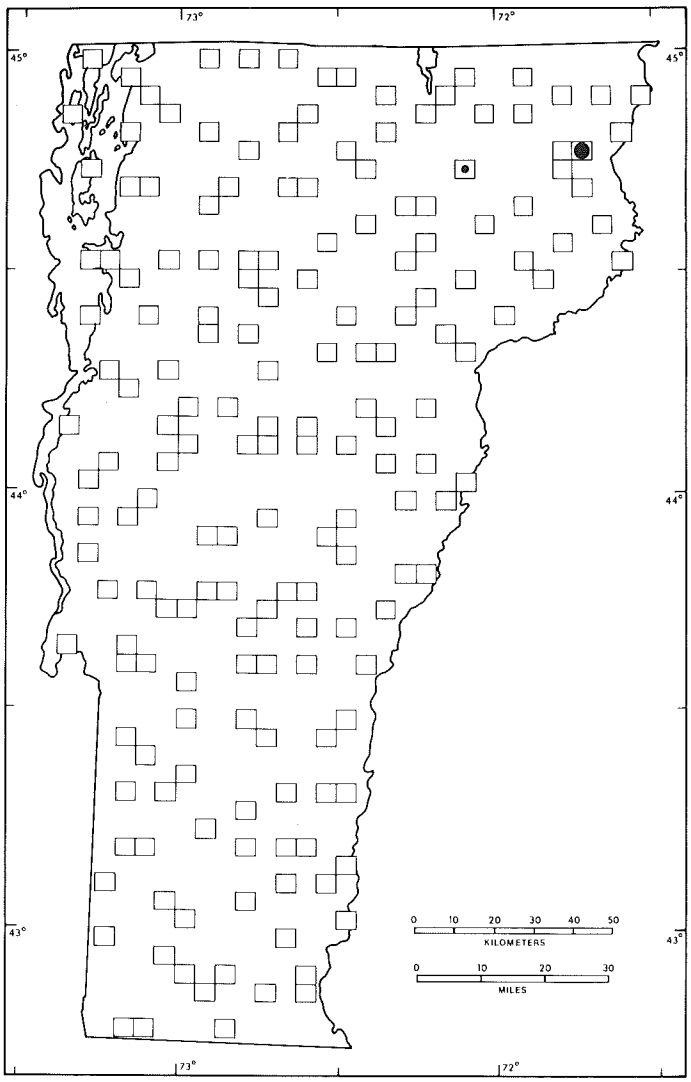
The Spruce Grouse requires extensive, dense stands of spruces (in Vermont, apparently black spruces) in cool, wet areas with openings supplied by bogs, swamps, or clearings. These boreal conditions exist only in the far northeastern corner of the state, where the species is restricted to approximately 104 sq km (40 sq mi); there a coniferous forest partly fills the large, wet bowl about halfway between the villages of Island Pond and Bloomfield. While extensive clearcutting since 1977 has reduced other forest tracts in the area, the Wenlock Wildlife Management area provides a refuge for the Spruce Grouse. This area was created by acquisition of an 809 ha (2,000 a) tract (including Moose Bog) by the Vermont Fish and Game Department, through the aid of The Nature Conservancy.

In New York State, the species is listed as Threatened, and occurs almost exclusively in spruce bogs, with black spruce, tamarack, and balsam fir the dominant tree species. In New York, the species' habitat has been reduced greatly by logging and the resulting conversion of spruce-fir forest to hardwood or mixed-hardwood-conifer forest; its decline is linked to its occurrence in isolated "islands" of spruce bogs separated from each other by hardwood or mixed-hardwood forest, which apparently prevents the remaining populations from intermixing (Chambers 1980; P. E. Nye, pers. comm.).

Nests of the Spruce Grouse consist of shallow depressions on the ground, often in moss, which are well concealed by overhanging spruce branches. Clutches number 4 to 10 eggs, typically 6 to 8 (Harrison 1975). The female incubates alone for about 24 days (Harrison 1978). The young leave the nest soon after hatching; by 1 week of age they can fly into low bushes (Rue 1973). As with other precocial young, fledglings begin feeding themselves almost immediately, relying initially upon insects for food.

Only four breeding records exist for Vermont: July 2, 1972, a female with young in Ferdinand, near Moose Bog (L. N. Metcalf, pers. comm.); June 29, 1978, a female with 4 to 5 tiny young in Moose Bog (ASR, G. F. Oatman and A. Pistorius); July 20, 1978, a female with 4 young in Moose Bog (ASR, W. G. Ellison); and June 14 and 15, 1980, a female with 7 to 9 tiny young in Moose Bog (ASR, G. F. Oatman). The breeding season is the most opportune time to see the Spruce Grouse in Vermont, as females allow a close approach while attending to their broods of precocial young.

The Island Pond Christmas Bird Count covers almost all of the species' current habitat; yet between 1973 and 1983 only 12 Spruce Grouse were located (five records): December 18, 1976, 2 seen; December 23,



No. of priority blocks in which recorded

TOTAL 2 (1%)

Possible breeding:	1 (50% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	1 (50% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	1	5	50
Northeast Highlands	1	6	50
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

1978, 1 seen; December 23, 1979, 3 seen; December 18, 1982, 4 seen; and December 27, 1983, 2 seen (CBC, 1974–84).

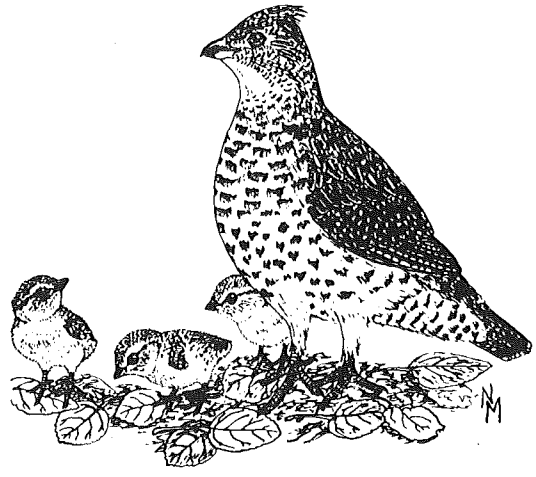
The Spruce Grouse is much more arboreal than the Ruffed Grouse; conifer needles and buds, usually taken from high up in the trees, consitute a substantial part of the species' diet, especially in winter. At other seasons Spruce Grouse eat berries, mushrooms, seeds of grasses and weeds, insects, herbaceous leaves, and fern fronds (Bent 1932; Johnsgard 1973). In summer Spruce Grouse frequent bogs, heaths, and other more open areas, though they always take to the trees when disturbed.

In many wild areas the Spruce Grouse is almost absurdly tame, allowing approach nearly within touching distance, thereby earning its popular name of "Fool Hen." Vermont birds of this species are more wary, normally flying up in a burst of wings upon human approach and disappearing into thick spruce-fir cover (G. F. Oatman, pers. observ.).

G. FRANK OATMAN

Ruffed Grouse

Bonasa umbellus



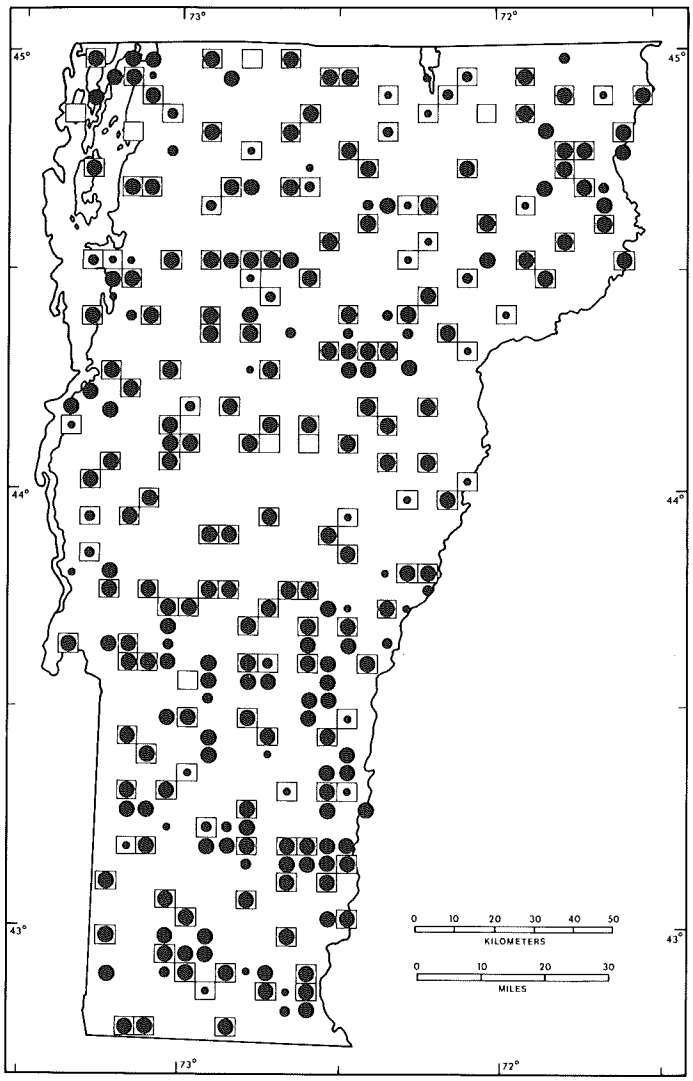
The Ruffed Grouse, or "partridge" as it is known throughout Vermont, is a popular upland gamebird for which there is an annual autumn hunting season. The species inhabits mixed or deciduous forest with brushy clearings and a thick understory growth of shrubs. The presence of grouse seems to be determined by the occurrence of catkin-bearing trees and shrubs, especially aspen (Svoboda and Gullion 1972), although alder has also been cited as important in marginal situations (Palmer 1963; Pietz and Tester 1982). Brood range, winter food resources, and drumming sites in Vermont are found in early successional forest, primarily second-growth areas and abandoned farmland (Black 1976; M. Scott, Vt. Fish and Wildlife Dept., pers. comm.).

Ruffed Grouse are often encountered along old roads and trails in the woods. The Ruffed Grouse's startlingly explosive flush often leaves the observer breathless. Another clue to the presence of Ruffed Grouse is the territorial drumming of the male. A low, throbbing, accelerating sound, drumming is caused by a series of compression waves created by the beating of the male's wings while he remains in a stationary position on a display log, stump, elevated terrain, or stone wall (Sousa 1978; M. Scott, Vt. Fish and Wildlife Dept., pers. comm.). Research in Grafton, Vermont, showed that stone walls were used frequently for drumming by grouse (Black 1976; M. Scott, Vt. Fish and Wildlife Dept., pers. comm.). Drumming begins after the snow melts, is most frequent from March through May (Edminster 1947), and peaks in late April (Brander 1967). Drumming may be heard at other times of year, especially when juveniles disperse in autumn. Confirmation is most easily obtained by locating broods, either through the conspicuous distraction displays of the hen or by flushing the chicks. Eighty-one percent of Vermont confirmations involved the discovery of a brood.

Adult Ruffed Grouse are resident and sedentary. Females may occasionally move more than 1.6 km (1 m) (Hale and Dorney 1963); juveniles may move considerable distances after broods break up in early September (Godfrey and Marshall 1969). Mating occurs from late March to mid May, and nesting is under way by mid April. Dates for 11 Vermont nests containing eggs range from April 20 to June 9. The nest is usually a hollow at the base of a tree or stump, and is lined with leaves. Eggs vary widely in number; the average size of 1,473 New York State clutches was 11.5 eggs (Bump et al. 1947). Replacement clutches were smaller, averaging 7.5 eggs for 149 renests in New York (Bump et al. 1947). The incubation period lasts 23 to 24 days, although it may be lengthened by cold weather (Bump et al. 1947).

Ruffed Grouse chicks leave the nest within hours of hatching. At that time broods move to early successional habitats and openings, such as recently lumbered areas and overgrown pastures, and along woods roads where insects—a staple in the chick's diet—are abundant (Edminster 1947). Twelve Vermont dates for flightless chicks range from May 30 to July 31. The young can fly at 10 to 12 days (Johnsgard 1973). Forty-two dates for broods of fledged young in Vermont range from June 10 to July 31.

The Ruffed Grouse is common and wide-



No. of priority blocks in which recorded

TOTAL 172 (96%)

Possible breeding:	22 (13% of total)
Probable breeding:	14 (8% of total)
Confirmed breeding:	136 (79% of total)

Physiographic regions in which recorded

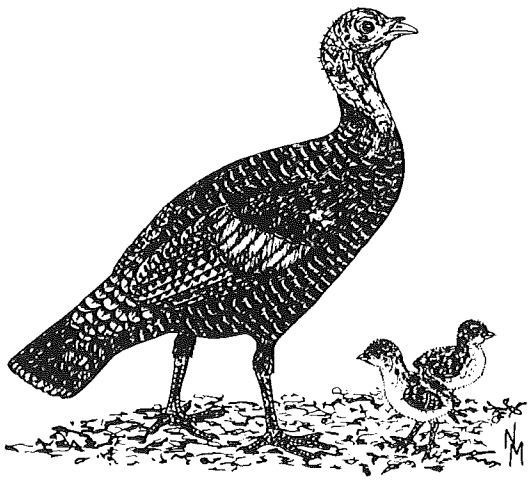
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	28	90	16.0
Green Mountains	53	98	31.0
North Central	18	95	10.5
Northeast Highlands	16	100	9.0
East Central	18	95	10.5
Taconic Mountains	15	94	9.0
Eastern Foothills	24	100	14.0

spread in Vermont; it was found in 96% of the priority blocks, and breeding was confirmed in 79%. This species is subject to periodic or cyclic declines. Average per-party-hour figures from the National Audubon Society's Christmas Bird Counts for the period 1969–82 illustrate a steady rise in the number of grouse between the winter of 1970–71 and the winter of 1979–80. During 1970–71, only 0.02 Ruffed Grouse per-party-hour were observed on Vermont counts; by 1979–80 the population had recovered to a peak party-hour figure of 0.28. Vermont forests have now grown somewhat beyond the successional stage of optimal ground cover for the Ruffed Grouse. The future of the Ruffed Grouse in Vermont will depend on land-use practices, and especially forestry practices in woodlands.

WALTER G. ELLISON

Wild Turkey

Meleagris gallopavo

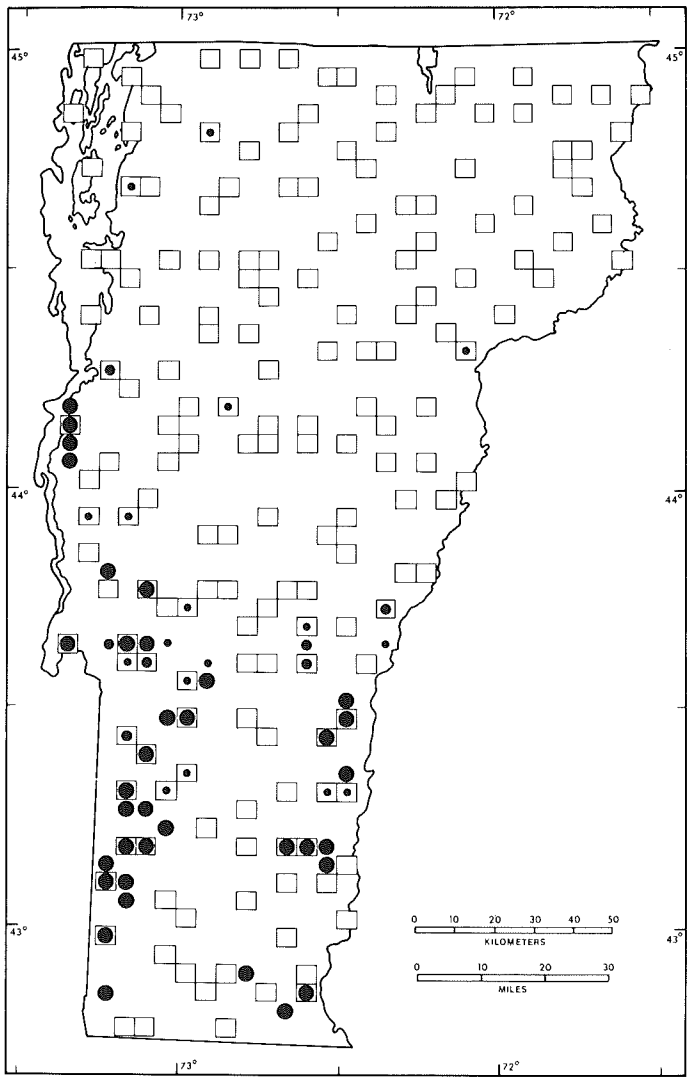


The Wild Turkey is native only to the Western Hemisphere, but was exported to Europe by the conquistadors; there, because of confusion with another recent import via the Turkish Empire—the African guinea fowl—our native bird acquired the name of a foreign land (Aldrich 1965). However, this largest of North American upland gamebirds, once proposed by Benjamin Franklin to be our national symbol, was extirpated from much of New England by the mid-1800s through destruction of its forest habitat.

The Wild Turkey currently numbers some 15,000 birds in Vermont (J. Wallin, pers. comm.) as a result of a highly successful reintroduction program carried out by the Vermont Fish and Game Department. In 1969 and 1970, 31 Wild Turkeys brought from western New York were released in two locations—Pawlet and Hubbardton. In 1972 instate relocation of trapped birds began. Wallin (1983) stated that between 1972 and 1982 "range extension has been expedited through the instate trap-and-transfer of 177 birds to 10 towns: Brattleboro, Bennington, Halifax, Dummerston, Milton, Weybridge, Norwich, Bristol, Jericho, and Grand Isle. Wild Turkeys now occur in a general range encompassing about 40% of the state." Hunting seasons have been expanded as the population has grown. In 1983, the eleventh spring hunt saw 294 birds taken; an average of 800 turkeys are taken in each fall hunt. Since Vermont has more Wild Turkeys than other New England states, its hunting kills greatly exceed those of the region's other states (Vt. Fish and Game Dept., *News and Notes* 1983). Nature watchers and hunters have benefited from this reestablishment of an extirpated species. Wild Turkeys were regularly sighted (4 out of 5 years) during the Atlas Project period on the Christmas Bird Counts in Bennington, Brattleboro, Saxtons River, and Rutland (RVB, Winter 1977–81). Sighting these impressive birds, which stand 0.9–1.2 m (3–4 ft) tall and weigh 8.2–10.9 kg (18–24 lbs), along a snowy road in winter is surely a thrill.

Historically, the Wild Turkey's Vermont range appears to have included the state's four southern counties (Foote 1946); in the mid-1800s the Wild Turkey still had a foothold "in the mountains of the southern part of the state," according to Thompson (1842). The turkey's habitat requirements include mature hardwood forests—which provide nuts, seeds, and roosting trees—interspersed with open farmlands or grasslands to provide the insects that the young particularly need (Wallin 1983). Land that is only 12% forested (such as the countryside of small woodlots around Addison, Bridport, and Panton) can provide suitable habitat, as long as hedgerows are present (Wallin 1983). Reintroduction in Vermont would have been impossible before the 1950s and 1960s, when forests had regenerated enough to provide suitable habitat for the species (J. Wallin, pers. comm.).

The Wild Turkey's courtship behavior is well known and dramatic: the male struts and gobbles in woodland clearings to attract the hens (Bent 1932; Aldrich 1967a; Terres 1980). The female prepares the nest, lays the eggs, and raises the young. Nests are placed in leaf-lined scrapes or depressions in the ground, often under fallen limbs, and



No. of priority blocks in which recorded

TOTAL 35 (20%)

Possible breeding:	14 (40% of total)
Probable breeding:	5 (14% of total)
Confirmed breeding:	16 (46% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	7	23	20.0
Green Mountains	3	5	8.5
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	1	5	3.0
Taconic Mountains	14	87	40.0
Eastern Foothills	10	42	28.5

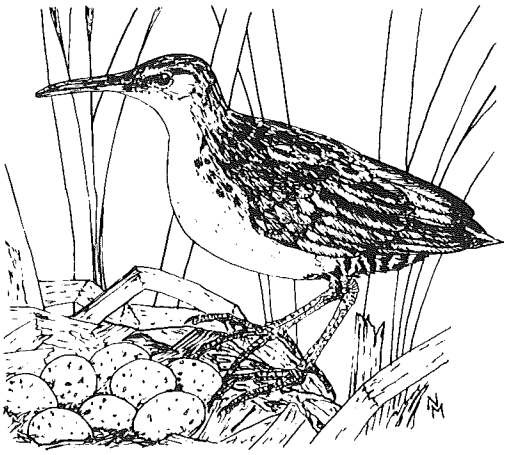
also in hayfields and slash (J. Wallin, pers. comm.). Ten to 12 eggs are laid, and the female incubates for 27 to 28 days. In Vermont, incubation is concentrated during the first 8 days of May (Wallin 1983). Atlas Project dates for nests with eggs are May 21 in Proctor and June 20 in Brattleboro; the sole date for recently hatched young is May 26. The most frequently used confirmation code was FL, for recently fledged young; five dates for FLS were between June 28 and July 23.

Because the Wild Turkey has been well studied in Vermont, it is one of the few species for which the Atlas Project produced no new data. Turkeys were most abundant in southern Vermont, occurring in high numbers in the priority blocks of the Taconic Mountains, and moderate numbers in the Eastern Foothills. The species was absent from the North Central region and Northeast Highlands. The Wild Turkey is an interesting, wily, and colorful readdition to Vermont's wildlife.

SARAH B. LAUGHLIN

Virginia Rail

Rallus limicola

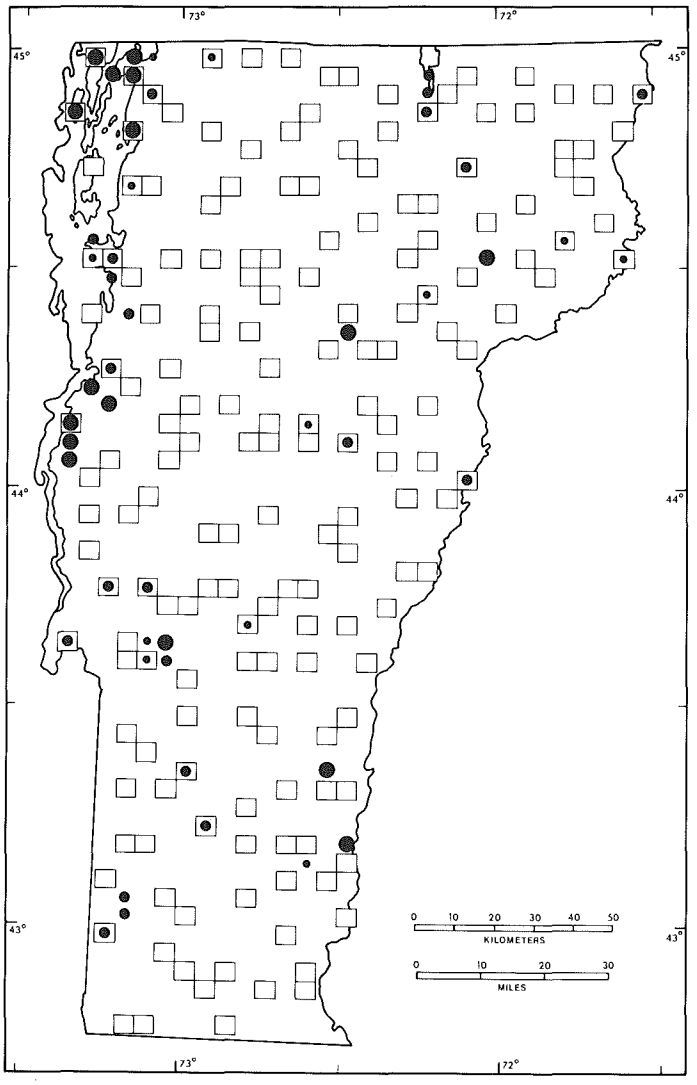


Widely distributed in North America, the Virginia Rail is the most frequently encountered rail in Vermont. Breeding across the middle of Canada and south to North Carolina, Oklahoma, and New Mexico, the species occupies freshwater marshes of various types. In Vermont, this species is most frequently found in cattail marshes. The Virginia Rail, though apparently highly territorial—as evidenced by its fearless, aggressive assaults on birdwatchers' tape recorders—demands little space for its territory. Tiny wetlands, 0.1 ha (0.3 a) or less in size, may host one or more pairs. While this fact undoubtedly contributes to the species' success, it also means that some pairs were probably overlooked by Atlas Project workers who ignored small patches of potential habitat. The species made a strong showing around the Memphremagog, West Rutland, and northern Champlain marshes, but was less well represented in the Connecticut River valley and southern end of Lake Champlain. Elsewhere in the state, Virginia Rails were sparsely distributed. Habitat is limited in much of the state, particularly in the Green Mountains, and without nearby rails to serve as population reservoirs, isolated patches of suitable habitat may go unpopulated.

Virginia Rails are early migrants and usually begin appearing on territory in the third week of April, shortly after the marshes thaw. Vocalizations by neighboring males are challenged at any time of day, although calling appears most intense in the evening. Territorial response was used to advantage by Atlas Project workers with tape recorders, who found Virginias quick to respond, frequently running or—more rarely—flying to the attack. The significance of interspecific territoriality is unknown, but tape-recorded Sora calls frequently elicit more vigorous responses from Virginia Rails than do the Virginia's own calls. Both species, however, may share the same territory (Glahn 1974). Densities of Virginia Rails in Vermont marshes are unknown, but in the major marsh systems at least they appear to be fairly high. Zimmerman (1977) included much of Vermont in the general area of highest breeding densities, and indicated that 0.4 to 4.0 pairs per ha (0.2 to 1.6 pairs per a) may occur locally.

Nests are loosely built of available vegetation in 3 to 4 days, and are placed 5–13 cm (2–5 in) above water that is 8–25 cm (3–10 in) deep. Rarely, a ramp to the water is built. Nest material may be added to compensate for rising water levels, and the nest may be domed by overhanging vegetation. From 6 to 13 buff eggs with brown spots are laid; incubation commences as soon as the clutch is completed. Nine Vermont clutches, containing 6 to 11 eggs each, have been reported between May 20 and June 14. Duties during the roughly 18- to 20-day incubation period are shared by both adults (Walkinshaw 1937). The young, like those of other Rallidae, are precocial and black. They can be told from young Soras by the black ring around their yellowish bills. Foraging by the brood may occur several hundred feet from the marsh. The young are unable to fly until 6 to 7 weeks of age; they have been sighted in Vermont as early as June 1 and as late as August 11 (six dates).

Virginia Rails winter from Virginia south to Mexico, normally departing from Vermont by mid October, but occasional lag-



No. of priority blocks in which recorded

TOTAL 28 (16%)

Possible breeding:	9 (32% of total)
Probable breeding:	14 (50% of total)
Confirmed breeding:	5 (18% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	12	39	43
Green Mountains	3	5	11
North Central	3	16	11
Northeast Highlands	3	19	11
East Central	2	10	7
Taconic Mountains	4	25	14
Eastern Foothills	1	4	3

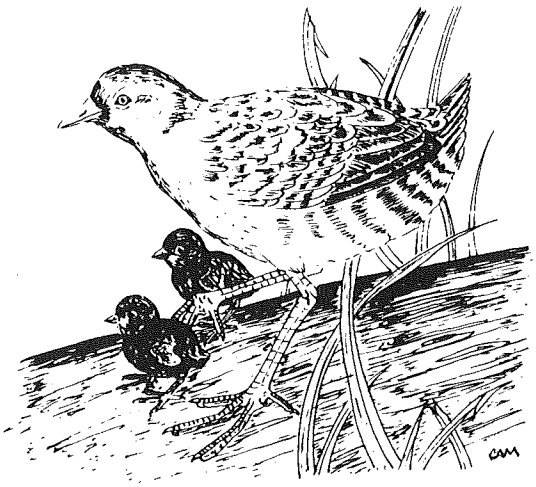
gards can be expected to remain in large marshes into December.

Considerable uncertainty exists over the past status of the Virginia Rail in Vermont. Apparently it has always been considered an uncommon species, although its past abundance relative to that of the Sora is unclear. Both species have always been classified as gamebirds with generous bag limits, but the actual annual take of either is minimal. Since drainage of marshland in Vermont has occurred only on a limited local basis, habitat loss is unlikely to have caused any change in status. No breeding studies or concerted searches for the Virginia Rail have ever been conducted in Vermont; such studies could offer further insight into the status of the species. With no evidence of a marked change in the species' status, it may be concluded that the Virginia Rail has probably always been common in prime habitats in the Champlain Valley and the Lake Memphremagog marshes, but uncommon to rare in suitable habitat elsewhere throughout the state.

DOUGLAS P. KIBBE

Sora

Porzana carolina

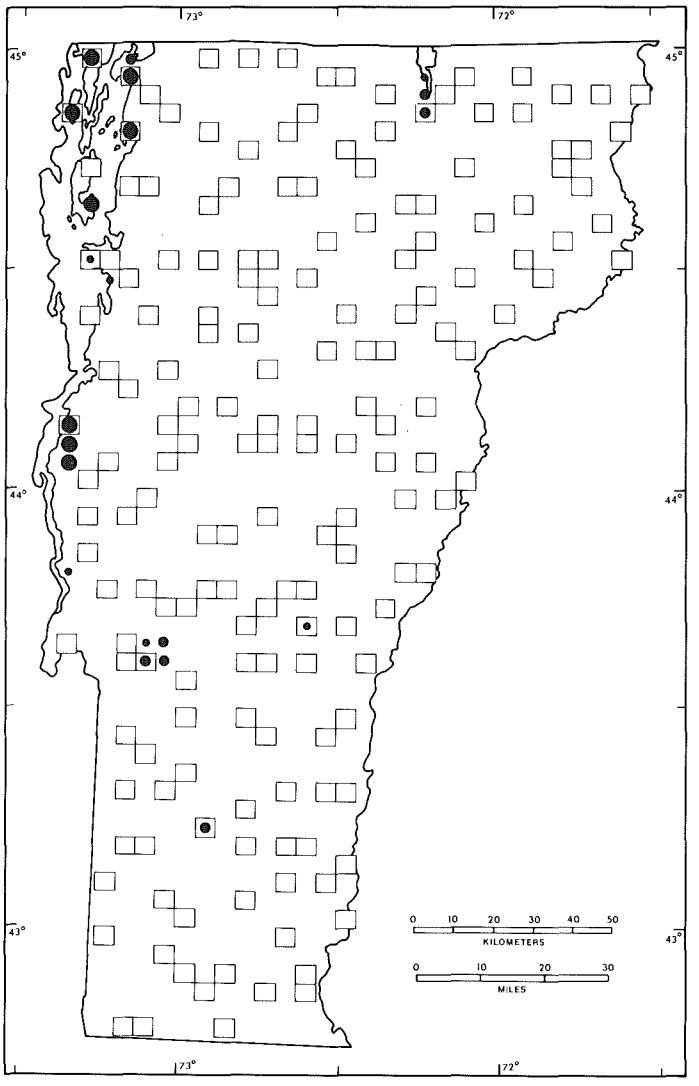


The Sora, with its stubby yellow bill and erect, constantly twitching tail, reminds one of an errant bantam hen. Although considered the most common rail in North America (Pough 1951), it proved to be one of the most difficult members of its family to find in Vermont. Located in only 10 Atlas Project priority blocks statewide, the Sora appeared to be primarily restricted to Vermont's larger marshes, namely those at West Rutland, Lake Memphremagog, and along Lake Champlain. No Soras were recorded in the Connecticut River valley, although suitable habitat exists there. Unless an observer is in excellent habitat, the chances of hearing, much less seeing, a Sora without using tape recordings of its call are slim indeed. Because Vermont does not offer the large inaccessible wetlands that make excellent rail habitat, it is perhaps not surprising that few Soras were lured into view by Atlas Project workers. However, the Virginia Rail was encountered three times more often than the Sora in priority blocks, a fact probably related to the former's acceptance of smaller marshes.

The status of the Sora is not known to have changed significantly since Vermont was settled. Habitat loss has been minimal, as relatively little drainage of the state's wetlands has occurred. Though classified as a gamebird, few if any Soras are harvested annually. Griscom and Snyder (1955) and Bull (1974) considered it a declining species in Massachusetts and New York; no reasons for the decline are apparent.

Those who have succeeded in flushing a Sora and have watched its short labored flight just above the marsh vegetation may be amazed to learn that it is a strong migrant, regularly crossing the Caribbean Sea, and that it has been recorded as far south as Peru (Terres 1980). Perhaps because it undertakes a longer migration, the Sora returns to Vermont slightly later than the Virginia Rail, generally announcing its arrival with *ker-wee* and *whinny* calls during the last week of April. Nesting commences about 2½ weeks after the first birds return (Pospichal 1952). Although researchers in other areas have reported nest densities as high as 35 nests per 43 ha (107 a) (Tanner and Hendrickson 1956), Vermont densities even in prime habitats such as the Dead Creek Wildlife Management Area are assumed to be considerably lower. In the absence of an intensive survey of these localized breeding areas, however, any estimate is speculative.

Soras prefer to nest in wet marshes, placing their nests above water 10–15 cm (6–10 in) deep (Walkinshaw 1940). Nesting apparently commences in mid May in Vermont. All three Vermont clutch dates are between May 27 and 31. The nest is placed in sedges, bushes, or cattails about 15 cm (6 in) above the water. It is constructed of surrounding vegetation, and, unlike the Virginia Rail's, is usually lined with fine plant material (Walkinshaw 1940). The female begins her clutch before the nest is completed, and incubation usually commences when the clutch is only half completed. A dome constructed of overhanging vegetation and an entry ramp are frequently added as laying progresses. Even partly submerged eggs have reportedly hatched (Gibbs 1899). A full clutch may consist of 6 to 18 (usually 8 to 11) buff, irregularly spotted eggs. Soras are apparently more shy around the nest



No. of priority blocks in which recorded

TOTAL 10 (6%)

Possible breeding:	2 (20% of total)
Probable breeding:	3 (30% of total)
Confirmed breeding:	5 (50% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	6	19	60
Green Mountains	1	2	10
North Central	1	5	10
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	1	6	10
Eastern Foothills	1	4	10

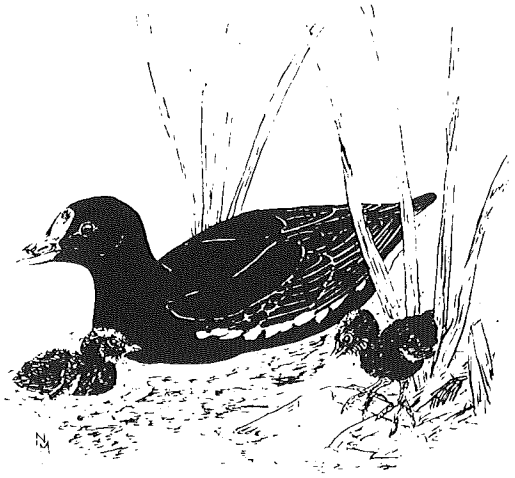
than are Virginia Rails (Gillette 1897; Mousley 1937). Both members of the pair share in incubating and caring for the young. Incubation may take 11 to 22 days; the average is 19, depending on clutch size (Walkinshaw 1940, 1957; Pospichal 1952). Since hatching takes place over several days, the pair frequently share responsibilities, one member brooding the jet black, precocial young while the other continues to incubate. Walkinshaw (1940) and Pospichal (1952) believed that posthatching Soras remain more closely associated with marshlands during the summer than Virginia Rails—a conclusion supported by local Vermont observations (D. Kibbe, pers. observ.).

Soras eat a wide variety of foods. Seeds, mollusks, insects, and even fish comprise the summer diet (Horak 1970), but seeds may constitute much of the diet during the remainder of year, and especially in the fall when the species congregates in large marshes (Meanley 1960; Webster 1964). Since Soras are relatively quiet except for a brief period in the spring, the fall departure dates are poorly defined for Vermont.

DOUGLAS P. KIBBE

Common Moorhen

Gallinula chloropus

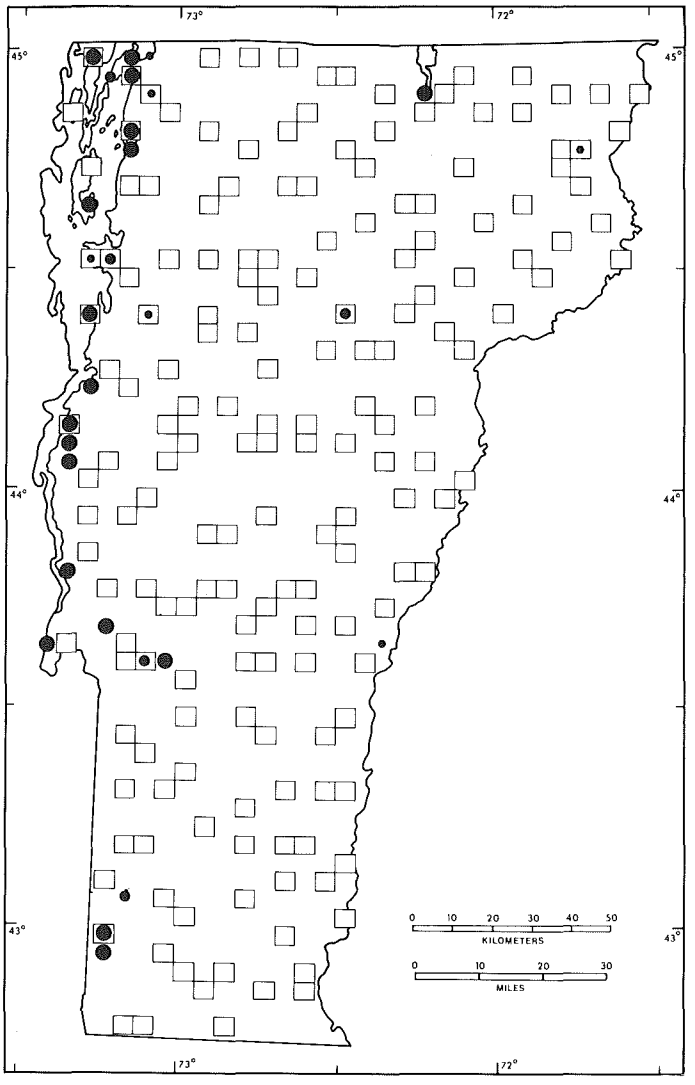


The Common Moorhen, formerly the Common Gallinule, seems inappropriately named for Vermont since it is neither common nor an inhabitant of moors. The species is generally restricted to the larger marshes of the state, which provide the dense emergent vegetation in which it prefers to nest. Nowhere in its extensive North American range does the Common Moorhen appear to be particularly common (Sanderson 1977), although its retiring nature and affinity for dense, inaccessible cover may confound population estimates. Because moorhens forage on open water, swimming and occasionally diving as they feed on aquatic vegetation and invertebrates, they are sometimes mistaken for ducks by the casual observer. However, moorhens are close relatives of the secretive, marsh-loving rails, despite their behavioral similarity to waterfowl.

In Vermont, Atlas Project workers found the Common Moorhen restricted almost exclusively to a band of wetlands bordering Lake Champlain. Breeding has also been observed at the West Rutland Marsh, the extensive marshes on Lake Memphremagog at the mouth of the Barton River, on Lake Bomoseen, and in the vicinity of Bennington. The species is extremely rare along the Connecticut River watershed, and was absent from Herrick's Cove, where habitat seems more than adequate. Moorhens are virtually unknown in the many ponds that dot Vermont's higher elevations. Perhaps because Vermont is near the northern breeding limit of the species, Common Moorhens are rarely seen even during migration away from their usual breeding areas. Migration extends from late April through mid May and from September through mid October, with April and October being the arrival and departure months, respectively. Common Moorhens of the East winter along the Gulf Coast (AOU 1983).

Pairing and courtship begin during migration, and care must be taken not to mistake migrants for possible breeders. Pairs defend a territory within the marsh, using calls, displays, and aggressive attacks on intruders (Cramp and Simmons 1980). Courtship entails a variety of visual and behavioral displays—bill dipping, mummering, bowing and nibbling, and chasing (Cramp and Simmons 1980)—all directed at the prospective mate. Unlike mating among many waterbirds, solicitation and copulation always occur on land or on a display platform, never on water.

Nesting activity in Vermont apparently commences in late May and early June. The nest, constructed by both members of the pair, is placed in dense emergent vegetation, usually in 0.3–0.9 m (1–3 ft) of water (Strohmeyer 1977). Built of dead cattails, sedges, and reeds, the nest, although supported and concealed by emergent vegetation, usually has a ramp to the water and a canopy. Clutches contain from 2 to 17 eggs—usually from 6 to 10. Eggs are deposited at a rate of 1 a day; the clutch is often incubated by both sexes from about the 5th egg on (Krauth 1972). The incubation period, normally 18 to 22 days, varies with clutch size, since the eggs hatch asynchronously. Data are extant on only one clutch from Vermont, a nest of 10 eggs found June 1 in the West Rutland Marsh. Although Common Moorhen chicks are precocial, they are brooded frequently after hatching by both adults. After leaving the nest, they use resting platforms (constructed from



No. of priority blocks in which recorded

TOTAL 13 (7%)

Possible breeding:	4 (31% of total)
Probable breeding:	3 (23% of total)
Confirmed breeding:	6 (46% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	9	29	69
Green Mountains	0	0	0
North Central	1	5	8
Northeast Highlands	1	6	8
East Central	0	0	0
Taconic Mountains	2	12	15
Eastern Foothills	0	0	0

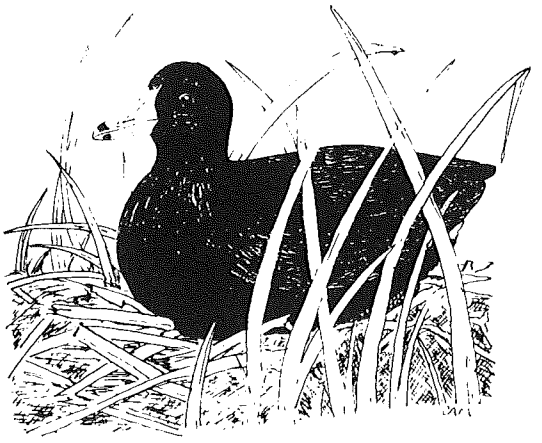
marsh vegetation) or muskrat houses as brooding areas. Although precocial, the young are entirely dependent on the adults during their first several weeks of life (Cramp and Simmons 1980). Despite their secretiveness, moorhens proved relatively easy to confirm as breeders through sightings of fledglings (FL), probably because full growth is not attained for 10 weeks (Strohmeyer 1977), and young remain with the parents well into the fall. Although moorhens have been reported to have high nesting, hatching, and fledging success (Byrd and Zeillemaker 1981), and northern birds are thought to have larger clutches than southern birds (Sanderson 1977), the four Vermont FLS were of relatively small broods (2 to 4 young). Six broods were reported from June 29 (downy young) to August 21 (fledglings).

Although moorhens are considered a gamebird throughout the Northeast, few hunters actively pursue them; consequently, harvests, despite generous bag limits, are probably minimal. However, the species is rare in some areas of apparently suitable habitat, perhaps because Vermont is near the northeastern edge of its range and at the limit of its climatic tolerance. Common Moorhens have been considered rare and local in Vermont since the 1800s (Allen 1909), a status they still hold today.

DOUGLAS P. KIBBE

American Coot

Fulica americana



Found in both North and South America, the American Coot is an abundant breeder throughout much of the western U.S. and Canada. In the East, the species breeds regularly across southern Canada and the northern tier of states to the St. Lawrence River valley, but becomes very local farther east and south (except for Florida, where it is a regular breeder).

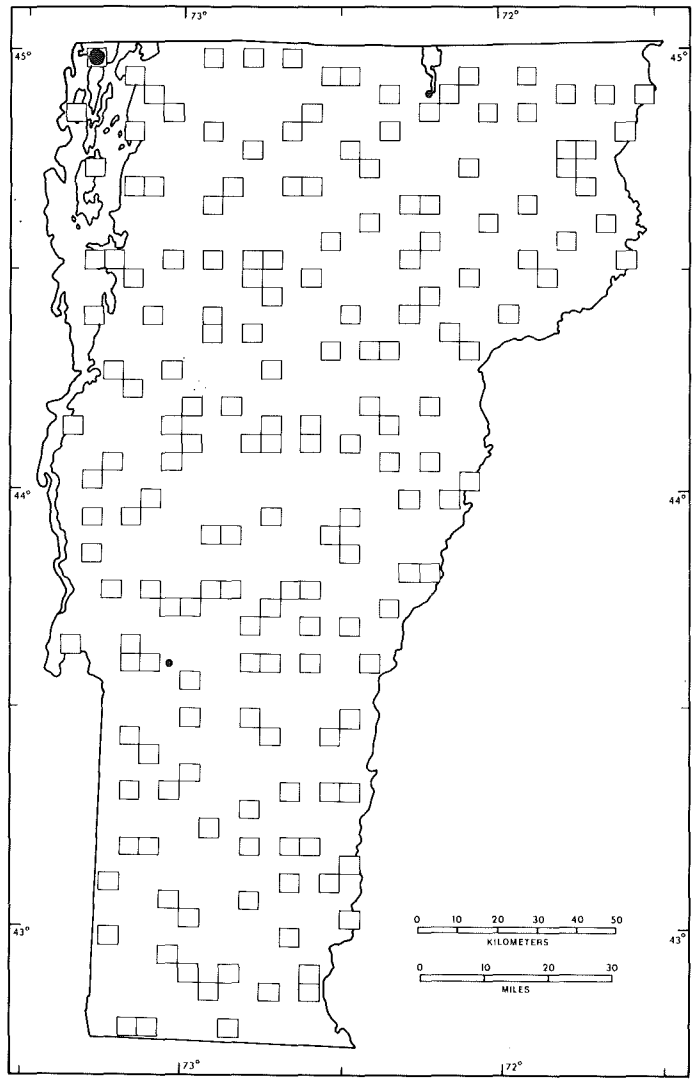
American Coots appear in Vermont in mid April during spring migration. Because of their scarcity the arrival and nesting dates of local breeders are unknown. Bull (1974) gave egg dates from April 25 to July 14 for New York. Nesting is not initiated until vegetative growth is sufficient for nest concealment (Fredrickson 1970), since the nests, while often floating, are usually anchored to emergent vegetation. Coots are highly territorial during the breeding period, attacking both waterfowl and other coots that venture into their territory. A variety of calls and notable displays are evident during courtship (Gullion 1954; Ripley 1977). In prime breeding range, territories are often as small as 0.7 ha (less than 1 a) in areas of emergent aquatic vegetation (Sugden 1979).

Nests are seldom closer than 40 m (131 ft) from one another (Sugden 1979). Both members of the pair participate in nest building. Cattails provide the most common nest material and cover. The female lays 7 to 12 eggs, commencing incubation before the clutch is completed. Incubation, shared by both sexes, takes 23 to 27 days. The male usually incubates during the night, and also assumes responsibility for night brooding of the young (Gullion 1954; Fredrickson 1970). Although chicks are precocious and nidifugous, they are brooded at the nest at least until all eggs hatch. The parents feed the young aquatic insect larvae while brooding and for several days after the young leave the nest. After the breeding period American Coots resume their gregarious ways. Small numbers, presumably migrants, appear occasionally on Vermont lakes and ponds during the fall.

There are two confirmed breeding records for the state. The earliest and only pre-Atlas Project record was made at Lake Bomoseen (Cooke 1904). A brood of young observed at Mud Creek Wildlife Management Area in Alburg was the only confirmation during the Atlas Project period (ASR, N. King). Possible breeding was recorded in the cattail marshes of West Rutland Marsh, where 1 coot was heard and seen on June 6, 1980 (ASR, W. J. Norse); and in marshes of the South Bay of Lake Memphremagog, near the mouth of the Barton River, where 3 adults were seen on May 28, 1980 (ASR, G. F. Oatman).

In Vermont, the American Coot is a rare bird even during migration; during the 10 years covered by *Records of Vermont Birds* it occurred in 4 spring seasons, 2 summer seasons, 7 fall seasons (an average of 4 individuals per fall), and, surprisingly, in mid December on 2 Christmas Bird Counts on the Burlington waterfront (RVB, Winter 1973–82).

The American Coot is a member of the Rallidae, closely related to the Common Moorhen, the Sora, and the Virginia Rail; because of its behavior, however, it is often mistaken by the novice observer for a duck. During much of the year coots are gregarious and spend their time paddling around on ponds and along shores of lakes, feeding



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	1 (100% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	1	3	100
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

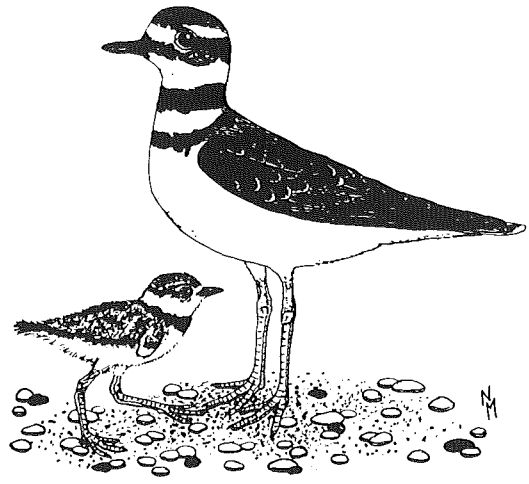
on aquatic vegetation. Although they have only lobed toes rather than the webbed feet of waterfowl, coots are strong swimmers and dive readily for submerged food. They are both prone to and subjects of kleptoparasitism—stealing water weeds from diving ducks whenever possible, while having food stolen from them by dabbling ducks. American Coots also often feed on land, grazing like geese on shore vegetation. Bulky birds, coots have difficulty becoming airborne, and a flotilla of them splattering madly across the surface in alarm is a comic sight. During the breeding season the American Coot becomes more stealthy, a fact that may account for the limited number of documented breeding records in Vermont.

The American Coot has apparently always been a rare member of Vermont's breeding avifauna. The coot probably breeds only sporadically within the state, perhaps when populations in neighboring states increase enough to cause dispersal to Vermont. Vermont is not located on a major flyway for the species, and despite a plethora of habitat on Lake Champlain, the appearance of a coot in the state may be merely accidental.

DOUGLAS P. KIBBE

Killdeer

Charadrius vociferus

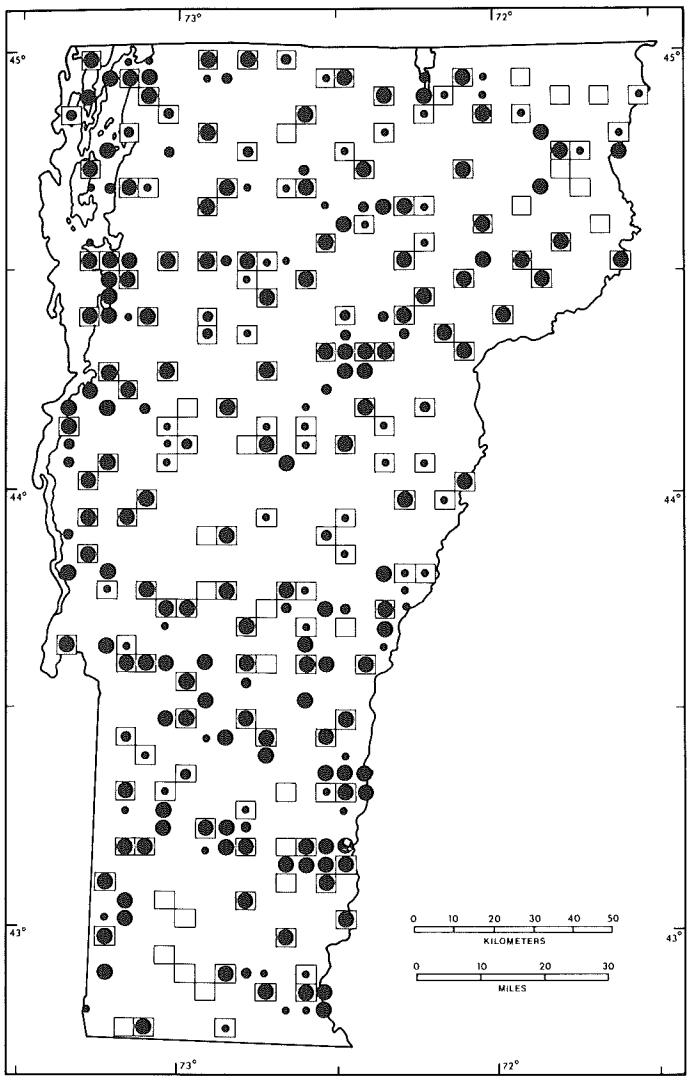


The Killdeer breeds in a variety of open habitats with low or sparse vegetation. The species takes readily to areas disturbed by human activities, such as lawns, fairgrounds, parking lots, dumps, newly planted fields, pastureland, athletic fields, and golf courses. Within the last century, Killdeer have begun nesting on the large, low, flat-roofed buildings that characterize modern shopping malls (Pickwell 1925; Fisk 1978); such nesting has been noted in Burlington, Vermont (W. G. Ellison, pers. observ.). In a life history of Killdeer, Mace (1978) noted that the lowest breeding densities of Killdeer in his Minnesota study area occurred in cultivated fields having plants more than 15 cm (6 in) high. However, Lenington (1980) noted that parents in the same study area led the precocial young to coarsely vegetated sites that provided hiding spots.

The Killdeer is a conspicuous and noisy shorebird, whose clear, piercing calls are readily elicited by intruders into its breeding territories. Confirmation is relatively easy, as the Atlas Project's 65% confirmation rate for the species indicates. Nests may be located by searching areas occupied by the birds in May. Nests containing eggs provided 20% of Atlas Project confirmations. The Killdeer is well known for its array of distraction behaviors, which accounted for 26% of confirmations. The young, which are relatively easy to observe, provided by far the largest number (52%) of confirmations in Vermont.

The Killdeer is among the earliest migratory birds to return to Vermont in the spring. The first arrivals are generally seen in mid March, rarely as early as late February. Nesting commences in April. The nest, a shallow scrape in the earth, is usually decorated with a scattering of light-colored objects. Eggs usually number 4, and are buff with dark brown or blackish blotches and spots. Egg dates for 17 Vermont nests range from April 26 to June 18; early dates for downy young indicate that incubation starts as early as the first week of April. The incubation period is 24 to 26 days (Nickell 1943). The young are precocial and leave the nest within a day; this is also true for roof-nesting birds, whose chicks must leap to the ground to accompany their parents to the feeding territory (Demaree 1975). The young fledge at 29 to 34 days and remain with their parents for only 3 to 4 days afterward (Lenington 1980). Dates for downy young in Vermont range from April 24 to August 2 (12 records). Killdeer are occasionally double-brooded, and may nest up to four times in a single breeding season if forced to by previous nest failures (Nickell 1943). The autumn migration in Vermont commences in late July and continues until late October, with two apparent peaks, one in August (presumably adults) and another in late September (presumably juveniles).

The Killdeer was considered common in New England during the mid-nineteenth century. The species declined drastically during the latter half of that century because many were shot for sale at food markets, and it was considered a scarce migrant in Vermont in the 1890s and early 1900s (Davenport 1907; Ross 1906a). In Vermont breeding apparently did not resume until 1914, when nesting was reported in Rutland County (Kent 1916); in 1915, nesting occurred in Bennington County (Ross 1924). As late as 1946 the Killdeer was considered scarce in the Wells River area (W. P. Smith,



No. of priority blocks in which recorded

TOTAL 155 (87%)

Possible breeding:	41 (27% of total)
Probable breeding:	13 (8% of total)
Confirmed breeding:	101 (65% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	20.0
Green Mountains	41	76	26.4
North Central	19	100	12.3
Northeast Highlands	9	56	5.8
East Central	19	100	12.3
Taconic Mountains	16	100	10.3
Eastern Foothills	20	83	12.9

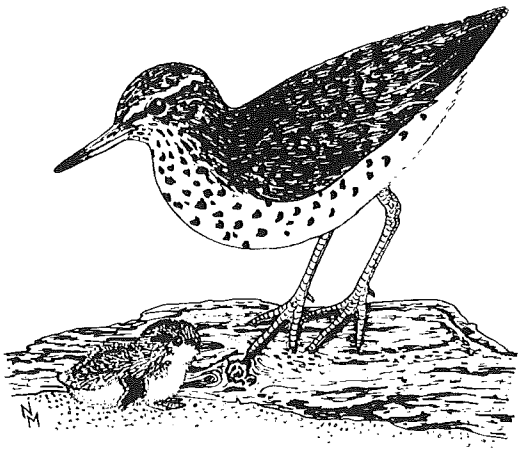
1945–51). At present, the Killdeer is widespread and common, indicating a healthy recovery.

Killdeer were recorded in 87% of the priority blocks in Vermont. They were recorded in all of the priority blocks in the Champlain Lowlands, the North Central and East Central regions, and the Taconic Mountains. The lowest incidences of occurrence were in the heavily forested Northeast Highlands and Green Mountains, as might be expected given this plover's predilection for sparsely vegetated barren areas.

WALTER G. ELLISON

Spotted Sandpiper

Actitis macularia



The Spotted Sandpiper is one of the most familiar shorebirds in North America. Most moderate to large streams or ponds and lakes with extensively open shorelines have one or more pairs of these engaging birds. Breeding habitats of the species are thinly vegetated areas near clean waters, and include recently cultivated fields, gravel bars, sandbars, stony pastureland, and even road shoulders and gravel parking lots.

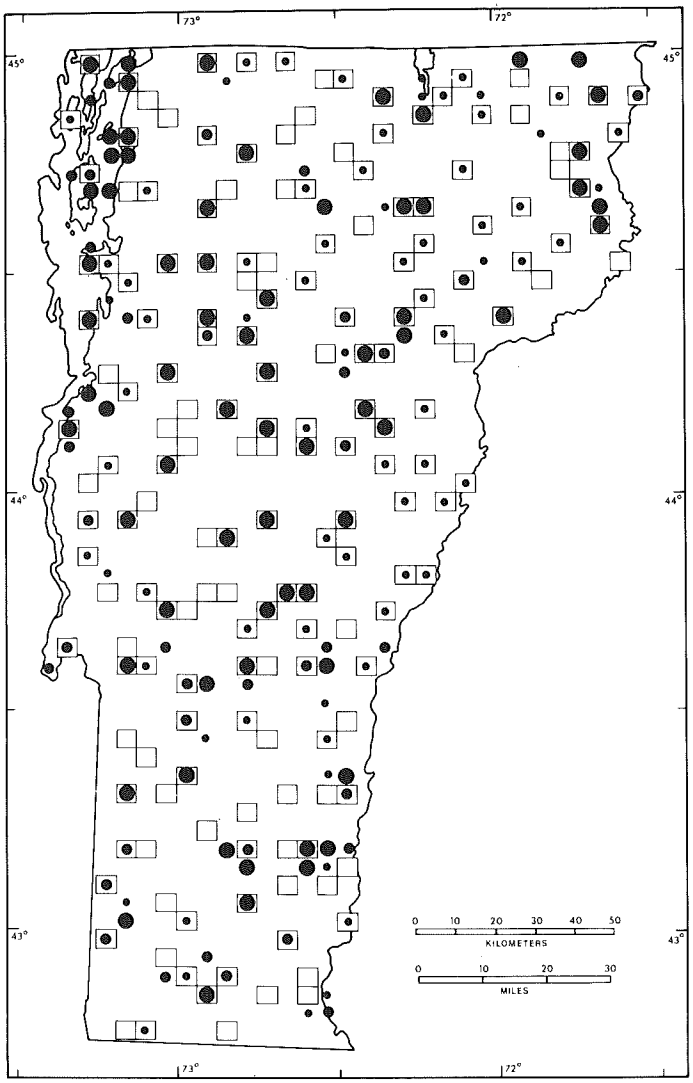
Detecting Spotted Sandpipers is usually not difficult. A methodical search of the larger streams and ponds will normally reveal the species. The birds actively forage along shorelines, exhibit a characteristic tendency to bob their tails, and fly on bowed wings with rapid, shallow wing beats. The sharp, disyllabic flight note, and the song of several mellow, whistled notes sounded in a series, also call attention to the species.

Parents with young accounted for 61% of Atlas Project confirmations; most of these were recently fledged young. Nests accounted for 17% of confirmations, and distraction displays led to another 17%.

Spotted Sandpipers are migratory, with the bulk of the population wintering in Central America and northern South America (Cramp and Simmons 1983). Adult females return ahead of males in late April and early May; males arrive over a period of a month (Oring and Lank 1982). Dates for 42 nests in Vermont range from May 20 to July 23. The nest is a sparsely lined scrape placed under sheltering vegetation or objects. Eggs in 37 Vermont clutches numbered from 3 to 5, with an average of 3.9. Oring et al. (1983) reported an average clutch size of 3.6 eggs for 317 nests. The eggs are buff with dark brown and black blotches and spots. The incubation period normally lasts from 20 to 22 days; the young are precocial and leave the nest after the last chick hatched has dried (Miller and Miller 1948). Ten dates for downy young in Vermont range from June 18 to August 1. The young are able to fly at 13 to 16 days (Stout 1967). Recently fledged young have been reported in Vermont from June 30 to July 16 (seven dates). The autumn migration commences in July and peaks in August, though individual stragglers have been observed as late as October in most years.

The Spotted Sandpiper's breeding system is unusual. Females take the initiative in courtship and leave the majority of incubation to the male. Males are also largely responsible for attendance to the young. In areas where there is a surplus of males in the population, females are usually polyandrous, mating sequentially with up to four males (Hays 1972; Oring and Knudson 1972). Oring et al. (1983) indicated that fluctuating environmental factors such as predation and flooding have led to a need for a high incidence of replacement clutches. A greater male involvement in nesting is a successful reproductive strategy because of the energy needed by females to produce eggs; under favorable circumstances, this in turn leads to multiple nestings with surplus males.

The Spotted Sandpiper is common in suitable habitats in Vermont. Although widespread, the species exhibits a patchy distribution because of the nature of its habitat requirements. The Spotted Sandpiper is best represented in the North Central and East Central regions, where many natural ponds and lakes are present, as well as in portions



No. of priority blocks in which recorded

TOTAL 122 (66%)

Possible breeding:	54 (44% of total)
Probable breeding:	20 (17% of total)
Confirmed breeding:	48 (39% of total)

Physiographic regions in which recorded

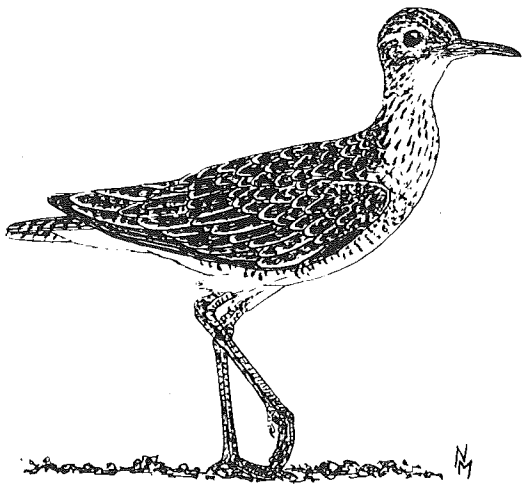
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	25	81	20
Green Mountains	30	55	25
North Central	18	95	15
Northeast Highlands	10	62	8
East Central	17	89	14
Taconic Mountains	10	62	8
Eastern Foothills	12	50	10

of five major river drainage systems. The species is also common in the Champlain Lowlands. It is least well represented in the Green Mountains and Eastern Foothills, where the distribution is limited to major streams and the few suitable permanent ponds.

WALTER G. ELLISON

Upland Sandpiper

Bartramia longicauda



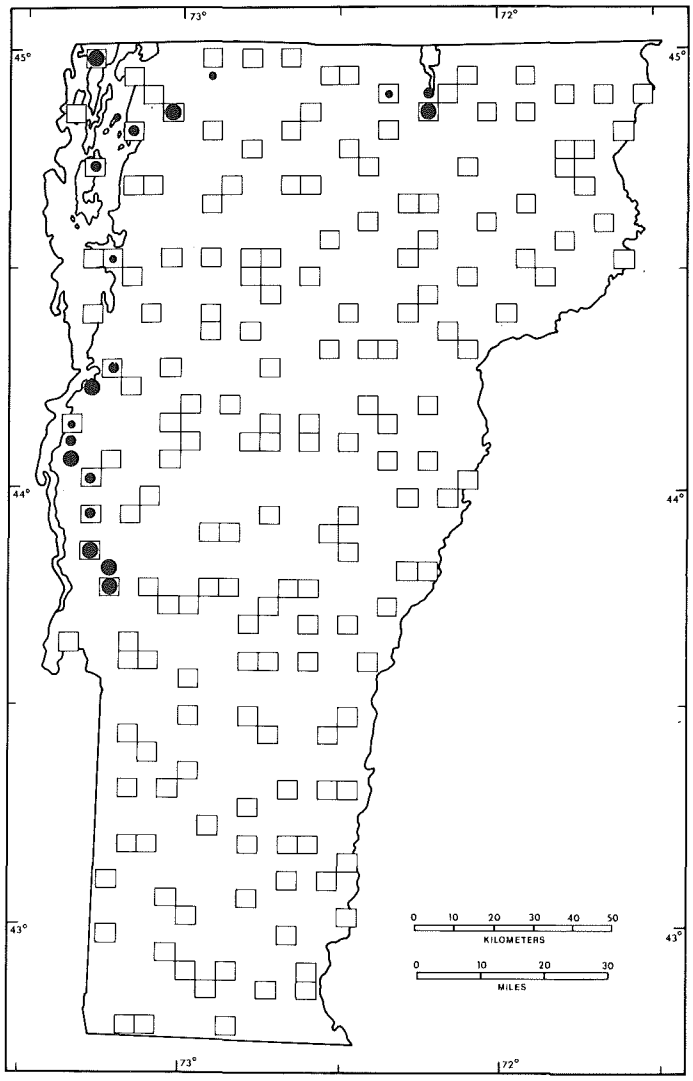
Although the Upland Sandpiper is the largest "shorebird" breeding in Vermont, it is rare and seldom seen by most birders unless specifically sought. Because the species tends to breed in loose colonies, its distribution is spotty even when the grasslands it breeds in are extensive. Although its breeding distribution may have been more extensive a century ago when 75% of the state was cleared of forests, hunting pressure at that time may have kept populations low. Today the Upland Sandpiper is restricted to the northern two-thirds of the state; most records come from the dairy lands bordering Lakes Champlain and Memphremagog. Within this area, the birds are typically found in pastures and hayfields where, unless displaying, they are easily overlooked. White (1983) concluded that extensive short-grass habitat and level topography were principal components determining the distribution of Upland Sandpipers in Wisconsin; clearly these components are determinants in Vermont as well. Almost all nesting in the state occurs in regions that fit this description.

A long-distance migrant that winters on the Argentinian pampas, the first Upland Sandpipers arrive in Vermont in late April. Any extensive grasslands may be utilized as a breeding habitat, but the practice of early summer haying makes successful nesting most likely in undisturbed pastures. These birds tend to avoid abandoned fields with invading shrubs and trees. Pairs exhibit loose coloniality (Bowen 1975); therefore entire colonies can be lost if a breeding area is mowed or tilled.

At the nesting areas, Upland Sandpipers can frequently be seen atop fences or utility poles or on wires as they watch the observer's intrusion. Courtship flights are performed both in high soaring displays accompanied by a drawn-out "wolf" whistle, and low over the ground on vibrating wings, accompanied by rolling trills and flutelike notes. The wolf whistle is also frequently heard from perched birds.

The grass-lined nest is built in a depression in a grassy field during late May or early June. Three egg dates in Vermont range from May 5 to May 20. Bull (1974) gave egg dates for New York from April 23 to June 15, but it is unlikely that Vermont birds commence nesting that early. Both sexes share the 21- to 24-day incubation of the 4 creamy to pink-buff eggs speckled with reddish brown. The precocial young are tended by both parents, who exhibit distraction displays similar to the Killdeer's when the family is threatened. Although the adults will eat a variety of seeds, Upland Sandpipers eat primarily invertebrates; this is particularly true of the young. The young begin flying at 1 month of age; four dates for downy young in Vermont range from June 9 to June 27. Migration takes place shortly thereafter, usually sometime during August. During migration periods local populations may occasionally be augmented by an influx of sandpipers from breeding areas in southern Ontario and Quebec, but it is unusual to encounter more than a dozen birds a day. Upland Sandpipers are rarely found in Vermont past the first week of September.

Because of their restricted distribution and specific habitat requirements, Upland Sandpipers appear to have a tenuous hold



No. of priority blocks in which recorded

TOTAL 13 (7%)

Possible breeding:	3 (23% of total)
Probable breeding:	5 (38.5% of total)
Confirmed breeding:	5 (38.5% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	10	32	76.5
Green Mountains	1	2	7.5
North Central	1	5	7.5
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	1	6	7.5
Eastern Foothills	0	0	0

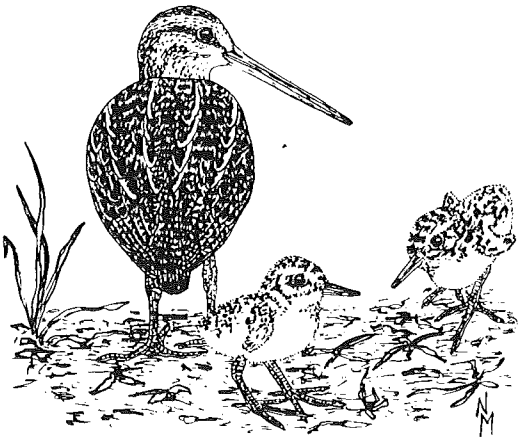
on their Vermont breeding range. As a result of concern expressed about loss of Upland Sandpiper breeding grounds and apparent population declines in the Northeast and central U.S., the species has been placed on the National Audubon Society's Blue List (Tate and Tate 1982) and proposed for Vermont's Threatened Species List.

The Upland Sandpiper displays strong fidelity to breeding sites, provided that the habitat has not been destroyed. This fact, and the species' predisposition to occupy a man-induced disclimax (grasslands), make it an ideal candidate for intensive habitat management. Since the Upland Sandpiper requires short-grass habitats, a species management program would not preclude continued use of a nesting area for limited pasturage or carefully timed haying. In fact, these activities may be essential to retard succession and maintain the short-grass nature of a site. Since a mix of habitat types may be desirable to supply nesting, brood, and foraging needs (Ailes 1976), it may be possible to integrate Upland Sandpiper management programs into normal farm operations with a minimum of disruption.

DOUGLAS P. KIBBE

Common Snipe

Gallinago gallinago



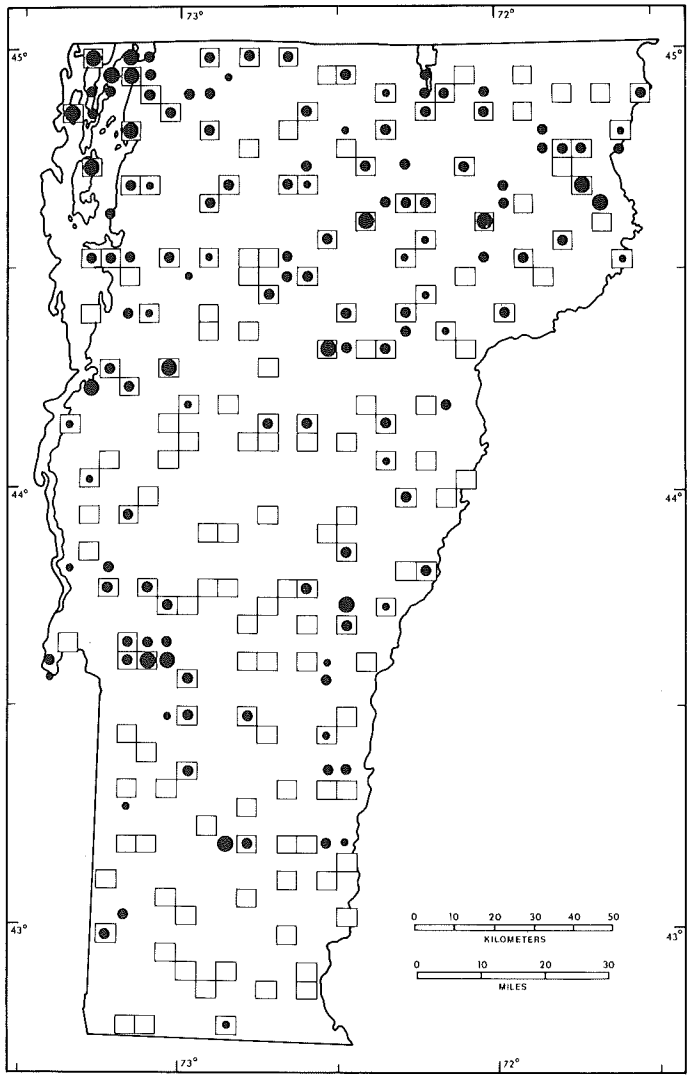
The winnowing aerial display of the Common Snipe is a characteristic summer sound on its Arctic tundra nesting grounds; the species also breeds in marshes and wet meadows as far south as West Virginia in the East and California in the West. Even so, many Vermont Atlas Project observers were surprised to discover that breeding snipe were widely distributed throughout the state in suitable habitat. Snipe are commonly encountered on shores and marshes during the spring and fall, but are less often observed during the summer while engaged in raising their young. These birds breed in Vermont in the same marshlands where one would expect to find them during migration, but may also be found throughout the state in wet meadows—the wetter and wider the better.

Male Common Snipe return to Vermont early, usually by the last week in March, some two weeks before the females. Males commence their aerial displays soon after arriving. Although they may continue to display through June, displaying activity peaks shortly after the females arrive. Displays may be heard at any time of day, but are most likely at dusk and on moonlit nights. The eerie, wavering, winnowing sound, frequently heard before the bird is seen, is produced by wind rushing through the narrowed outer tail feathers as the bird plunges toward the ground. The wavering quality is the result of changes in air speed apparently modulated by the birds' wings (Tuck 1972). Both sexes can winnow, but males do so more frequently. Copulation, which occurs on the ground, is preceded by a strutting display with fanned tails. Aerial displays may continue after pairs are formed, and unpaired birds may continue to winnow into the summer. Most (55%) records for the Vermont Atlas Project are of birds engaged in aerial displays.

Like the American Woodcock, the Common Snipe is a ground nester, but it prefers moister, more open breeding grounds than its upland, woodland cousin. The clutch of 4 heavily blotched, buff eggs is started in a mere scrape. The nest is gradually added to as laying progresses, but even upon completion it is anything but substantial. Incubation, the female's responsibility, takes about 19 days. The male continues to display during incubation, but once the eggs hatch he cares for part of the brood. The young, though precocial, are fed for the first 10 days by the parents, who probe in moist soil for animal matter with their long bills (Tuck 1972). The young elicit feeding by pecking at their parents' bills. More than 80% of the Common Snipe's diet is animal matter. The young are first able to fly at 2 weeks of age, but are not capable of sustained flight until nearly 3 weeks old.

Snipe are noted for their knack of remaining concealed in seemingly barren marshlands until the last moment, when they burst off in rapid, zigzagging flight. Fall migration commences in August, with most birds heading south by the second week in November. Snipe are hardy birds, often lingering about marshy springs until freezing weather forces them to retreat south. An occasional individual may even successfully overwinter in Vermont. Common Snipe typically winter from the southern U.S. into northern South America.

Although historically considered uncommon in Vermont (Perkins and Howe 1901), the Common Snipe is currently a widespread breeder in the state, particularly in



No. of priority blocks in which recorded

TOTAL 86 (63%)

Possible breeding:	18 (21% of total)
Probable breeding:	57 (66% of total)
Confirmed breeding:	11 (13% of total)

Physiographic regions in which recorded

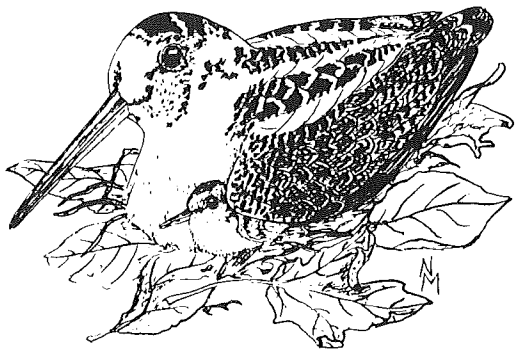
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	25	80	29
Green Mountains	16	30	19
North Central	17	89	20
Northeast Highlands	8	50	9
East Central	6	32	7
Taconic Mountains	9	56	10
Eastern Foothills	5	21	6

the North Central region and the Champlain Lowlands. Snipe were least frequently encountered in the Eastern Foothills, the East Central region, and the Green Mountains, where the lack of open land and the steep slopes keep the species from breeding. In general, however, Common Snipe may be expected to breed in small numbers wherever suitable open wetlands can be found. Although it is a gamebird, the snipe receives little hunting pressure in Vermont. Only the abandonment of pastureland is likely to affect the species adversely in the foreseeable future.

DOUGLAS P. KIBBE

American Woodcock

Scolopax minor



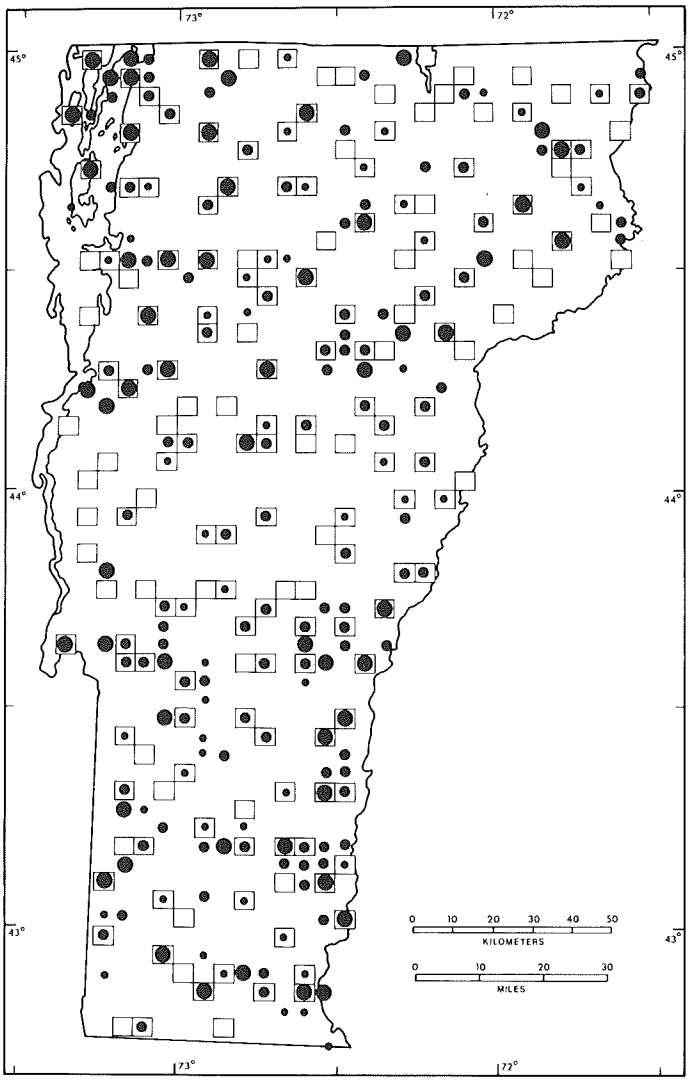
The American Woodcock, an eastern Nearctic species, breeds from southern Canada to Florida and as far west as the eastern edge of the Great Plains. Its winter range encompasses southern New Jersey and northern Florida as well as the Gulf Coast states, but avoids high Appalachian Mountain areas. Considered an upland gamebird throughout its range, the American Woodcock has been the subject of innumerable studies (see Dwyer et al. 1979). Woodcock were formerly more numerous in the Northeast than they are now, but extensive hunting and habitat change in the late nineteenth century reduced their numbers drastically by about 1900 (Sheldon 1971). Since then the species has been managed by various federal and state game agencies, though without gaining its former numbers. Censuses indicate that woodcock population densities in Vermont and in the adjoining states of New York and Massachusetts are relatively high, though not as high as those of states and provinces north and east of Vermont (Owen et al. 1977).

The species is widely distributed in Vermont, occurring wherever suitable habitat is present. Belying their status as shorebirds, the American Woodcock breeds in open areas, nests in old fields or pole-stage timber, and feeds wherever there are earthworms and suitable cover. These secretive birds frequently use alder and willow thickets as diurnal cover.

The American Woodcock is an early spring migrant, returning as soon as the spring thaw has progressed enough for the species to obtain its primary food—earthworms—for which it probes with its long prehensile bill. Woodcock generally arrive at lower elevations in mid March (March 7 is an early date) and considerably later at higher elevations, where snow and ice linger.

The males, which arrive first, perform ground and aerial courtship displays on "singing grounds" at dusk and dawn to attract receptive females. The singing ground may be any opening, 0.1 ha (0.25 a) or larger, in which tree cover remains low enough to permit the male to perform his aerial flight. Old farmlands reverting to forest, a common feature in Vermont, are optimum habitat in the Northeast (Owen et al. 1977). The male's courtship displays, which usually last from half an hour to an hour, may go on all night when the moon is full. Males perform individual acrobatic flights of a minute or more, accompanied by wing twittering (produced by the outer primary flight feathers) and chirping; this behavior, in turn, is followed by a ground display during which the male repeatedly utters nasal nighthawk-like *peent* calls (Sheldon 1971). Observation of these displays was the most widely used method of detecting woodcock in Atlas Project blocks.

Females attracted to the males' performance may or may not nest near the singing ground. The nest is a shallow depression in the ground among dead leaves, where the bird's protective coloration provides excellent camouflage. A clutch usually contains 4 eggs, mottled with brown or gray. Nesting takes place in April (frequently before the last snowfall) and early May. The eggs, relatively large considering the size of the bird, are incubated for about 21 days by the tightly sitting female, who may allow observers to advance within inches without flushing. The precocial young leave the nest within a day of hatching, and are indistinguishable in the field from adults by 4 weeks of age (Sheldon 1971). Vermont records for young range from May 15 to July 6 (10 records). Vermont Atlas Project confir-



No. of priority blocks in which recorded

TOTAL 122 (68%)

Possible breeding:	34 (28% of total)
Probable breeding:	53 (43% of total)
Confirmed breeding:	35 (29% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	22	71	18.0
Green Mountains	36	67	29.5
North Central	10	53	8.0
Northeast Highlands	8	50	6.5
East Central	13	68	11.0
Taconic Mountains	11	69	9.0
Eastern Foothills	22	92	18.0

mations were almost evenly divided between fledglings (40%) and nests with eggs (38%).

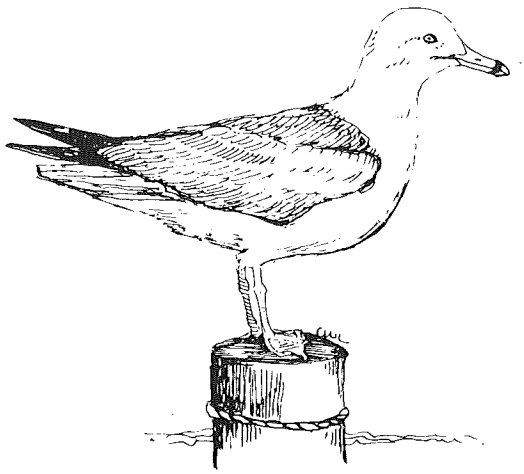
Woodcock are crepuscular throughout the year, typically walking or flying from cover to open fields at dusk to feed, roosting in the evening in fields, and feeding in forests during the day (M. Scott, Vt. Fish and Game Dept., pers. comm.). Although extremely hardy, they seldom attempt to overwinter. The last migrants depart from Vermont near the end of October, when the frozen ground prevents them from securing earthworms.

Recent winters have been severe in the southern Atlantic states that provide the main wintering ground of Vermont woodcock. Extremely low temperatures and hard, frozen ground are lethal for American Woodcock, and cold, wet springs have hurt birds on the breeding grounds in the Northeast. The U.S. Fish and Wildlife Service's annual singing ground survey of breeding woodcock indicated a 20% decline in 1982 from 1981 levels.

WILLIAM J. NORSE
DOUGLAS P. KIBBE

Ring-billed Gull

Larus delawarensis

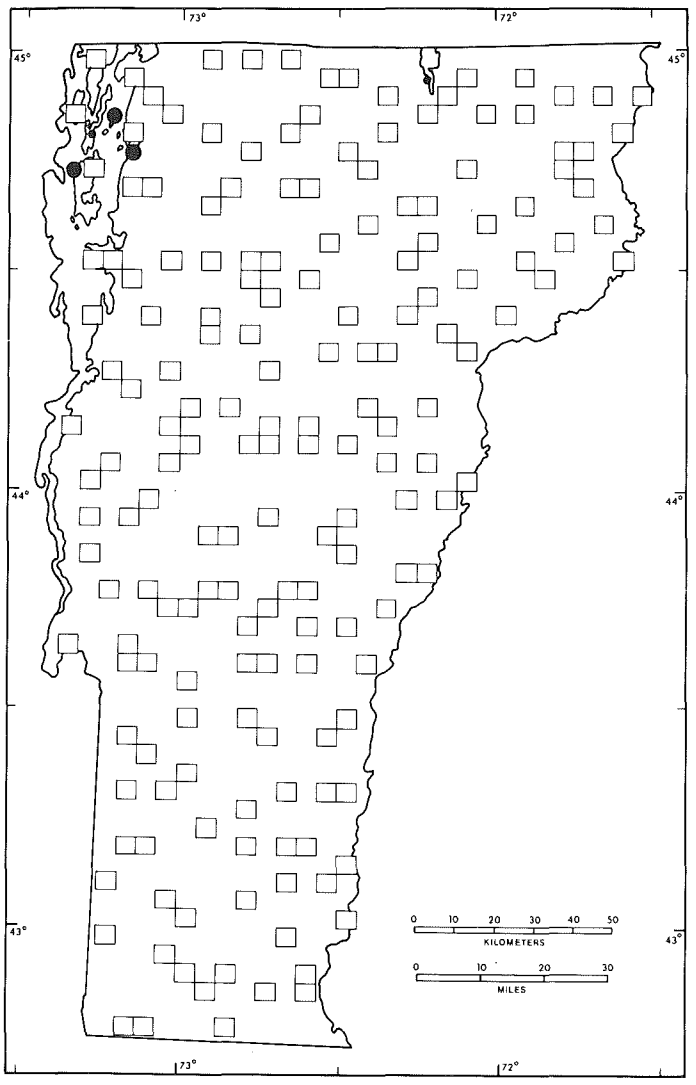


Of Vermont's two nesting gulls, the Ring-billed is by far the most abundant, outnumbering the Herring Gull by at least 60 to 1. This was not always the case. Early references, including Thompson (1853) and Wolfe (1923), indicated that the Herring Gull was the sole nesting gull on Lake Champlain. In fact, no confirmed record of the Ring-billed existed for Vermont until November 1939 (Weaver 1939). It is entirely possible that before this date the species was overlooked during migration among the similar and more numerous Herring Gulls. The species first bred on Lake Champlain on the Four Brothers Islands in Essex County, New York in 1949 (Bull 1974). The first Vermont nesting occurred on Young Island—the current site of Vermont's largest colony—in 1951, when about 100 pairs were located (Miller and King 1981); duck hunters had cleared enough of the island to afford the gulls a foothold (N. King, J. D. Stewart, pers. comm.).

The Ring-billed Gull breeds largely inland in freshwater habitats. It is apparently more sensitive to persecution than the Herring Gull, and was nearly extirpated throughout its former broad eastern range by the early twentieth century (Bent 1921). The species reappeared on Lake Huron in 1926 after a quarter-century absence (Ludwig 1943), and was noted nesting on Lake Ontario by 1927 (Ludwig 1974). The species first nested in New York State in 1936 (Hyde 1948). After a lengthy period of relative stability, the population increased dramatically on the Great Lakes during the early 1960s (Ludwig 1974). Lake Champlain appears to have been colonized from gulleries in eastern Lake Ontario and the St. Lawrence River. The gull population of Lake Champlain has grown rapidly since the 1970s. Although McLaughlin (1973) estimated the Four Brothers' population at about 2,500 pairs in 1973, Spear, after a careful survey, estimated it for that year at 15,000 pairs (R. N. Spear, pers. comm.). In 1982, 15,033 nests were counted (Peterson 1983). The population of Young Island in 1983, according to the most recent estimate, was roughly 9,000 gulls; there were also 4,000 nests (RVB, Summer 1983).

The Ring-billed Gull, like the Herring Gull, is a scavenger, but it is also a plow follower, and ranges throughout the Champlain Valley and adjacent river valleys searching for food in the fields. Spear (1970) speculated that the Ring-billed's additional methods of obtaining food—following plows, hunting worms on golf courses, hawking insects in the air—might account for the Champlain Valley's ability to support a much larger population of Ring-billed Gulls than Herring Gulls.

Ring-billed Gulls prefer to nest on islands where they are safe from most terrestrial predators. Ring-billeds return to their rocky, sparsely vegetated Vermont nesting islands in March or early April. The nest is a scrape lined with grass, weed stems, and sticks, with an inner lining of fine grass and feathers (Bent 1921). Eggs number from 1 to 5, with clutches of 2 or 3 most common. Incubation takes about 25 to 28 days (Nol and Blokpoel 1983), and the young leave the nest about a day after hatching. Seven dates for eggs from Vermont islands range from May 1 to June 17 (N. King, J. D. Stewart, pers. comm.). Early dates for young are from late May. Eighty percent of the clutches on St. Lawrence River islands in 1978 were



No. of priority blocks in which recorded

TOTAL 0 (0%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

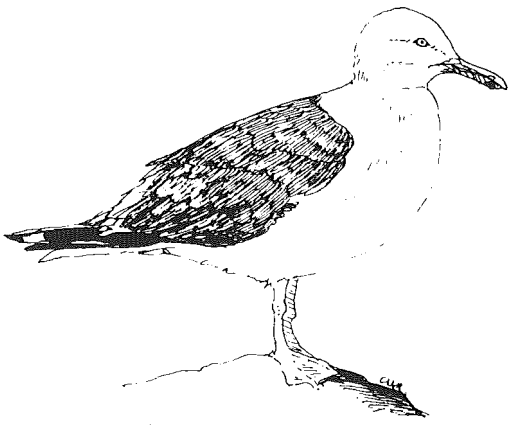
completed between May 5 and May 28; the last completed clutch was reported on July 11 (Maxwell and Smith 1983).

The Ring-billed Gull's nesting distribution in Vermont is restricted to northern Lake Champlain. During the Atlas Project, nesting was documented on five islands: Young, Hen, Sunset, Popasquash, and Rock—all in non-priority blocks. The largest colony was on Young Island, with Popasquash Island (1,500 pairs) second (J. D. Stewart, pers. comm.). The total Vermont nesting population appeared to be in the range of 5,500 to 6,000 pairs at the close of the Atlas Project period in 1981. The Vermont Institute of Natural Science's estimate was that the adult population of Ring-billed Gulls on Lake Champlain was about 40,000 birds in 1983. A few birds may nest on tiny, rock islets and sandbars on the larger lakes of northern Vermont, in particular Lake Memphremagog, where the species is common throughout the summer (although these birds may come from Lake Champlain via the Missisquoi drainage). Ring-billeds depart for winter quarters along the coast, especially the Gulf Coast of Mexico, in November and December. A few may be seen throughout the winter on Lake Champlain and its tributaries, or as long as sections remain free of ice.

WALTER G. ELLISON

Herring Gull

Larus argentatus



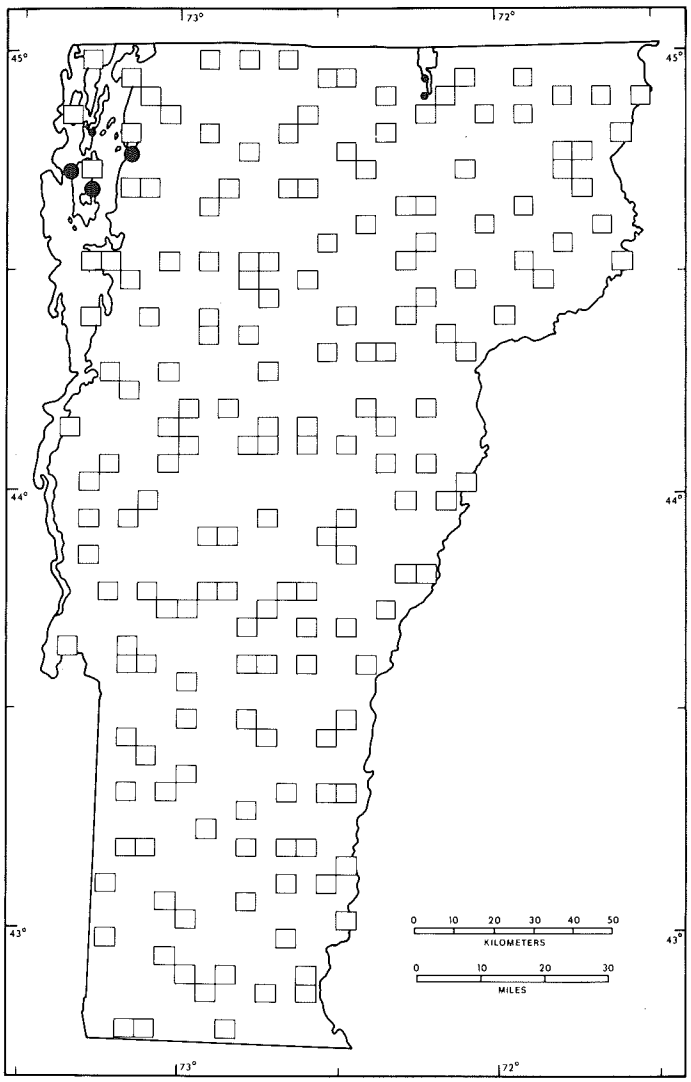
The Herring Gull is the common large gull of the Atlantic Coast and of lakes and rivers in the interior of the U.S. In Vermont, it is overshadowed by the much more numerous Ring-billed Gull.

Herring Gulls were *the* breeding species of gull on the Champlain Islands until the appearance of the Ring-billed in the 1940s. Thompson (1853) called Herring Gulls "not uncommon on Lake Champlain where numbers of them breed on the small, uninhabited islands," and spoke of eggs collected from the Four Brothers Islands on the New York portion of the lake. Allen (1909) called the species an "uncommon migrant and rare summer resident" on Lake Champlain, and Fortner et al. (1933) noted that it was fairly common around Lake Champlain and less so at Lake Memphremagog. In 1944, Herring Gulls bred on Law Island off Colchester Point and on one or both of the Sister Islands (Perkins 1944). In 1963, a colony of 52 pairs nested on Sunset Island off Colchester Point; they continued to nest there until at least 1967, when the colony was deserted (GMAS records, P. Upton). Spear (Field notes) documented that this species nested on Rock (1965), Popasquash (1970), Young (1970), and Bixby (1970) islands, and estimated the size of the 1964 colony on Young at between 200 and 300 individuals.

At present the only Vermont colony is on Young Island. In 1982, population estimates ranged from 20 to 30 pairs (J. D. Stewart, pers. comm.) to 50 pairs (S. B. Laughlin, A. L. Gosnell, pers. comm.). Herring Gulls' nests fringe the rocky shoreline of the island, and Ring-billed Gulls occupy the interior. During the Atlas Project, pairs also nested on Rock Island and on Fish Bladder Island. Although Herring Gulls have been seen in summer on rocky islets in the Vermont portion of Lake Memphremagog (J. D. Stewart, pers. comm.), nesting was not documented there during the Atlas Project.

The chief Lake Champlain colony of Herring Gulls is in the New York waters of the lake, on the Four Brothers Islands (Essex County, New York). Records of Herring Gulls nesting there reach back to at least the 1850s, when the Rev. G. Ingersoll presented Zadock Thompson with eggs from "one of the islands called the Four Brothers situated five or six miles from Burlington" (Thompson 1853). These islands have apparently been continuously occupied as a nesting site since at least that time, although counts of the nesting population have varied widely. In 1887 or 1888 Davis found 25 to 30 pairs on the islands; Wolfe, in 1923, found about 300 pairs in residence, and cited the protection offered by the owners—the Hatch brothers—for this notable increase (Wolfe 1923). More recent figures include 60 pairs in 1967 (Bull 1974), 250 pairs in 1974 (N. King, J. D. Stewart, Vt. Fish and Game Dept., pers. comm.), and around 200 pairs in 1982 (Peterson 1982).

Herring Gulls arrive at nesting areas as soon as Lake Champlain is relatively ice-free, usually in mid to late March. The ground nest is a bulky structure of grass, weeds, and other debris. Egg laying commences in late April. Clutches have been started as early as April 19 on Young Island; a completed clutch which was collected on "an island in Lake Champlain" on July 9, 1883 is in the Pember Collection at the University of Vermont. Laying appears to peak in early May. Most clutches are composed of 3 eggs, although reports of 2-egg clutches are not uncommon. The eggs are large, variable in shape, and range in color from olive



No. of priority blocks in which recorded

TOTAL 0 (0%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

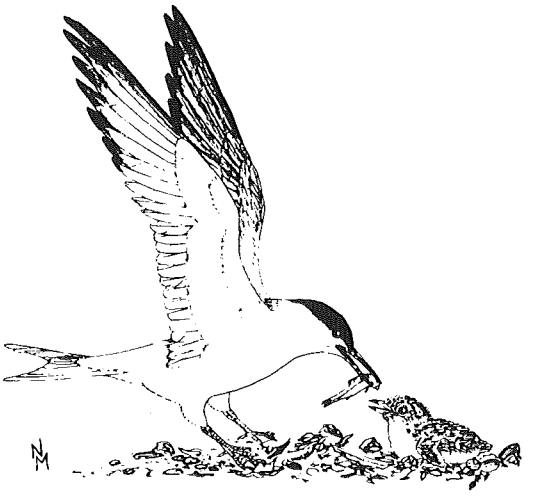
to buff to light blue with scattered gray and brownish blotches. The incubation period ranges from 24 to 28 days. Young first hatch in mid to late May; there is an early date of May 27 for Vermont. The young fledge in early July.

The Herring Gull seems much more closely linked with the waters of its nesting lakes in Vermont than does the Ring-billed Gull, which often occurs at points far removed from Lake Champlain and forages on agricultural land—a habit only rarely displayed by Herring Gulls in Vermont. Over much of their breeding range, adult Herring Gulls are largely sedentary, whereas the younger birds (age 1 to 4 years) are at least partly migratory. Since Lake Champlain freezes in most years there is a mid-winter exodus of virtually all gulls from the lake. It is not certain where most Lake Champlain Herring Gulls winter. Herring Gulls (mostly young birds) banded on the Four Brothers Islands have been recovered from eleven locations from Quebec to Mexico during the months of November through February (J. M. C. Peterson, pers. comm.). Most adults presumably winter nearby in the St. Lawrence or Hudson river drainages.

WALTER G. ELLISON

Common Tern

Sterna hirundo



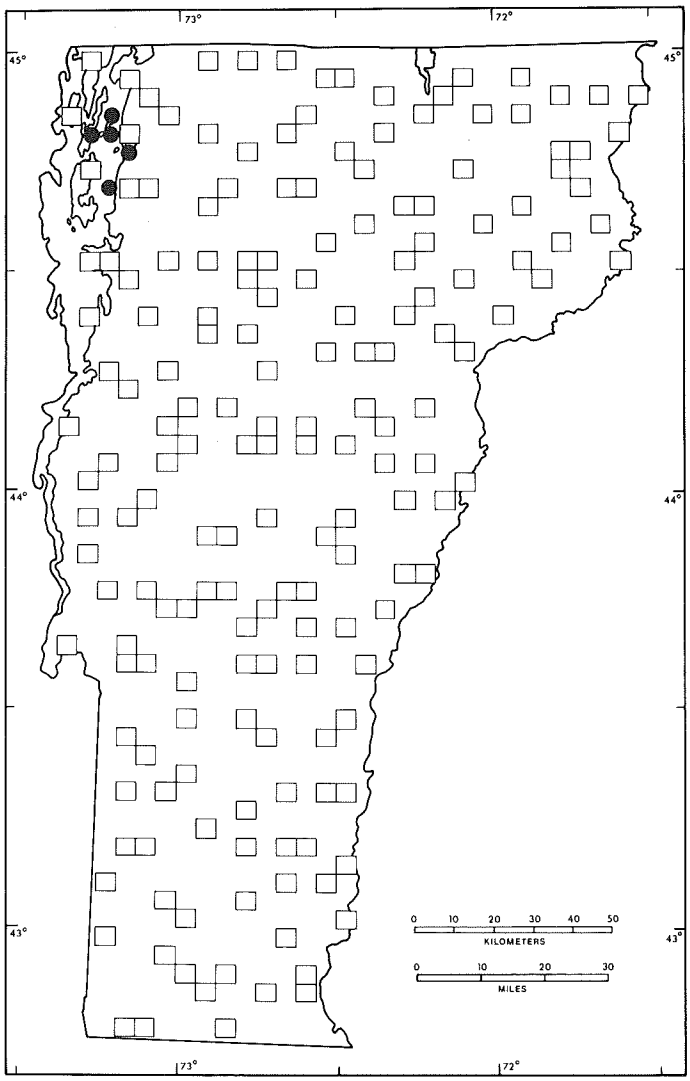
The Common Tern is distributed worldwide and in North America breeds along the East Coast, across Canada from Newfoundland inland to central Mackenzie, and south to Montana, South Dakota, Ohio, and New York. A population decline has been noted since the 1930s throughout the species' North American range, and has been particularly severe in the Great Lakes (Morris et al. 1980) and in Massachusetts (Nisbet 1973). The eastern U.S. population, occurring from the Great Lakes, Gulf of St. Lawrence, and northern Atlantic Coast south to Virginia, is estimated at 70,000 to 75,000 pairs (Kress et al. 1983). Chlorinated hydrocarbons and mercury (Hays and Risebrough 1972), competition with gulls for nesting sites (Nisbet 1973; Morris et al. 1980; Kress et al. 1983), loss of suitable nest sites, predation, and human disturbance all seem to have contributed to the decline. In the East, the species winters along coasts from the southern edge of the breeding range in South Carolina south to South America. Common Terns arrive in Vermont during the first week in May and usually depart by the end of September.

Vermont's first documented record for the species dates from 1892, at the height of the Common Tern's decimation for the millinery trade, when the few remaining colonies on the East Coast had to be protected by paid keepers (Chapman 1904). While no earlier mention of terns in Vermont exists, the Vermont population is believed to have established itself on Popasquash Island (Lake Champlain) near St. Albans in the late 1800s (J. D. Stewart, pers. comm.). Estimates of the size of that colony have existed since 1947, when the number of adults was put at 100 (RNEB 1947); more recent estimates have ranged from 500 adults and 260 nests in 1968 (Miller and King 1981) to 50 adults and 30 nests in 1980 (S. B. Laughlin, pers. comm.). Since their arrival in the 1940s Ring-billed Gulls have occupied more and more of the interior of the island, leaving the terns to nest on the edges.

Common Terns vary the location of their main Vermont colony from year to year, utilizing three other small (0.1 ha [0.3–0.5 a]), shaley islands—Rock, Gramma (or No-Name), and Hen; a rock ledge exposed only in years of low water (about 100 adults incubated eggs on bare rock there in 1980); and spits of land on larger islands (Laughlin 1983). The rock ledge has produced the highest nesting success in recent years. The Vermont Institute of Natural Science annual tern censuses have produced the following data (Laughlin 1980, 1981, 1982, 1983):

	1980	1981	1983
adult birds at nesting islands	275	286	196
nests	121	178	111
young located	21	0	21
fledglings	0	0	10

Spear (1970) postulated that the low nesting success of Common Terns on Lake Champlain was a result of heavy boating traffic around and human disturbance on the nesting islands, which kept the terns off their eggs long enough for the eggs to become inviable. Predation by Black-crowned Night-Herons and Great Horned Owls has been documented at other tern colonies (Nisbet 1984), raising the possibility that nighttime



No. of priority blocks in which recorded

TOTAL 0 (0%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

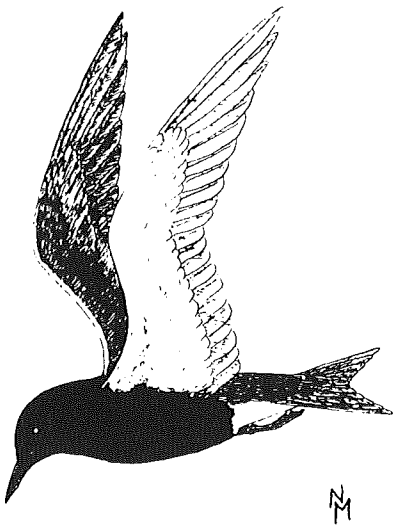
intrusions may have kept incubating adult terns off their eggs until daytime, with the same results. Vermont egg dates range from May 14 to July 7 (later dates are of inviable eggs); clutches contain from 1 to 4 eggs, and average 3.

A Common Tern research program to determine the exact causes of nest failure and to introduce means to reverse the trend is planned by the Vermont Institute of Natural Science and the Vermont Fish and Wildlife Department. In recent years nesting success has been low enough to warrant proposing the species for the state Threatened Species List.

SARAH B. LAUGHLIN

Black Tern

Chlidonias niger



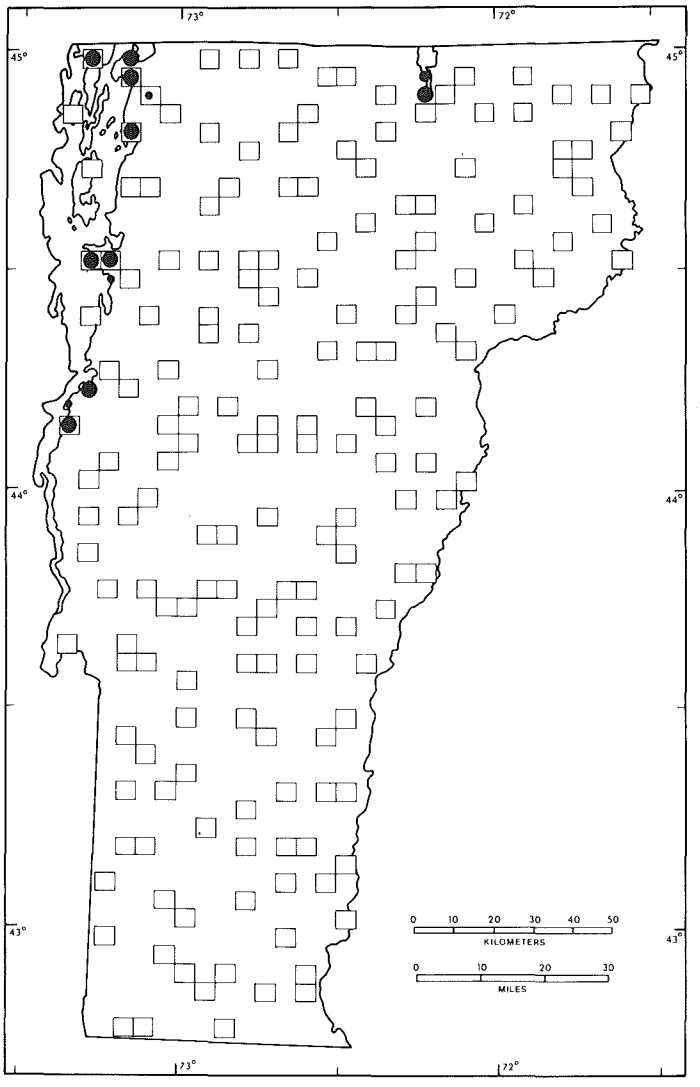
In Vermont the graceful Black Tern is largely limited to the extensive riparian marshlands on or near the two major lakes, Lake Champlain and Lake Memphremagog. The species occurs in both cattail and shrub marshland. On the breeding grounds the species is highly insectivorous, feeding largely upon *Odonata* (dragonflies and damselflies) and *Ephemeroptera* (mayflies). Dunn (1979) found that fish provided important nutrition for the young, although they were taken in smaller numbers than insects.

The Black Tern was easily located by Atlas Project workers in appropriate habitat, as it is a tireless flier and is conspicuously plumaged. The birds protect their nests and young aggressively, diving at and often striking intruders. The relative ease of confirmation is reflected in the tern's confirmation in 86% of the priority blocks and 58% of all blocks in which the species occurred. Seven of the nine confirmations (in priority and nonpriority blocks) for this tern were of nests with eggs.

Black Terns arrive in their Vermont breeding areas in early May. From emergent vegetation, waterweeds, and debris they construct a nest on stumps, logs, planks, floating or matted plants, or old muskrat houses (Harrison 1975). Nest sites tend to be in thin spots in the emergent vegetation, where either water flow or cuttings by muskrats create openings (Bent 1921; Cuthbert 1954). Because fieldworkers were not required to submit nest dates, and because few historical data on the species exist, the Atlas Project has little Vermont nesting information for the Black Tern. Data from nearby states indicate a range of egg dates from late May to late July, with the peak of laying in early June (Bent 1921; Cuthbert 1954; Bull 1974). July 1 is the only nest date available for Vermont (nest with 4 eggs, at Lake Memphremagog). The eggs range from oval to pyriform in shape, and vary from buff to olive in color, with many dark brown or black blotches and spots. Clutch size may range from 2 to 4 eggs; however, clutches rarely vary from 3 eggs: 85% of 114 New York State clutches contained 3 eggs (Bull 1974). The incubation period lasts 21 to 22 days (Cuthbert 1954). Day-old young may swim up to 30 m (100 ft) from the nest when danger threatens (Cuthbert 1954); they first fly at 25 days of age.

The flying juveniles remain in the natal marsh, being fed by their parents for about another 3 weeks (Cuthbert 1954). Cuthbert (1954) indicated that flying juveniles will establish feeding "territories" in their natal marsh even while being fed by the parents. Parental defense of the nests and young is vigorous, as is typical of terns; Atlas Project workers on Lake Memphremagog observed a colony of Black Terns pursue a Peregrine Falcon (D. P. Kibbe, pers. comm.). Black Terns are Vermont's earliest departing waterbirds, often leaving the state before mid August.

According to Forbush (1925), the Black Tern had not nested in New England as of the early 1920s. It is uncertain whether the species expanded its range eastward into New England and maritime Canada, or whether improved fieldwork in marshlands in the northeastern U.S. led to its rather recent addition to the breeding avifaunas of Maine, New Brunswick, and Vermont (AOU 1957). The Black Tern was first recorded in the literature of Vermont breeding birds in



No. of priority blocks in which recorded

TOTAL 7 (4%)

Possible breeding:	1 (14% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	6 (86% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	7	23	100
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

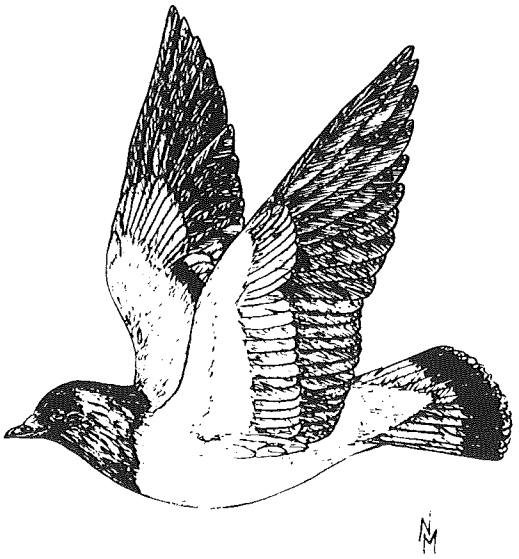
1937 when a Black Tern nest on Lake Champlain was photographed by L. Babbit (Richardson 1937). In 1950 Smith noted the presence of a "fairly large colony at [the] northern end of Lake Champlain" (Smith 1950a). The species was first reported from the South Bay of Lake Memphremagog in 1949 (Smith 1950a); breeding was established there in 1963 (J. D. Stewart, pers. comm.). The species was first reported from Addison County in 1965 at Dead Creek (GMAS record, F. Bellinger).

The present Vermont distribution of the Black Tern is restricted to the basins of Lakes Memphremagog and Champlain. Eleven of the 13 Atlas Project records for the species were from the Champlain Lowlands, and the other two records indicated the Memphremagog population. Estimates of the Vermont population at the eight known breeding locations are between 180 and 300 pairs. More than half the pairs breed at the Missisquoi National Wildlife Refuge; other breeding locations are at the Dead Creek Wildlife Management Area, South Bay of Lake Memphremagog, Mud Creek Wildlife Management Area, the Burlington Intervale, Little Otter Creek, and St. Albans Bay.

WALTER G. ELLISON

Rock Dove

Columba livia



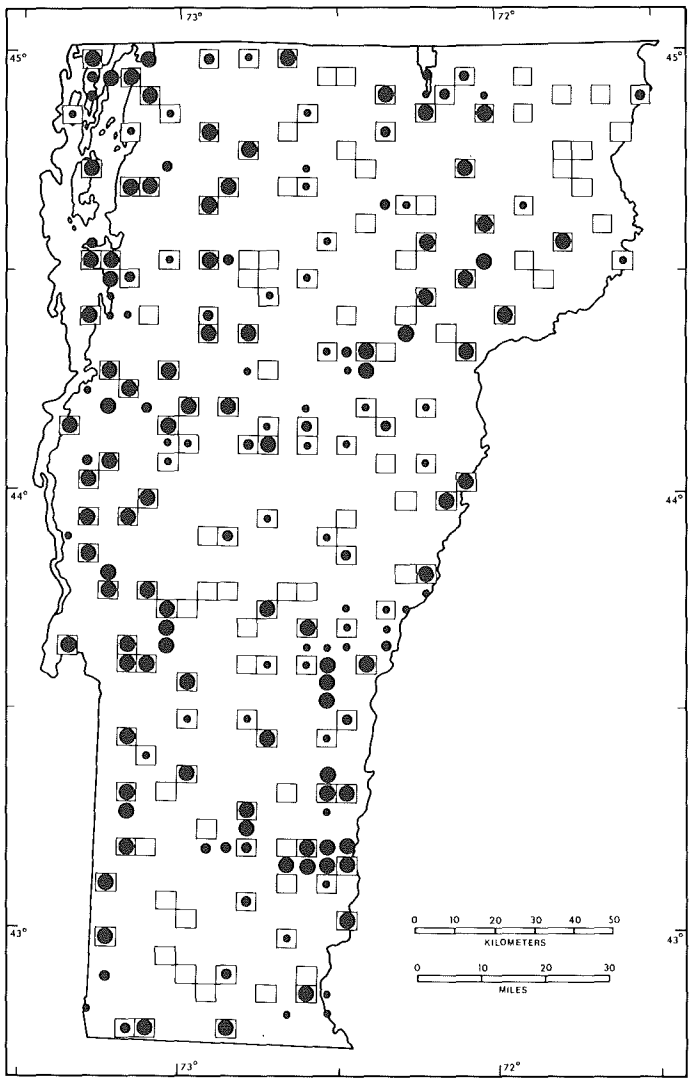
Because of its foreign origin and frequent dependence on man, the Rock Dove has frequently been regarded as a second-rate citizen by many birders, as well as by the National Audubon Society, which disdained to count the species on the annual Christmas Bird Counts from 1950 through 1974. Such disdain has robbed birders of a wealth of information regarding the species' past populations; the Rock Dove's close association with man would have made it a useful barometer of the effects of urbanization.

Introduced to North America by the French in the early 1600s (Schorger 1952), the Rock Dove was raised for food throughout colonial America in the 1700s. Feral birds from early settlements formed the ancestral stock of today's populations. It is not known whether the species was more widespread in the mid-1800s when agricultural clearing reached its zenith in Vermont, but present reforestation trends and the decline in agriculture seem destined to restrict its Vermont distribution by limiting critical winter foraging habitat.

Although often nesting on man-made structures (bridges and barns), the Rock Dove also nests on cliffs and ledges if open agricultural foraging areas are within a few miles. Greatest densities in Vermont are encountered near the larger metropolitan areas in the Lake Champlain and Connecticut River valleys, where abundant nest sites and foraging areas are in close proximity and winters tend to be milder than in other parts of the state. Rock Doves are relatively rare in the mountainous and extensively forested sectors of Vermont. They were found in only 25% of the Northeast Highlands priority blocks and in only little more than half of the blocks in the Green Mountains and the North Central region.

The Rock Dove was apparently the first bird to be domesticated, in about 4500 B.C. (Zeuner 1963); its breeding biology is well documented (Naethes 1939; Fabricius and Janssen 1963). Although reproductively active throughout the year at southern latitudes, the onset of breeding in Vermont seems to be weather-related. A significant increase in courtship displays—particularly wing clapping and gliding by pairs with wings in a V, and billing and nodding in late winter—marks the onset of nesting. Since Rock Doves may remain paired for several consecutive seasons, these courtship displays may be seen at almost any season. Billing and displacement preening more typically accompany actual mating (Stokes 1979).

The nest, built principally by the male, is a messy affair of twigs placed on a ledge, beam, or other support, natural or man-made. The 17- to 18-day incubation of the 2 off-white eggs starts as soon as the first egg is laid. The male shares incubation duties only during the day. Although information for Vermont is scanty, young have been reported in the nest on five dates from March 4 to October 19. Members of the Columbiformes initially feed their young on "pigeon milk," an inner lining of the crop that is sloughed off and regurgitated. Toward the end of their 10-day nesting period young Rock Doves are fed increasing amounts of solid food. Postfledgling attendance tends to be brief, since the parents usually initiate renesting within a few days. The number of



No. of priority blocks in which recorded

TOTAL 124 (69%)

Possible breeding:	34 (27% of total)
Probable breeding:	17 (14% of total)
Confirmed breeding:	73 (59% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	30	97	24.1
Green Mountains	31	57	25.0
North Central	12	63	10.0
Northeast Highlands	4	25	3.2
East Central	14	74	11.2
Taconic Mountains	14	87	11.2
Eastern Foothills	19	79	15.3

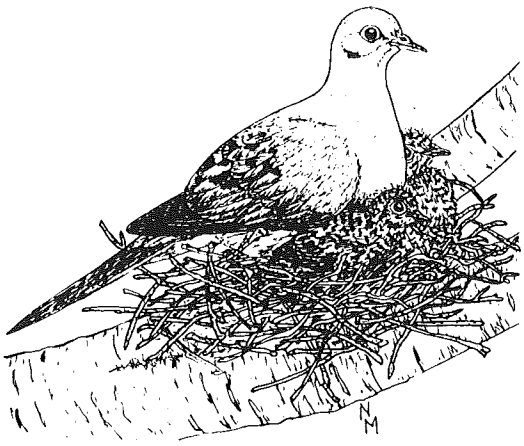
broods typically raised each year in Vermont is unknown, but 3 or more are likely.

Rock Doves—or "homing pigeons," as they are also known—are nonmigratory; yet because of their nest-site tenacity they have proven excellent subjects for research on the ability of birds to orient by celestial and electromagnetic cues. Birds taken from their breeding cote have been shown to be capable of returning from many miles away even if the eyes are covered. Much recent ornithological research on navigation has focused on the Rock Dove (Keeton 1971, 1972; Emlen 1975).

DOUGLAS P. KIBBE

Mourning Dove

Zenaida macroura



The Mourning Dove, essentially a seed eater, may be found in the bare weed and seed-producing ground areas associated with orchards, farmland, open mixed woodland, residential areas, and road edges. It is not found in dense forests or at high mountain elevations.

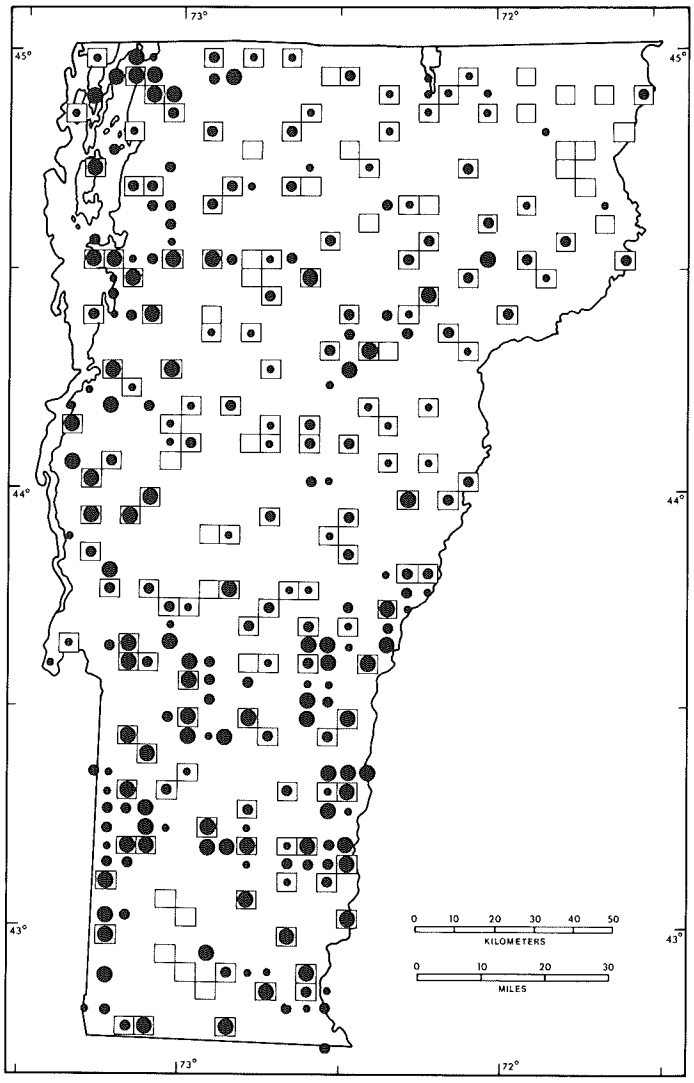
The range extension and increased abundance of the Mourning Dove in Vermont during the past 20 years can be dramatically illustrated by comparing Christmas Bird Count records for 1959–61 to those for 1980–81 (CBC 1959–61, 1980–81). Sightings at Saxtons River in the Eastern Foothills went from 36 in 1959 to 539 in 1981; at Bennington in the Taconic Mountains sightings rose from 31 in 1961 to 369 in 1980; and at Ferrisburg in the Champlain Lowlands sightings exploded from 1 in 1961 to 792 in 1981. Wintering concentrations of Mourning Doves are identified with those physiographic regions offering the most suitable habitats and lowest elevations, such as the Champlain Lowlands, Eastern Foothills, and Taconic Mountains.

The Mourning Dove is relatively abundant in both its winter and summer ranges in Vermont, making it difficult to speculate on the species' migration in the state. Banding records for New York indicate that numbers of individuals banded in that state migrate to the South, to Georgia and Florida in particular (Bull 1974). In New England, fall migration occurs during August and September (Keeler et al. 1977); spring migration takes place in the first half of April (Bent 1932). Sanderson (1977) observed that those Mourning Doves that do migrate return with remarkable fidelity to the areas in which they nested the previous year, although immatures are seldom faithful to their natal areas.

The normally gregarious Mourning Dove is one of the earliest nesters in Vermont. Courtship display occurs both on the ground, where the bowing male intently and persistently pursues the female, and in the air, where the male may be seen towering upward, often with noisy wing beats, then gliding downward or sweeping in circles on widespread wings (Goodwin 1977) with tail feathers spread (Bent 1932). During the breeding season, the Mourning Dove may be heard articulating its characteristic *coo*, a clear, melodious, and somewhat sad tone, with distinguishable variations according to whether the bird is advertising its presence, displaying, or calling from the nest.

Nests of the Mourning Dove are characteristically flimsy structures composed of sticks and twigs. The male and the female construct the nest together. Nest building as a rule takes place in the early morning (Nice 1922–23). The Mourning Dove exhibits a wide choice of nesting sites, although the typical nest may be placed in the tangles of a shrub or on the horizontal branch of a tree—often an evergreen—not far from the trunk, and at a height of 3–8 m (10–25 ft). However, any horizontal support, including the ledge of a building or an old nest of another species may be used as a foundation for a new nest (Nice 1922–23; Harrison 1975).

Two pure white eggs form the normal clutch. Incubation of the eggs and brooding of the young are shared by both male and female, the former usually attending during the day and the latter during the night, early morning, and late afternoon (Nice 1922–



No. of priority blocks in which recorded

TOTAL 149 (83%)

Possible breeding:	44 (30% of total)
Probable breeding:	57 (38% of total)
Confirmed breeding:	48 (32% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	21
Green Mountains	38	70	25
North Central	15	79	10
Northeast Highlands	6	37	4
East Central	19	100	13
Taconic Mountains	16	100	11
Eastern Foothills	24	100	16

23). Four egg dates recorded during Atlas Project fieldwork fell between April 25 and June 25. Both parents regurgitate "pigeon milk" for the young squabs; it is soon supplemented by weed seeds and grain. As the incubation period lasts from 14 to 15½ days, and the young fledge in 13 to 15 days, the nesting cycle is completed in approximately 30 days. Two nestling dates for Vermont were April 17 and May 14, and the latest of five fledgling dates was July 16; the Mourning Dove potentially can have at least three broods. Nice (1922–23) recorded two striking differences between nest behavior of the Mourning Dove and passerine birds: Mourning Doves provide almost constant brooding of the young until the end of nest life nears, and do not take sanitary care of the nest.

ROY W. PILCHER

Black-billed Cuckoo

Coccyzus erythropthalmus

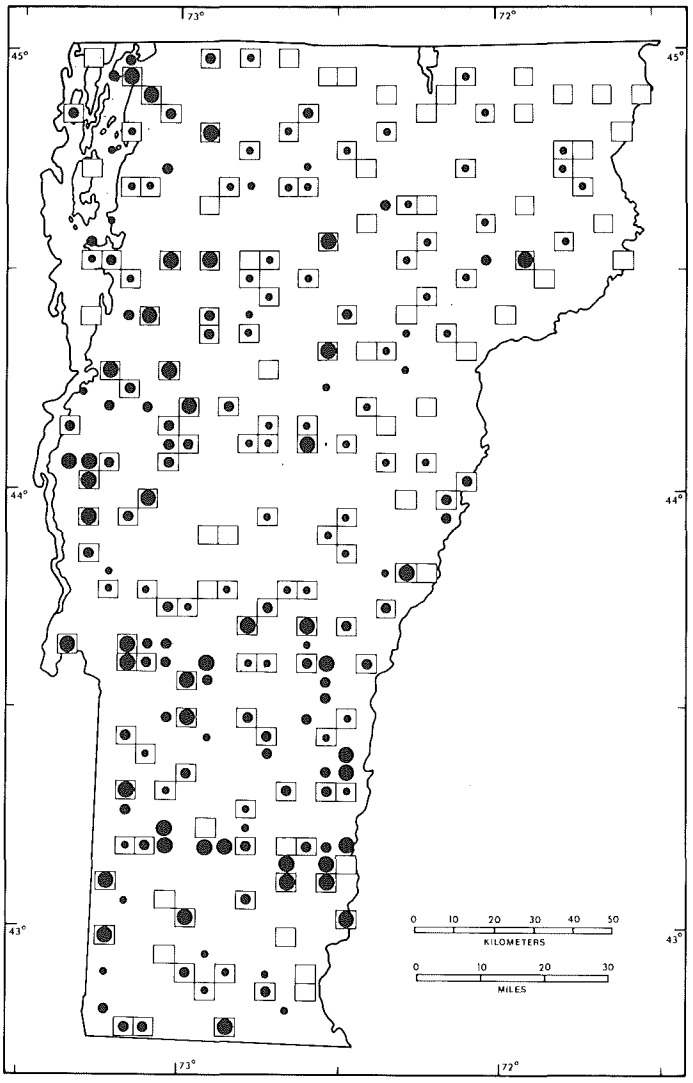
The Black-billed Cuckoo breeds from central Alberta across southern Canada to Nova Scotia and Prince Edward Island; in the U.S. it breeds as far west as Wyoming, and south to Missouri and North Carolina. It is found in a wide variety of habitats, including dry pastures with fencerows, brushy hillsides, and broken hardwood and mixed woodlands, as well as river bottom thickets and marsh edges.

Vermont provides fine Black-billed Cuckoo habitat, and in some years the species may be found—albeit thinly distributed—anywhere in the state away from the higher mountain elevations. Cuckoos are not easy birds to confirm; statewide only 24% of priority block sightings resulted in confirmation. Black-billeds are easy to locate in May, thanks to their familiar monotonic *cucucu* song, delivered in a series of 2 to 5 notes with brief pauses between series, by night as well as by day. Once nesting is under way, however, they quiet down and become furtive, skulking, and reclusive birds, seen briefly, if at all, while slipping into the depths of a woodland.

Black-billed Cuckoo numbers vary from year to year, depending, apparently, on the abundance of their favorite insect prey. One reference called this bird "wholly insectivorous" (Martin et al. 1951), but according to most researchers it takes some wild fruit and small animal prey as well (Pearson 1936; Terres 1980). Caterpillars are the usual favorite food. Examination of 121 stomachs of this species turned up 2,771 caterpillars (Forbush 1913), most of them of the destructive hairy variety (tent caterpillars, fall webworms, mourning cloak caterpillars, and tussock moths, including gypsy moths). Few birds will touch these hairy caterpillars—cuckoos' stomachs are said to become "so felted with a mass of hairs and spines that it obstructs digestion," whereupon the birds shed the stomach lining and grow a new one (Forbush and May 1939). The cuckoos' appetite for this fare endeared them to early "economic ornithologists," whose praises for the most part overcame earlier objections to the birds as cowards and habitual nest robbers (Samuels 1880; Bent 1940).

Black-billed Cuckoos nest in a wide variety of shrubs and trees, both deciduous and coniferous. Nests are typically 0.6–3 m (2–10 ft) above the ground, but occasionally lower or higher; this species has been known to nest on the ground in herbaceous cover, though such a site is exceptional. The nest is a loosely constructed platform of twigs (sometimes with an admixture of bark strips or rootlets or burrs), either unlined or fairly substantially lined with leaves, grass, catkins, pine needles, and/or fern material. Clutches contain 2 to 4, most commonly 3 eggs (rarely, as many as 8, but larger clutches probably involve two or more females); eggs are a dull, light blue-green, and are typically darker and slightly smaller than the similar eggs of the Yellow-billed Cuckoo. Egg dates from Massachusetts and New York (Bent 1940) and from Maine (Palmer 1949), together with Vermont Atlas Project data, suggest that the majority of clutches in these latitudes are initiated during the first 2 weeks of June. Six Vermont records for eggs range from June 7 to July 25.

Young cuckoos, hatched coal-black and nearly naked, grow at an astonishing rate on a diet of regurgitated caterpillars. A week after hatching (which is often asynchro-



No. of priority blocks in which recorded

TOTAL 134 (75%)

Possible breeding:	62 (46% of total)
Probable breeding:	40 (30% of total)
Confirmed breeding:	32 (24% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	27	87	20
Green Mountains	41	76	30
North Central	13	68	10
Northeast Highlands	5	31	4
East Central	13	68	10
Taconic Mountains	16	100	12
Eastern Foothills	19	79	14

nous) they may be climbing about on limbs near the nest; they hasten feather development by using their bills to strip the covering from their quill feathers. The Black-billed Cuckoo is generally considered single-brooded in the northern parts of North America; late summer egg records for the Northeast may be the result of a breeding cycle skewed by erratic local prey populations (see the Yellow-billed Cuckoo species account). Although the Black-billed species usually builds its own nest "as every other self-respecting bird does" (Gladden 1936), the family tendency toward brood parasitism appears sporadically; eggs have been found in nests of the Yellow-billed Cuckoo, Eastern Wood-Pewee, Cedar Waxwing, Gray Catbird, Wood Thrush, Yellow Warbler, and Northern Cardinal.

In spring, Black-billed Cuckoos arrive in Vermont in mid May. An April 20, 1977 arrival in Weathersfield (RVB, Spring 1977) was exceptional, besting even the inland New York record of April 25 (Bull 1974). Fall migration peaks are small in this solitary species, but records suggest that most migrants move through Vermont in September; wintering grounds are in northwestern South America. Sightings of Black-billed Cuckoos are rare in Vermont after mid October.

ALAN PISTORIUS

Yellow-billed Cuckoo

Coccyzus americanus

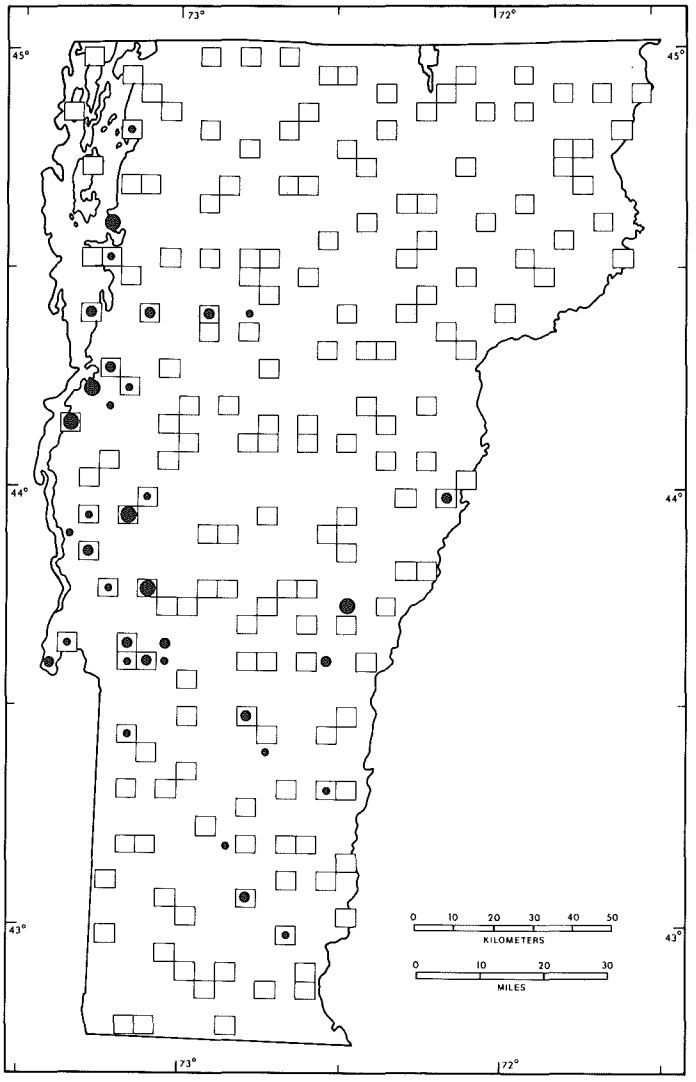
The Yellow-billed Cuckoo breeds from the latitude of the Great Lakes south to the Greater Antilles and Central America. In the western U.S., however, the bird is scarce and local, as it depends on increasingly rare riparian habitats. Common and widespread in the Southeast, the Yellow-billed is less frequent in the Northeast, where it is a denizen of brushy fencerows, overgrown pastures and orchards, and, especially, riparian thickets.

The Yellow-billed Cuckoo's New England distribution has long been a puzzle. A century ago Samuels (1880) described the species as "very irregularly distributed through New England as a summer visitor." Recently Spear (1976) listed the species' nesting status as uncertain in Vermont. The most recent—and most detailed—range map (Peterson and Peterson 1980) shows the species to be absent from most of Vermont, occurring only in the extreme south and in the northwest corner, which forms the tip of a range "thumb" extending east from southern Ontario.

The Vermont Atlas Project data paint a different distribution picture for breeding cuckoos. Yellow-billeds are absent from the higher mountain elevations and from the Northeast Highlands and North Central region, all but absent from the Eastern Foothills and East Central region, and very scarce in the southern Green Mountains and along the western Quebec border. They are somewhat more numerous in the southeastern foothills and in the southern Connecticut River valley, and are most numerous in the west central part of the state, in the Taconic Mountains and (particularly) the Champlain Lowlands. Indeed, 24 of the total 36 Atlas Project records (including those for non-priority blocks) were recorded in a strip 134 km (83 mi) long by 21 km (13 mi) wide extending along Lake Champlain from Fair Haven and West Rutland north to St. Albans Bay and Fairfield. This narrow strip in the Champlain Lowlands produced 8 of the state's 13 probable records and 5 of 6 confirmed records: copulation at Dead Creek in Panton; nest building bordering the Cornwall Swamp in Salisbury; a nest with 3 eggs at Jones Brook in Brandon; and two observations of food being carried—one over Lewis Creek in Ferrisburg, the other in a floodplain forest in Milton. The sixth confirmation was based on a used cuckoo nest found in a swampy area of Woodstock, where a Yellow-billed Cuckoo had been seen and heard earlier in the year.

There is very little in the literature about the early stages of reproduction in this species. One report of courtship feeding exists, in which the female held an insect in her bill through two copulation acts (Pistorius 1981). Nest type and construction, nest placement, clutch size, and egg color are similar to those of the Black-billed Cuckoo, with minor exceptions: the Yellow-billed seems to favor vine-covered nest sites, and its nest may, on average, be slightly smaller and less substantially built and lined than that of its near relative. The Yellow-billed Cuckoo incubation period is generally given as 14 days, but at one nest 4 eggs, laid on consecutive days, hatched 9 days after laying (Potter 1980).

Several anomalies in the reproductive behavior of cuckoos—especially their often interrupted egg-laying sequence and the wide variation of laying dates from year to year—have led Hamilton and Hamilton (1965) to



No. of priority blocks in which recorded

TOTAL 24 (13%)

Possible breeding:	11 (46% of total)
Probable breeding:	10 (42% of total)
Confirmed breeding:	3 (12% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	11	35	46
Green Mountains	5	9	21
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	1	5	4
Taconic Mountains	6	37	25
Eastern Foothills	1	4	4

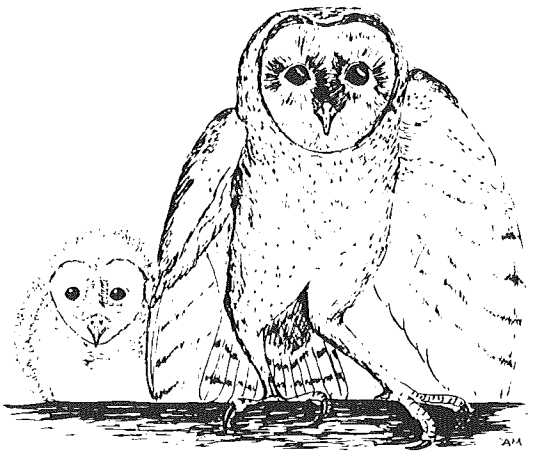
conclude that breeding by this bird is adjusted to local food resources, which may be appraised during a postmigratory period of wandering. When the birds detect a suitable caterpillar hatch or cicada emergence, their reproductive system somehow times egg laying to coincide with peak prey abundance. Nolan and Thompson (1975) supported these contentions on the basis of fieldwork, and theorized that egg production, triggered by an insect outbreak, might find females ready to lay but without a nest, leaving no alternative but to deposit eggs in the nests of other birds.

Most of the few Yellow-billed Cuckoos breeding in northern New England vacate the area in September, and most late fall records are for early October. A sighting on November 7, 1977 in Fairlee (RVB, Fall 1977) was matched by a November 16 observation reported for inland New York (Bull 1974). The birds winter in South America as far south as Uruguay.

ALAN PISTORIUS

Common Barn-Owl

Tyto alba



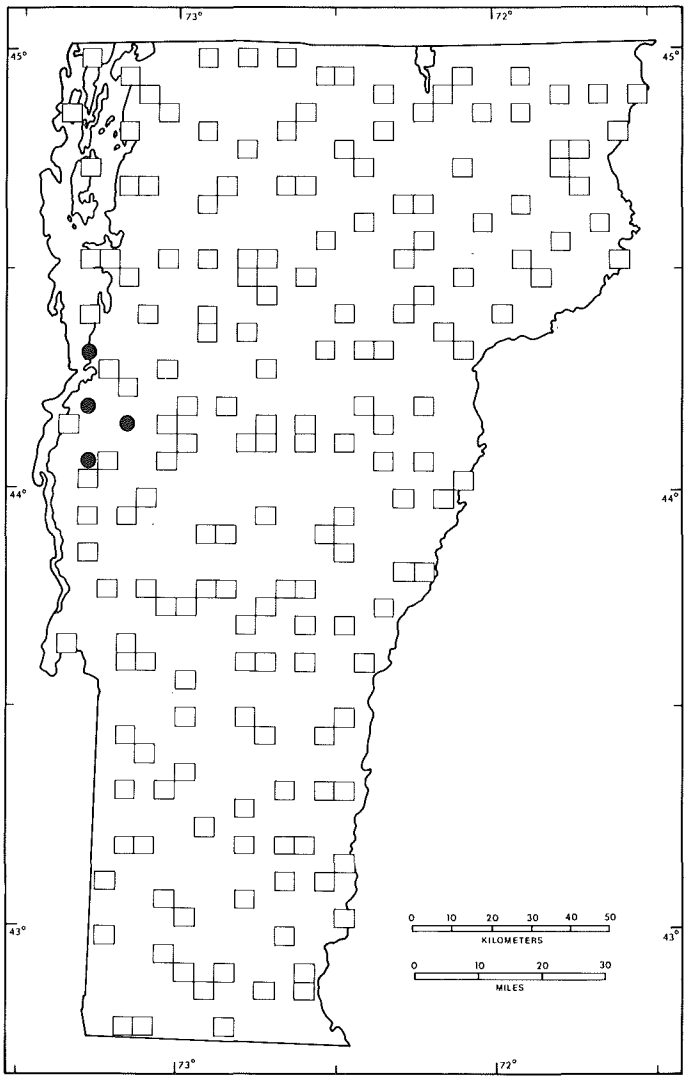
The Common Barn-Owl is distributed worldwide, occurring in North and South America, Eurasia, Australia, and Africa, and populating most tropical zones and temperate regions where winter temperatures are not too severe (Bunn 1982); the subspecies *T. a. pratincola* occurs in North and Central America. Although the American Ornithologists' Union recently changed the species' name to Common Barn-Owl (from Barn Owl), it is doubtful that it is common anywhere in the United States; the species has been on the National Audubon Society's Blue List since 1972 (Tate 1981). This long-winged bird of open country with a distinctive heart-shaped face and dark eyes belongs to a different family (Tytonidae) than the other North American owls.

The Common Barn-Owl is a secretive species that requires open habitat, such as lightly wooded areas or agricultural lands. It nests in such man-made structures as barn lofts, church steeples, uninhabited buildings, nest boxes, ruins, silos, and water towers, as well as in natural sites such as hollow trees and hollows in banks or cliffs (Bent 1938; Bunn et al. 1982). An expert mouser able to hunt in total darkness (Payne 1962), the Common Barn-owl specializes in meadow voles, white-footed mice, rats, and shrews (Errington 1932).

The Common Barn-Owl is on the northern edge of its range in Vermont, and was not known to breed in the state until the Atlas Project survey (Cutting 1884; Perkins and Howe 1901; Stewart 1952; AOU 1957). Fortner et al. (1933) and Smith (1934b) called the species "accidental" in Vermont. The species is rather lightly feathered for an owl and is susceptible to mortality during cold weather, requiring therefore a protected place to roost (Speirs 1940; S. B. Laughlin, pers. observ.) as well as a steady supply of food. Stewart (1952) stated that birds north of 35° latitude tend not to be sedentary.

Four specimen records exist for Vermont from 1894 to 1920 (Tyler 1894; Fortner et al. 1933). Although no evidence of barn-owl nesting in Vermont has previously been published, the Vermont Institute of Natural Science has received at least two reports of nesting "monkey-faced" owls with weird calls: a nest in an unused fireplace in Rockingham in the 1920s (M. E. Workman, pers. comm.); and a nest with adults and young, in the late 1800s, in a sawmill in Shrewsbury (M. Collins, pers. comm.)—an area now completely reforested but then devoid of trees. The possibility exists that, despite the lack of documentation, the Common Barn-Owl has bred in Vermont in the past. The intensive fieldwork of the Atlas Project, as well as an appeal for the report of observations through newspaper articles and articles in the state agricultural journal, led to 4 confirmed nestings between 1976 and 1981. Of the birds found nesting, however, only 1 pair was still breeding in 1983. The species is nocturnal as well as secretive, making detection difficult at any time and, outside the breeding season, nearly impossible. Aside from Atlas Project reports, only two Vermont records exist, both from the *Records of Vermont Birds* (1973–83): one from Poultney in the spring of 1973, and one from Middlebury in the winter of 1978–79.

The first confirmed breeding for the state was obtained on July 3, 1977, when 3 young (ranging in age from 10 days to 2 weeks) were rescued from a collapsed chimney in



No. of priority blocks in which recorded

TOTAL 0 (0%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

Charlotte (ASR, M. Burden, S. B. Laughlin); 2 of the young were unhurt, but the youngest had a crushed wing and has remained at the Vermont Institute of Natural Science.

Barn-Owls nested in the chimney of a house on a large dairy farm in Addison in the summer of 1976; 4 to 5 birds were seen flying out of the chimney at night in late summer (ASR, B. Danyow). The adults were frequently seen and the young were heard. A pair laid 5 eggs in the upper part of a hay barn in Ferrisburg in May 1977; the farmer stored his bales carefully so as to not interfere with the birds (ASR, B. Guyett).

A fourth nesting was in an old quarry south of Burlington; the report was submitted on the understanding that the location be kept confidential. The owls have nested in a man-made structure there from 1980 to 1983. This site provided Vermont with its only definite egg dates: 2 eggs on July 12, 1982, and 3 eggs on July 30, 1983 (ASR, J. J. Allen). Clutch size in North America has reportedly ranged from 2 to 11 eggs (Bent 1938; Terres 1980; Bunn et al. 1982). The only Vermont hatching date is for July 20.

The Atlas Project established that the Common Barn-Owl nests in Vermont, however tenuously. This rare and beneficial species is proposed for Species of Special Concern status in Vermont.

SARAH B. LAUGHLIN

Eastern Screech-Owl

Otus asio

The Eastern Screech-Owl is a tiny bundle of ferocity. Roughly 20 cm (8 in) tall, in spite of its small size it survives the rigors of the winters in the northern part of its range. This species of screech-owl breeds along the length of eastern North America northward to southern Canada, and is usually a permanent resident within its range (Van Camp and Henny 1975). Appropriate habitat consists of old apple orchards, stream edges, woodlots, and villages. In Massachusetts, small hardwood forests were found to be a preferred habitat (Andrews and Komar 1982). Hollows in trees, old woodpecker holes, or nest boxes are a necessity both for breeding and winter roosting.

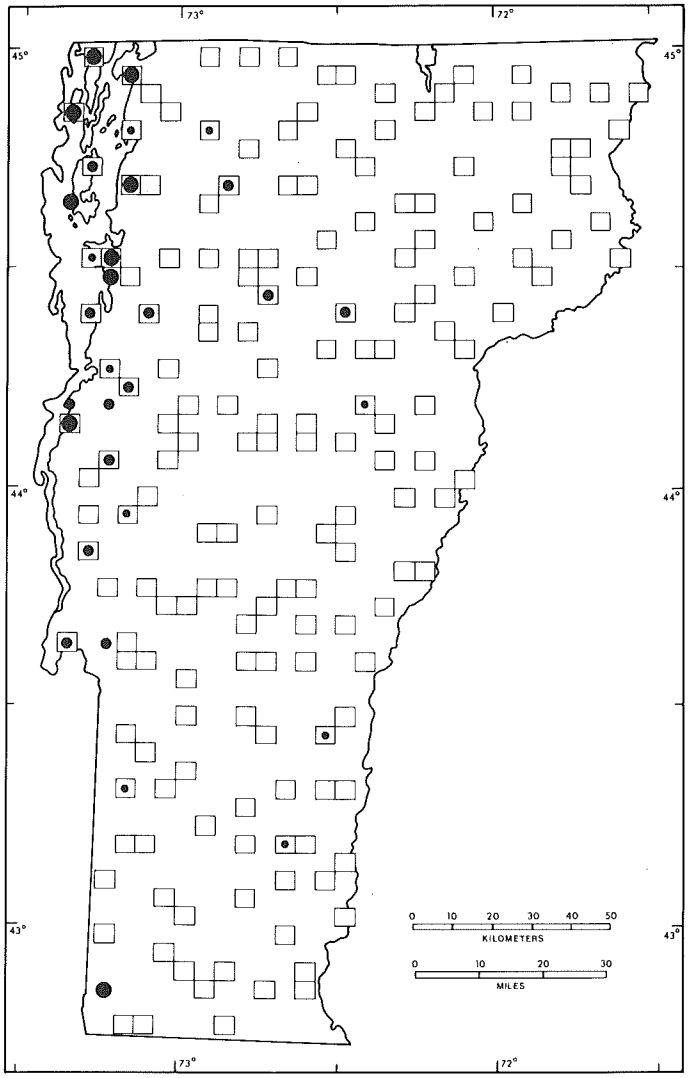
The Eastern Screech-Owl is named for its voice, which in fact resembles a trill or a quaver rather than a screech. Eastern Screech-Owls will eat what they can catch; their diet consists of small mammals—especially mice—insects, birds, amphibians, and even fish and reptiles (Errington 1932; Bent 1938). In some areas songbirds appear to be an important part of the prey caught for the young (Allen 1924; Van Camp and Henny 1975), which may explain the intense mobbing response songbirds display at the sight of a screech-owl.

The Eastern Screech-Owl was apparently commoner in Vermont in the nineteenth century (Thompson 1853; Cutting 1884; Fortner et al. 1933; GMAS records); Smith (1934b) called it a fairly common resident locally at low altitudes, and uncommon elsewhere. Spear (1976) detected a population decline from the 1940s to the 1970s. Before laws protected birds of prey, the screech-owl was an easy target for vandals because of its habit, when roosting in the open, of pulling itself up into a stiff dead-stub position, narrowing its eyes to slits, and trusting to its invisibility. The regeneration of Vermont's forests undoubtedly eliminated many of the small, separate woodlots used for nesting in the last century. Although insecticides have been suggested as a reason for the species' decline, Van Camp and Henny's (1975) study of screech-owls in Ohio detected no eggshell thinning.

The Atlas Project determined that the screech-owl is presently distributed over much of its former Vermont range. The species occurs in all physiographic regions except the Northeast Highlands, and its center of abundance is the Champlain Lowlands. This distribution agrees with that indicated by *Records of Vermont Birds* for 1973–83, in which 76% of all reports received in the those 10 years were from the Champlain Valley, with concentrations in Ferrisburg, Burlington, Dead Creek, and Middlebury.

Eastern Screech-Owls occur in two color phases, a gray-phase and a red-phase, which are not related to age or sex. Studies in Ohio have shown that gray-phase individuals are better able to withstand severe winters. The red-phase birds, which have significantly higher metabolic requirements in temperatures below -5° C (23° F), experienced a sharp population drop during severe winters (Van Camp and Henny 1975; Mosher and Henny 1976). From 1973 to 1983, *Records of Vermont Birds* reported only 2 red-phase birds: 1 in a North Ferrisburg cow barn on February 13, 1978, and 1 found dead in North Hartland on December 13, 1979.

Eastern Screech-Owls have been recorded calling in every month of the year in Vermont (RVB, 1973–83), although calling peaks in the spring breeding season. Atlas



No. of priority blocks in which recorded

TOTAL 25 (14%)

Possible breeding:	9 (36% of total)
Probable breeding:	10 (40% of total)
Confirmed breeding:	6 (24% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	19	61	76
Green Mountains	1	2	4
North Central	1	5	4
Northeast Highlands	0	0	0
East Central	1	5	4
Taconic Mountains	1	6	4
Eastern Foothills	2	8	8

Project workers most frequently detected the species by hearing the territorial call (s). Courtship begins in February, with the pair sitting as close together as possible and preening each other (Bent 1938). The 4 or 5 eggs (out of a range of 2 to 8) are laid in the nesting hollow at intervals of 2 or 3 days; incubation begins usually with the first egg (Bent 1938; Terres 1980). The male feeds the female while she incubates; the young hatch after a 26-day incubation period (Sherman 1911), which is usually between April 15 and May 5 in Ohio (Van Camp and Henny 1975). Both parents feed the young (Allen 1924), which fledge in late May or early June in Ohio (Van Camp and Henny 1975). The young remain dependent on the parents for food for some time afterward.

The Atlas Project established that the Eastern Screech-Owl has an apparently stable population in Vermont, especially in the Champlain Lowlands, and that it is a healthier population than many Vermont ornithologists would have predicted. The screech-owl appears to be recovering in Vermont from its decline earlier this century.

SARAH B. LAUGHLIN

Great Horned Owl

Bubo virginianus

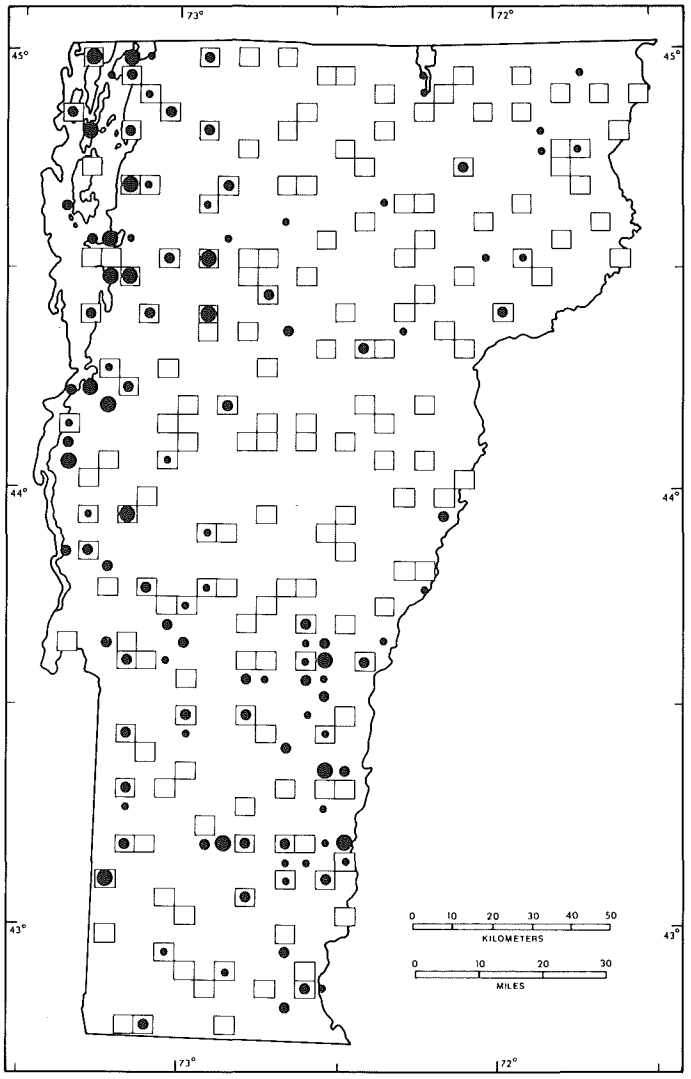
The Great Horned Owl is the second most abundant owl in Vermont, and was recorded in 32% of the priority blocks. This American species of *Bubo* occurs from the tree limit in the Arctic to the tip of South America, and is highly successful in climates and habitats ranging from deserts to forests to city parks. The Great Horned Owl, a distinctive large brown owl with yellow eyes, prominent feather tufts, and a white breast bib, is the most powerful and one of the largest North American owls. As adults, these owls are largely nonmigratory. Most Great Horneds remain year-round near their hatching and breeding grounds (Stewart 1969), with pairs found near the nest site in all months, except perhaps in late summer and early fall (Baumgartner 1938). Preferred habitat is dense woodlands (often pines) for roosting, surrounded by open land (often farmland) for hunting. These conditions are ideally met in the Champlain Lowlands, where 40% of Vermont's priority block sightings were reported.

The size of one pair's territory ranges from 5.2 sq km (2 sq mi) in Kansas to 7.8–10.4 sq km (3–4 sq mi) in New York State (Baumgartner 1939). Bent (1938) believed that Great Horned Owls periodically exhausted the prey supply and were forced to change territories every four years or so, but a pair in Woodstock, Vermont, appears to have utilized the same territory of 15.5 sq km (6 sq mi) for 10 years (S. B. Laughlin, pers. observ.).

The Great Horned Owl's status in Vermont has remained much the same historically, except for a decline in the 1930s (Cutting 1884; Perkins and Howe 1901; Fortner et al. 1933; Smith 1934b). During the Atlas Project, the Great Horned was recorded in all seven physiographic regions of the state.

Great Horned Owls are one of the earliest northeastern species to nest, and are often brooding eggs as early as January or early February. Bent (1938) stated that March 1 was the usual date in Massachusetts. For nesting sites Great Horneds utilize old hawk, eagle, or osprey nests; squirrel nests; and tree hollows, cliffs, and caves (Bent 1938). During the Atlas Project, this species was recorded breeding in a Red-tailed Hawk nest in Woodstock (appropriated before the hawks returned), which was situated in a lone American linden tree in a pasture, at a height of about 9 m (30 ft); in a broken, hollow stub near Rutland; in a nest in a vacant Great Blue Heron rookery in Fairfax; and in the bare metal supports of a railroad bridge over the Connecticut River. Vermont egg dates are for 2 egg clutches, and range from March 13 to April 16. Six records of nest with young are all for 2 young, and range from April 30 through early June.

The eggs are incubated for between 28 and 35 days (Bent 1938; Kendeigh 1952), with the male feeding the female on the nest (Baumgartner 1938). The young remain in the nest for 6 to 7 weeks, cannot fly until they are 10 to 12 weeks old, and frequently tumble to the ground before fledging. The parents are very attentive and protective, and will feed the young on the ground. The fledged young will follow their parents and expect to be fed as late as the fall. Fledglings cared for at the Vermont Institute of Natural Science did not learn to hunt on their own until mid September. Vermont dates for recently fledged young (nine records) range from



No. of priority blocks in which recorded

TOTAL 57 (32%)

Possible breeding:	18 (32% of total)
Probable breeding:	32 (56% of total)
Confirmed breeding:	7 (12% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	23	74	40.0
Green Mountains	13	24	23.0
North Central	2	11	3.5
Northeast Highlands	2	13	3.5
East Central	1	5	2.0
Taconic Mountains	7	44	12.0
Eastern Foothills	9	38	16.0

May 18 through July 15; two reports are of 3 fledglings.

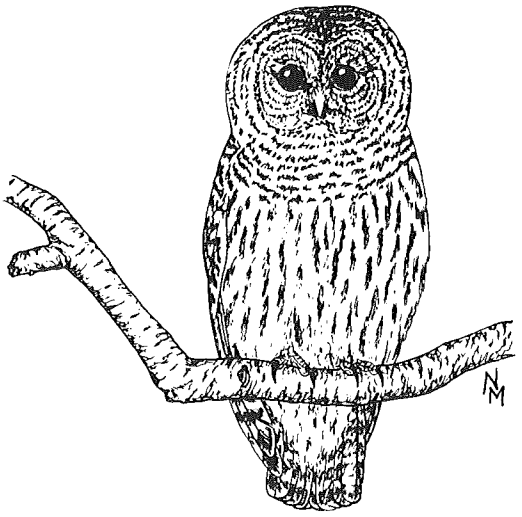
The diet consists largely of mammals, with a decided preference shown for hares and cottontails, squirrels, rats, mice, and skunks; if a chicken- or duck-yard adjoins the owls' territory, they will take an occasional domestic bird (Errington 1932). Great Horneds tend to hunt from elevated perches (Petersen 1979). The male and female both hoot, with her hoot being higher pitched and consisting of 7 or 8 syllables; the deep, soft voice can carry for a mile or more.

The Great Horned Owl is a magnificent creature, with no natural enemies except man. Mated individuals behave very tenderly with each other; courtship involves much mutual preening, sitting close together, and bill stroking. Adults are very solicitous of the young, and will readily adopt and feed orphaned young (S. B. Laughlin, pers. observ.). The "winged tiger of the woodland" has a gentle side to its nature; it also provides an important check on rodents.

SARAH B. LAUGHLIN

Barred Owl

Strix varia



The Barred Owl is the most common owl in Vermont, occurring in 53% of the priority blocks. This large, gray-brown owl has dark eyes, no feather tufts, and white breast barring; it is very distinctive in appearance. This species' diet includes mice, squirrels, reptiles, amphibians, fish, and insects; it will take whatever is easily available and within the grasping power of its relatively small feet (Errington 1932; Bent 1938). A gentle creature with an engaging personality, the Barred Owl can be quite tame and curious even in the wild. One individual raised at the Vermont Institute of Natural Science's raptor care facility in Woodstock returned there each winter for four years after his release, greeting his former benefactors with hoots, and swooping down to pluck mice from their hands. He returned in October or November and stayed until February or early March; the remainder of the year he lived on his own in the wild. Where he summered is not known, but he was found dead in Thetford, about 25 aerial miles from Woodstock, in January of his sixth year. As Errington (1932) wrote, the Barred Owl seems endowed with as mild a personality as a raptor could have and yet maintain a predaceous existence.

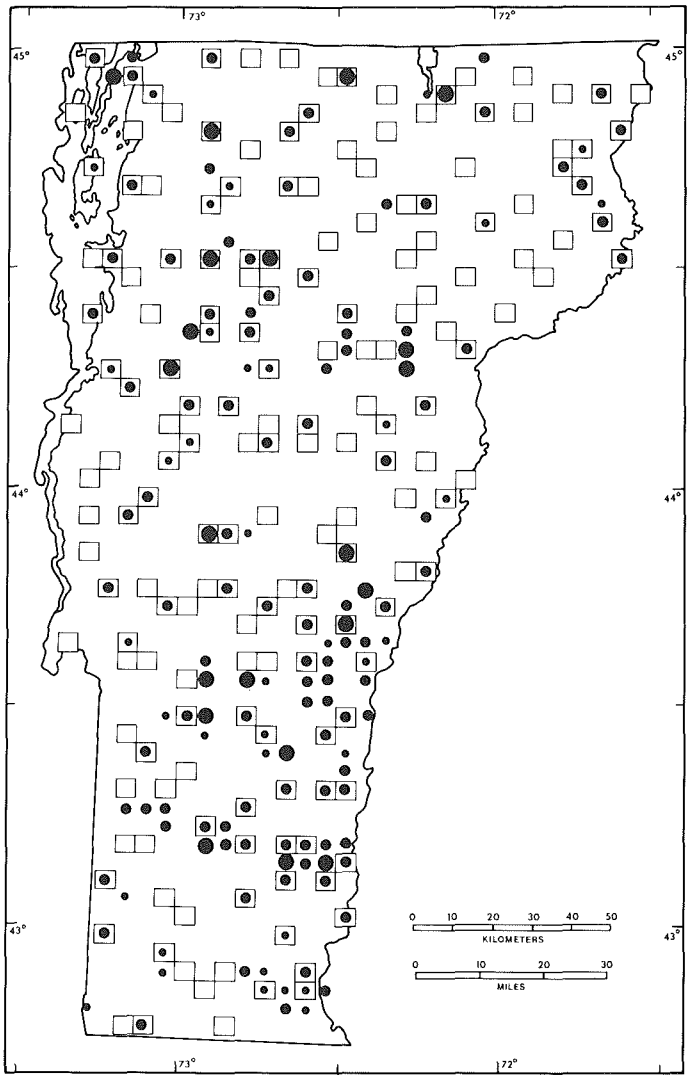
The Barred Owl is a very vocal owl and will frequently call during the day. The distinctive call is given by both the male and the female, with the male's deeper voice distinguishable in duets; the call can be translated as *who cooks for you? who cooks for you-all?* A variety of shorter calls, squeaks, and grunts is given.

The Barred Owl is one of the most common species across North America east of the Rockies. It occurs wherever preferred habitat exists—heavily wooded swamps, hemlock or pine forests, with adjacent open areas for hunting (Bent 1938). The Barred usually hunts by pouncing and so probably does not require as much open land as the Great Horned Owl.

The Barred Owl's historical status in Vermont resembles its status today, although Cutting (1884) sensibly reported that it seemed to decrease with the cutting of the forests. The Barred Owl's distribution in New England in the past has been considered meshed with that of the Red-shouldered Hawk (Bent 1938). The Barred is more common than the Red-shouldered in Vermont today (the Barred occurring in 53% of the priority blocks, the Red-shouldered in 35%). Both species' distribution is centered in the Eastern Foothills, with the Barred occurring in 92% of the priority blocks there and the Red-shouldered in 63%. In the Champlain Lowlands, the Barred occurred in 55% of the priority blocks and the Red-shouldered in 48%, and in the East Central region both occurred in 37%. Each of the two species occurred in all seven of the state's physiographic regions.

Although special fieldwork was carried out for this species, most Barreds were located during the course of regular block coverage. Barreds will answer readily to an imitation or tape of their hoot. Territorial pair hooting (T) and singing (S) provided the most frequent means of locating the species.

The breeding season begins in February or March, and the preferred nesting site in Vermont and Massachusetts appears to be the hollow of a tree (S.B. Laughlin, pers. observ.; Bent 1938). On two occasions, young owlets have been brought to the Vermont Institute of Natural Science by loggers who had inadvertently cut a large old beech



No. of priority blocks in which recorded

TOTAL 95 (53%)

Possible breeding:	20 (21% of total)
Probable breeding:	66 (69.5% of total)
Confirmed breeding:	9 (9.5% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	17	55	18
Green Mountains	30	56	32
North Central	5	26	6
Northeast Highlands	7	44	7
East Central	7	37	7
Taconic Mountains	7	44	7
Eastern Foothills	22	92	23

that contained an owl family. In each tree, a long slit entered into a natural hollow. If hollow trees are not available, Barred Owls will nest in a stub or the old nests of hawks, crows, or squirrels (Bent 1938). Such nesting has not yet been reported in Vermont.

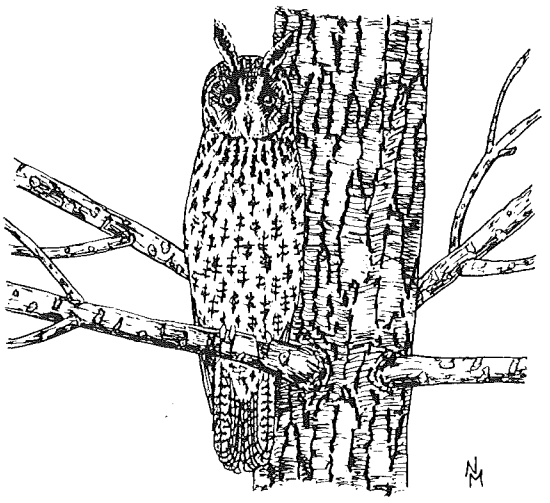
The number of eggs laid varies from 2 to 3; laying is at intervals of 2 to 3 days (Kendeigh 1952). Incubation, as with most owls, usually begins with the first egg, probably because owls nest so early in the spring that unprotected eggs might freeze. There are two egg dates for Vermont: April 25, 1900, Brandon, 2 eggs; and March 15, 1913, Pomfret, 3 eggs. Dates for young include June 10, 1972—3 young were found in a tree cut by loggers in Thetford; and May 13, 1981, Springfield. There are five dates for fledged young ranging from June 17 to July 9, with a concentration in the third week of June; three records are of 3 fledglings each. Young expect their parents to feed them for several months after they fledge.

The Barred Owl occurs in suitable habitat of deep, wet woods almost everywhere in Vermont and was widely reported during the Atlas Project. The species' future in Vermont could be threatened by careless woodlot management involving the removal of the old, hollow trees upon which so many species depend.

SARAH B. LAUGHLIN

Long-eared Owl

Asio otus



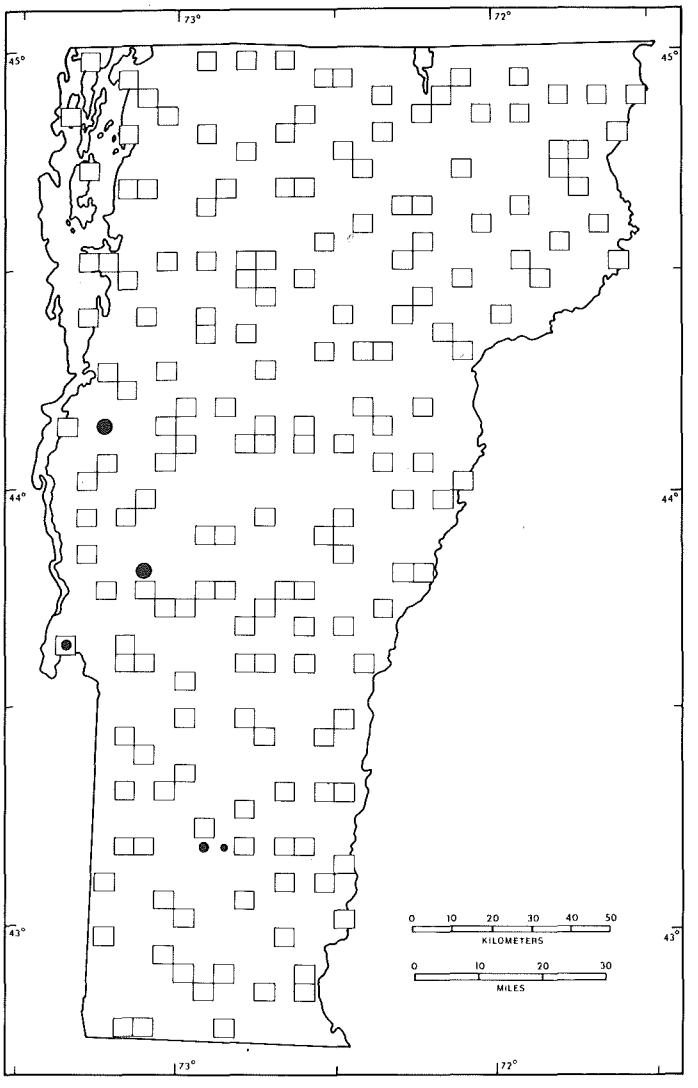
The Long-eared Owl breeds in a broad belt that spans the world's northern temperate zone. In North America it is found from the Great Slave Lake area of the Northwest Territories and southern California eastward, in an increasingly narrow band, to Nova Scotia and Pennsylvania, with an extension along the Appalachians into Virginia. This owl requires wooded cover in which to roost and nest, and although it prefers coniferous woods, it will make do with sparse deciduous cover, fencerows, even desert oases, if necessary. Its density over its huge range is unknown, since the Long-eared is both secretive and local. In Vermont, it has been proposed for Species of Special Concern status.

Reports published in *Records of Vermont Birds* from 1973 to 1983 and Atlas Project data record the presence of 15 different adult Long-eared Owls. These records represent observations in all four seasons, in a geographical range from Craftsbury and Burlington to Bethel and Londonderry, and from West Haven to the Long Trail south of Camels Hump. The observations produced only three breeding confirmations: an active nest located in Sudbury in May 1975 (A. Pistorius, pers. observ.); recently fledged young with adults in Waltham (Addison County) in the summer of 1978 (ASR, D. Potter); and several fledged young associating with an adult Long-eared in an apple orchard in Brandon in June 1981 (ASR, E. Barbarise). The scarcity of encounters is often considered to be a result of the bird's strictly nocturnal activity, its silence away from the nest, and its low-profile roosting habit. Generally it roosts in thick conifer cover or vine-tangled deciduous cover. It is unclear whether this owl is as rare in Vermont as the number of reports seems to suggest.

The pre-Atlas Sudbury nest was typical. The pair had taken over an old crow's nest high up in a conifer located near the edge of a mixed woods. This is much the favored type of nest, though those of squirrels, hawks, and other birds are also used. Occasionally nests are found in bushes, in stub cavities, or on the ground. Nests are usually used as found, although sometimes the owls do repair work, and occasionally add bark, leaves, or their own feathers for lining.

Long-eareds characteristically lay 4 or 5 white, elliptical eggs (the range is 3 to 10). Apparently only the female incubates, starting with the first egg, so that after the 4-week incubation period the nest is populated with young of different sizes. In good prey years all may survive; in most years, however, only the oldest nestlings survive. The young clamber out of the nest in 21 to 26 days and fly 1 to 2 weeks later. The adult female reacts unpredictably when the nest tree is approached. She may slip quietly away or sit tightly; pressed closely, she may raise her wings to form a circular shield and hiss, attack the intruder, or—in behavior apparently unique among raptors—drop to the ground to perform a broken-wing act.

Though woodland nesters and roosters, these long-winged and light wing-loaded owls hunt mostly in the open and on the wing. The Sudbury birds characteristically hunted a hay meadow and an overgrown pasture bordering their nesting woods. Long termed a beneficial owl by economic ornithologists, this species preys largely on rodents such as voles, deer mice; small numbers of shrews and birds (mostly jay-sized



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	0 (0% of total)
Probable breeding:	1 (100% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	1	3	100
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

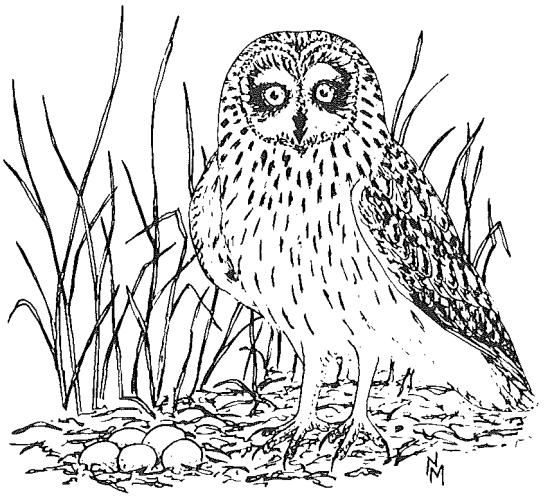
and smaller) are also taken, as well as insects, frogs, snakes, and fish. Although Marti (1976) indicated that small mammals make up 89% of this owl's prey in Europe and 98% in North America, there is evidence of occasional opportunistic feeding.

An astonishing variety of calls has been ascribed to the reputedly taciturn Long-eared Owl: low, mellow, *hoooo's*, doglike yelps and barks, catlike *meows*, and weird shrieks, cackles, whistles, and yowls. The Sudbury adults gave a two-part, metallic nighttime flight note (perhaps a hunting call or a teaching call) strongly reminiscent of the common Killdeer call.

ALAN PISTORIUS

Short-eared Owl

Asio flammeus



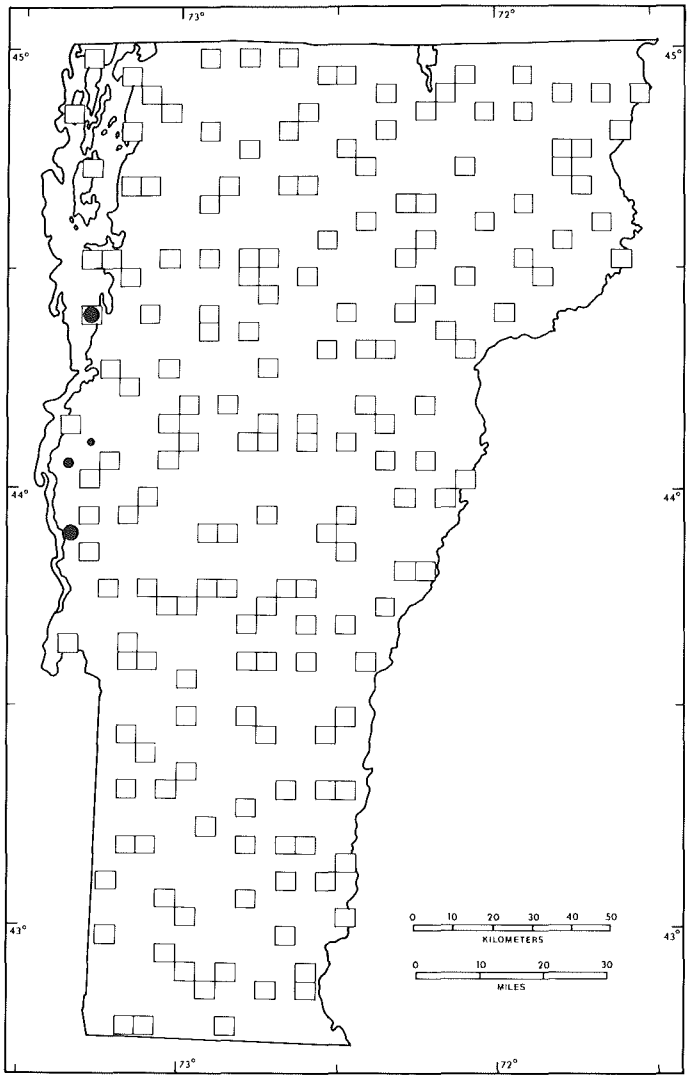
The Short-eared Owl is a splendid flier whose range includes all continents except Australia; Vermont is within its zone of permanent residence (Clark 1975). Although the Short-eared had been listed as a Vermont breeding species in the past (Thompson 1842; Fortner et al. 1933), it is rare in the state, and the Atlas Project produced the first breeding records in many years. The species was reported four times and confirmed twice.

The Short-eared Owl requires open country—grasslands, tundra, dunes, or marshes—for hunting and breeding. Unlike most other owls, the Short-eared nests on the ground, builds its own nest, frequently hunts during the day (especially in late afternoon and early morning), and often roosts on the ground. Like the Northern Harrier, the Short-eared quarters the fields, hunting for the mice that constitute its basic diet (Errington 1932). This owl is sometimes considered an irruptive species because of its nomadic movements, specialized feeding habits, and the variability of the time and location of breeding and number of eggs laid (Clark 1975).

During the years that *Records of Vermont Birds* has been published—1973–1983—the Short-eared Owl has been reported in two fall seasons, four winter seasons, and five spring seasons. The only summer records are in Atlas Project reports. The species occurs almost exclusively in the Champlain Lowlands, but single sightings have also been reported in Craftsbury (October 29, 1974), Newport (October 1, 1977), Springfield (February 28, 1978), and East Montpelier (April 16, 1979) (RVB, 1973–82). In winter, Short-eareds often gather in groups in areas where mice are abundant. Notable Vermont wintering concentrations have occurred in Ferrisburg (4 to 15 owls from December 7, 1974 to April 17, 1975), at Dead Creek Wildlife Management Headquarters in Addison (up to 13 owls in the winter of 1980–81), and at a Vergennes farm (24 were reported on April 9, 1975, though the number had dwindled to 14 by April 12 and 1 by April 18) (RVB, 1973–83).

Two nesting confirmations were obtained during the Atlas Project period. In the summer of 1981 a pair with young was observed in rough fields near a wooded swamp in Shoreham. The adults were observed carrying food on several occasions, and on July 11 the observers followed the adults and found 5 young owls (ASR, E. Weeks). The second confirmation was in Shelburne, where from June 29 to July 2, 1980, 2 downy-headed young were located in a copse of young white pine adjacent to open fields; adults carried food in to them (ASR, B. Farrell). The probable symbol on the map represents 2 adults seen flying near the Brilyea Access of the Dead Creek Wildlife Management Area on June 15, 1976—one with "what appeared to be a rabbit in its talons" (ASR, B. and G. Gianetti); since food carrying in raptors does not establish confirmation, the sighting was accepted as probable. The possible record represents a single bird observed April 19, 1977, again near Dead Creek headquarters in Addison, within the egg date range of March 20 to June 28 (Forbush 1929; Townsend 1938; Bull 1974; Clark 1975).

The courtship flight of this graceful species involves wing clapping, in which the male climbs with a rowing wing beat in



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	1 (100% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	1	3	100
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

tight circles to an altitude as high as 365 m (1,200 ft), then brings his wings together below his body in a clapping motion that is often repeated 15 to 20 times; the flight ends with a spectacular descent—the bird rocks back and forth with the wings held in a dihedral (Clark 1975).

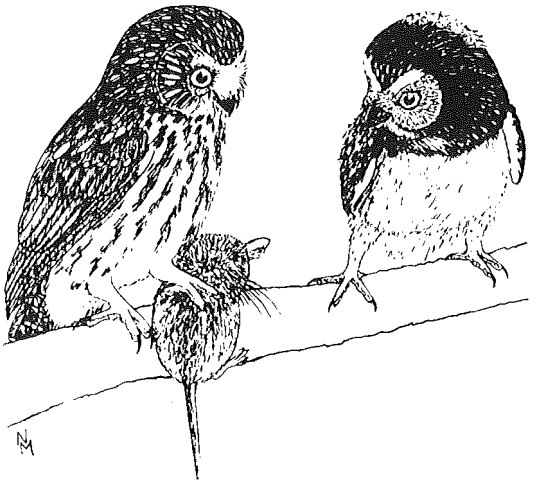
Clutches usually contain 4 to 7 eggs, although up to 9 and even 14 have been reported (Townsend 1938; Terres 1980); young may leave the nest before they fledge (Clark 1975) and hunker down in grass that camouflages them. They fly at 31 to 36 days (Townsend 1938).

Short-eared Owls occur in Vermont throughout the year, though in limited numbers; the species has been a rare migrant and casual resident since at least the 1930s (Fortner et al. 1933; Smith 1934b). The species is now gone from almost all of New England (L. Master, pers. comm.), is proposed for listing as a Species of Special Concern in Vermont, and is on the National Audubon Society's Blue List (Tate and Tate 1982).

SARAH B. LAUGHLIN

Northern Saw-whet Owl

Aegolius acadicus



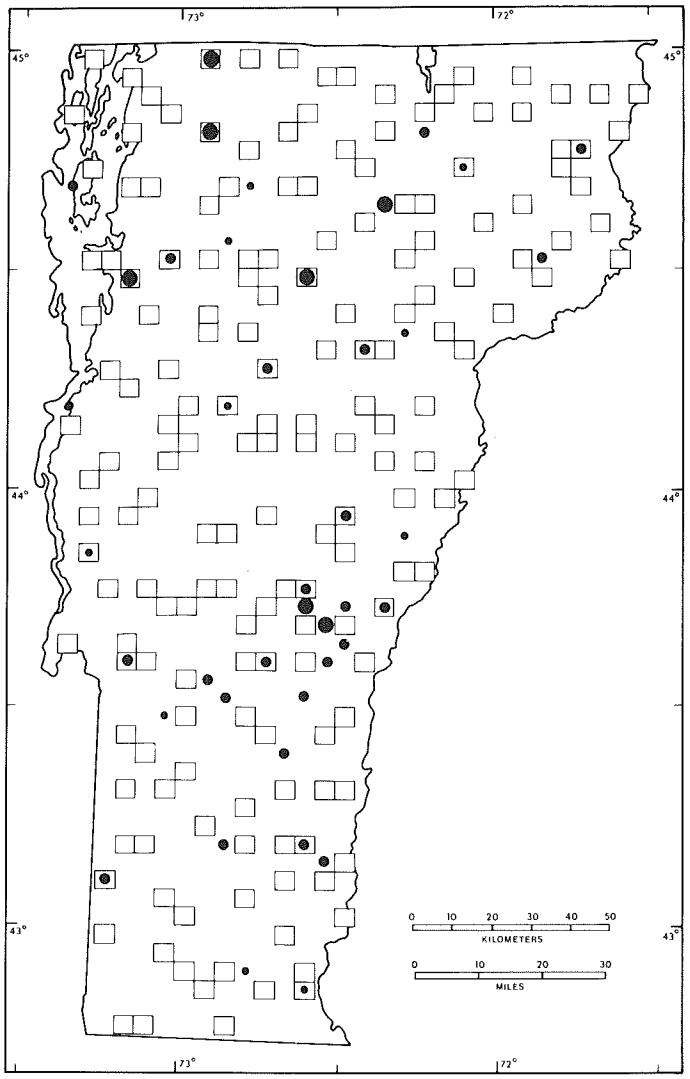
An exclusively New World bird, the Northern Saw-whet Owl nests across the southern half of Canada (from extreme southern Alaska to Prince Edward Island) and the northern half of the U.S., as well as in the western mountains well into Mexico, and in the Appalachians into North Carolina. The smallest of the eastern owls—at 91 grams (3.3 oz), it is half the weight of a screech-owl—the Saw-whet is most commonly associated with deep woods, particularly wet coniferous woods.

The Northern Saw-whet Owl is noted for two behavioral quirks: allowing a close approach—even handling—by humans at its daytime roost, and poking its head out of the entrance hole when its nesting tree is rapped. Despite its "tameness," the Saw-whet is a retiring and usually quiet bird; hence its presence is often overlooked. Atlas Project workers found the species sprinkled through all regions of Vermont. Not surprisingly, fieldworkers located the species most frequently by its call (s), for Saw-whets are easy to locate only during late winter and spring, when courting males deliver an endless, monotonic, single-noted whistle or, less often, the *skreee-awe*, *skree-awe*, *skree-awe* call for which the bird is named.

Saw-whets typically nest in old woodpecker holes (especially those of Northern Flickers and Hairy Woodpeckers) that are 6–18 m (20–60 ft) above the forest floor, but occasionally lower or higher. They will rarely choose natural cavities or bird boxes. The usual clutch of 5 to 7 white eggs is laid in the unimproved nesting cavity, most often in April in New England. Occasionally a lined nest is found, but most investigators agree with Bent (1938), who ascribed such work to an intervening occupant—a squirrel or a mouse. The Saw-whet female performs most or all of the 4-week incubation chores, and the asynchronously hatched nestlings are tiny, helpless, and blind. After 2 weeks, however, the white down begins to give way to the rich chocolate brown juvenile plumage that the young wear into their first autumn. Dates for dependent young in Vermont range from early June to early July.

A radio-tagged Northern Saw-whet Owl released in late fall in Minnesota (Forbes and Warner 1974) provided a rare glimpse into the night life of this species. The owl hunted and roosted over favored sections of a 114 ha (281 a) range. Consistently active from about 20 minutes after sunset to about 20 minutes before sunrise, the owl spent its nights in alternate periods of activity (chasing prey, changing perches) and inactivity (presumably spent on a perch watching for prey). Before the first snowfall it hunted mainly in wooded country, after which it spent more time hunting in open country. Forbes and Warner (1974) speculated that white-footed mice and red-backed voles became harder to hear after the first snowfall, and thus the owl sought the more visible deer mice and meadow voles in open grassland. Terres (1980) claimed that insects constitute the bulk of Saw-whet prey, but all other contemporary authorities agree with earlier investigators (Scott 1938) that these owls feed primarily on rodents, a diet supplemented by small birds, shrews, bats, and insects.

The question of whether the Northern Saw-whet Owl is sedentary, migratory, or periodically incursive has long been debated. We now know that northern populations are regularly migratory, and points



No. of priority blocks in which recorded

TOTAL 19 (11%)

Possible breeding:	4 (21% of total)
Probable breeding:	11 (58% of total)
Confirmed breeding:	4 (21% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	5	16	26.3
Green Mountains	4	7	21.0
North Central	2	10	10.5
Northeast Highlands	1	6	5.2
East Central	2	10	10.5
Taconic Mountains	2	12	10.5
Eastern Foothills	3	13	16.0

where passage birds concentrate have been located from the Great Lakes east to the Atlantic coast. Banders working at one of these locations—Prince Edward Point, Ontario, which juts eastward off the north shore of Lake Ontario—netted a total of 1,128 Northern Saw-whet Owls during four autumns in the 1970s (Weir et al. 1980). They found that large flights—like those of most other migratory species—correlated with the clear skies and northwesterly winds of an approaching high pressure cell. The principal owl migration occurred during October.

Although some Northern Saw-whet Owls winter to the northern limit of the breeding range, many winter well south of that range, and a few go as far south as the Gulf Coast. Saw-whets were reported in Vermont for each winter from 1973 to 1983 by *Records of Vermont Birds.*

ALAN PISTORIUS

Common Nighthawk

Chordeiles minor

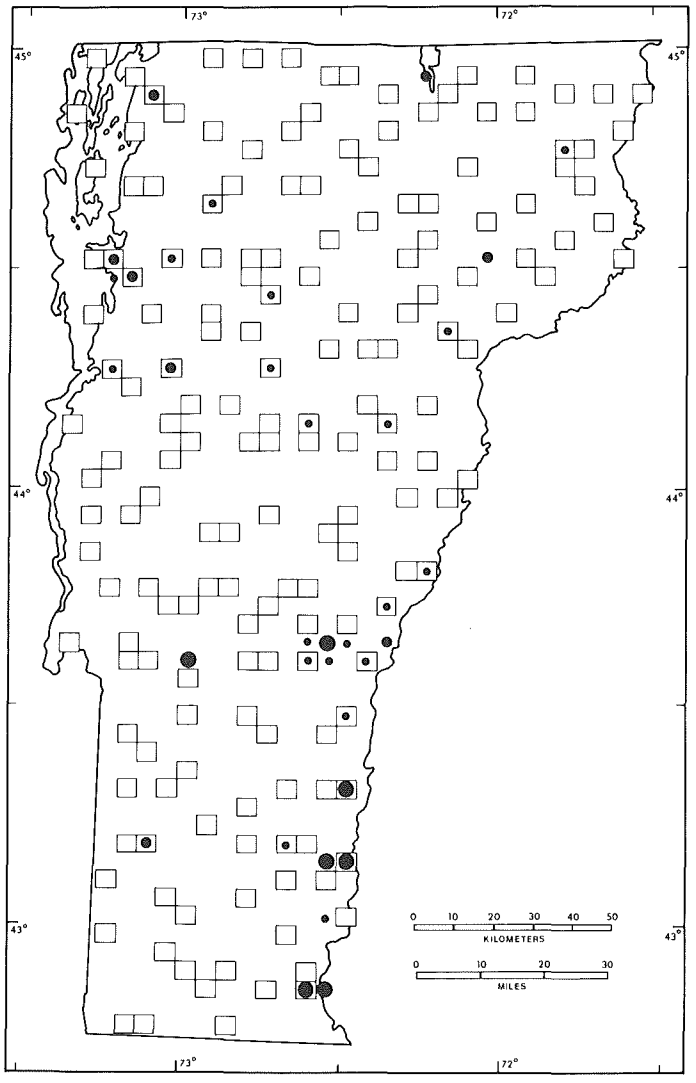
The Common Nighthawk is by far the most well-known and conspicuous member of the goatsucker family (Caprimulgidae) to occur in Vermont. Folklore erroneously maintained that birds in this family sucked milk from goats with their enormous mouths. Commmon Nighthawks are frequently seen hawking for flying insects over towns and open countryside in the evening.

A ground nester, the Common Nighthawk benefited in several ways from the conversion of forest land to pasture, which created favorable habitat for nesting and foraging. Although the species avoids woodlands, pairs are remarkably adaptable: they will nest on beaches, ledges, stumps, burned and barren land, cultivated fields, and, for at least the past century, flat rooftops (Bent 1940). Rooftops are used extensively in the eastern U.S. where barren, undisturbed land for nesting is scarce. Consequently, Common Nighthawks may be readily found in many urban areas.

Because much of Vermont is densely wooded, suitable breeding habitat for nighthawks is restricted to agricultural areas within the Champlain Lowlands and to urban areas, particularly along the Connecticut River (Brattleboro and Bellows Falls). The species was rarely encountered by Atlas Project workers in mountainous and highland portions of the state, even where dairying activities seemed to provide adequate acreage of overgrazed pastures for nesting, and was found in only 13% of all priority blocks.

Their aerial displays and foraging behavior make Common Nighthawks easy to identify as probable breeders. Confirmation is considerably harder to achieve because of the inaccessibility of rooftop nest sites, the difficulty in detecting the cryptically colored eggs and young, and the near impossibility of seeing food or fecal sacs being carried by the adults. All 6 confirmations in Vermont were based on the discovery of either eggs or young (some of the young were restored to rooftops by Vermont Institute of Natural Science staff after preflight falls).

Nighthawks, which winter from northern South America into central Argentina, may return to Vermont during the third week of May. Courtship display activity peaks in June. Pairs nest singly, and are territorial. Limited nest site availability, however, may result in nesting aggregations. Although inactive during the day, which they spend on the ground or perched lengthwise on a stout tree limb, Common Nighthawks, like many other Caprimulgids, have evolved a dramatic twilight courtship performance (Bent 1940). The male circles high over the nesting site uttering sharp, nasal *peent* calls while the female sits below. Periodically he swoops to within a few feet of her before making an abrupt upward turn, producing a bellowing or booming noise with his flight feathers—a sound that has led to the colloquial name of "bullbat" because of its resemblance to the bellowing of a bull. Following several repetitions of this aerial display the male lands beside the female, spreads his white tail bar (lacking in the female) in a fan, and wags it while rocking his body. He distends his throat to display the white throat patch (buff in the female) and utters guttural croaking notes. The male continues his aerial performance throughout the nesting period, although he assists



No. of priority blocks in which recorded

TOTAL 23 (13%)

Possible breeding:	15 (65% of total)
Probable breeding:	5 (22% of total)
Confirmed breeding:	3 (13% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	7	22	30.4
Green Mountains	2	4	9.0
North Central	1	5	4.2
Northeast Highlands	1	6	4.2
East Central	3	16	13.0
Taconic Mountains	1	6	4.2
Eastern Foothills	8	33	35.0

in feeding the incubating female and young and may occasionally share incubation duties (Bent 1940).

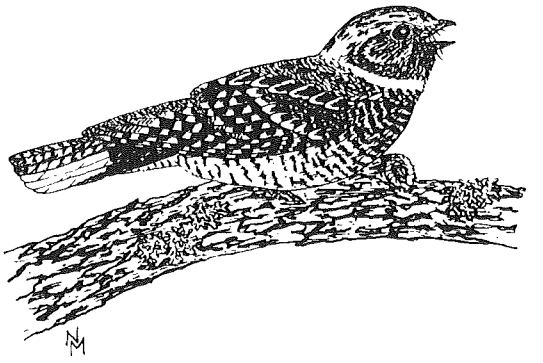
The 2 eggs, creamy white to greenish and speckled with brown and gray, are laid directly on barren ground (or bare roof) without apparent effort to produce a nest or scrape. If nest site temperatures are excessively hot the eggs may be moved. Incubation lasts 19 to 20 days. Egg dates for Vermont (five records) range from May 31 to June 17. The young may fly at 3 weeks of age but remain dependent on the adults for a while afterward. Unfledged young have been recorded as late as July 28 in Vermont and August 14 in New York (Bull 1974).

Southbound migration begins in August and is completed in Vermont by mid September. Large flocks of nighthawks may occasionally be seen during the day or evening in fall migration, particularly along the Connecticut River valley, where counts have ranged up to 400 birds. Data from *Records of Vermont Birds* and those compiled by the Massachusetts Audubon Society in the 1970s indicate that the Connecticut River valley serves as one of the primary nighthawk flyways through New England.

DOUGLAS P. KIBBE

Whip-poor-will

Caprimulgus vociferus



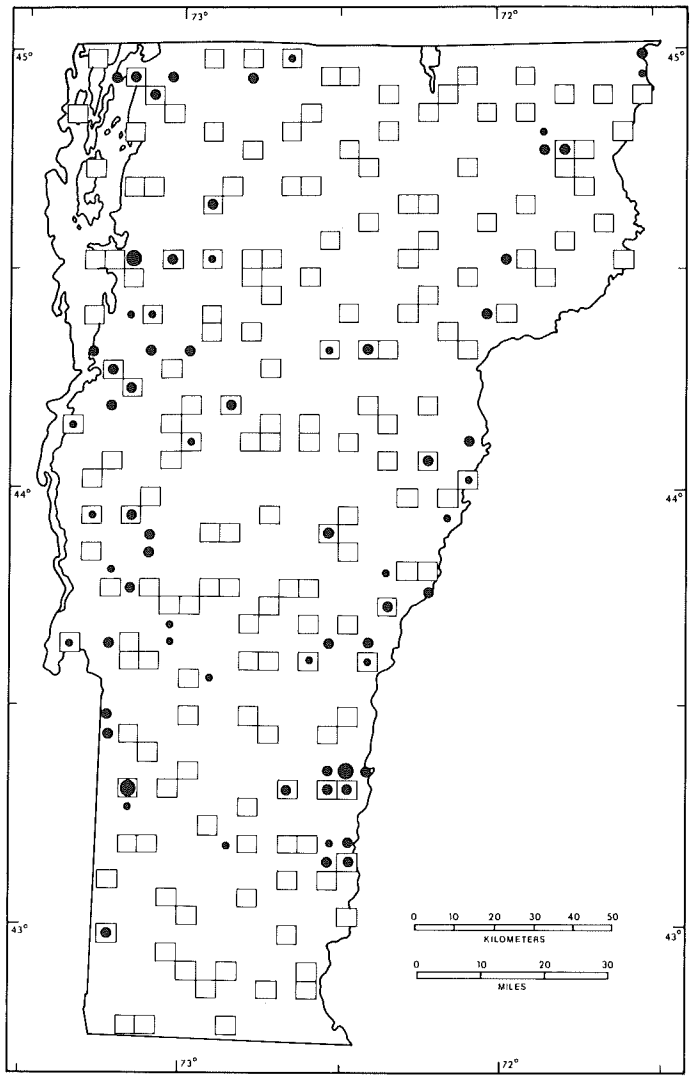
With the possible exception of owls, no breeding bird in Vermont is as well known but as seldom seen as the Whip-poor-will. Although the species inhabits ungrazed woodlots and forests throughout Vermont, many active observers go for years without actually sighting one of these exclusively nocturnal birds. Rare indeed are those observers fortunate enough to have witnessed actual courtship.

Although apparently suitable breeding habitats occur throughout Vermont, Whip-poor-wills were recorded in only 17% of the Atlas Project priority blocks. Very few were recorded in Vermont's North Central region, Northeast Highlands, or Taconic Mountains; but this relative scarcity may be in part a result of the fact that much of the Atlas Project fieldwork in these sectors was conducted by block-busting teams rather than by local residents who might have been more likely to hear nocturnal singing. Fifty percent of all records came from non-priority blocks, in response to a general news release soliciting sightings. Even in those areas where most frequently encountered, the Champlain Lowlands and Eastern Foothills, the species was relatively uncommon, occurring in 39% and 33% of the respective priority blocks in these sectors.

The Whip-poor-will is believed to have been more common in Vermont in the past. Allen (1909) considered it to be fairly common everywhere in the state except at the extreme high elevations. Thompson (1853) and Perkins and Howe (1901) indicated the species was locally distributed, more frequently encountered in lowland areas than in upland areas. Davenport (1907) reported that Whip-poor-wills were less abundant and more restricted in Windham and Bennington counties than in earlier times. Although reported to undergo cyclic population fluctuations in response to availabilty of prey (principally *Cecropia* and other large moths) (N. Proctor, pers. comm.), the exact reasons and extent of the Whip-poor-will's apparent decline in Vermont are unknown.

Whip-poor-wills winter in small numbers in the southern U.S., but the majority of the population spends the winter from northern Mexico to Costa Rica. The species begins reappearing in Vermont's forests during the last week of April, but the brunt of migration is in early May, with the peak of breeding activity coming later in that month. As is true for most nocturnal bird species, vocalizations play a major role in territorial and courtship displays, and the Whip-poor-will's song, a monotonous repetition of its name, can keep nearby would-be sleepers awake. The birds exhibit a daily bimodal peak in singing, at dusk and again near dawn. Moon phase affects calling activity significantly; the singing period is greatly extended on moonlit nights (Cooper 1981). More than 60% of all Whip-poor-will records for the Vermont Atlas Project were of singing birds. Courtship apparently includes accelerated and shortened renditions of the first call note, and a hovering display by the male, who exhibits his white tail patches (Bruce 1973). Copulation may occur on a perch (D. P. Kibbe, pers. observ.) or on the ground (Bent 1940).

The 2 eggs, usually creamy white with gray blotches overlaid with brown dots, are laid directly on the open forest floor. The cryptically colored female incubates for 19 to 20 days. The male may occasionally share in the incubation duties, at least during the



No. of priority blocks in which recorded

TOTAL 30 (17%)

Possible breeding:	11 (37% of total)
Probable breeding:	18 (60% of total)
Confirmed breeding:	1 (3% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	12	39	40
Green Mountains	3	5	10
North Central	1	5	3
Northeast Highlands	1	6	3
East Central	3	15	10
Taconic Mountains	2	12	7
Eastern Foothills	8	33	27

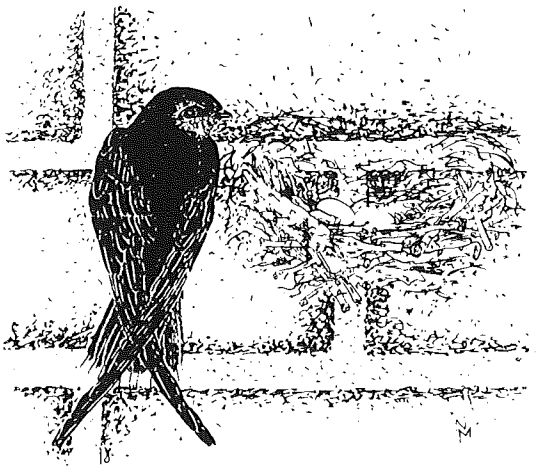
night (Raynor 1941; Babcock 1975). There is at least one record of a marked pair in New York raising a second brood (Raynor 1941). Because Whip-poor-wills are rarely observed outside the courtship period, their actual fall departure dates for Vermont are poorly defined. The latest sighting on record is October 3 (RVB, Fall 1982).

The Whip-poor-will is currently undergoing a range expansion in the southern U.S., apparently in response to reforestation of abandoned cropland (Cooper 1981). Forest area has increased markedly in Vermont over the past century, but whether the Whip-poor-will has undergone a proportional population increase remains unclear. The concensus of most observers is that the population has, at best, remained stable.

DOUGLAS P. KIBBE

Chimney Swift

Chaetura pelagica



The Chimney Swift breeds from southern Canada south to Texas and Florida. It is the northern representative of a large group of closely allied *Chaetura* swifts found in the American tropics. Its winter range is mostly in the Amazon River basin of Brazil; it does not winter in hollow trees in Vermont, as early natural history accounts from the state claim. Chimney Swifts feed almost entirely on minute flying insects, and consequently are vulnerable to cold, rainy spring weather that grounds the food supply; starvation or reverse migration has often resulted. The swift's cigarlike shape and rapid, stiff-winged flight are a familiar sight over most communities in eastern North America.

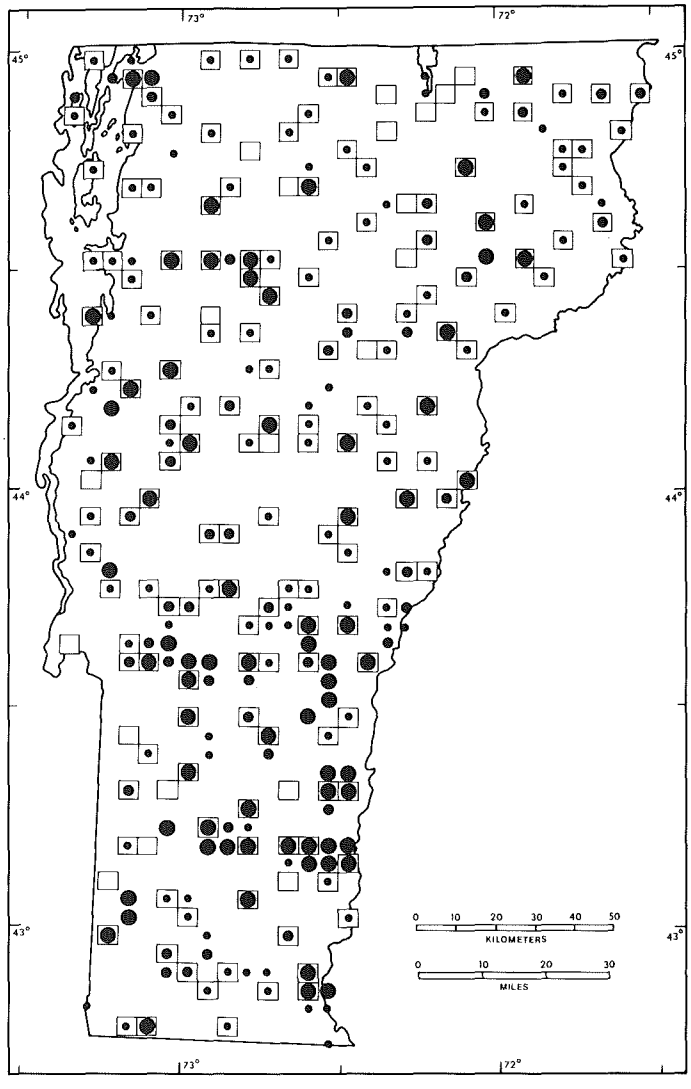
In Vermont, the Chimney Swift usually arrives in late April or early May, depending on the weather; an early date is April 18 (RVB, Spring 1973–83). It is one of the first breeding species to disappear in the fall. Most swifts leave their breeding locations in early August to form large roosting aggregations before heading south. Swifts may be seen migrating throughout September, but become scarce thereafter.

The Chimney Swift is one of several species whose nesting habits were changed by the arrival of Europeans in North America. The species nested in hollow trees before the Europeans arrived, but afterward switched to unused chimneys. Natural substrates are apparently rarely used now for nesting. Vermont's early ornithologists considered the swift common (Thompson 1842); today it is generally conceded that the species' opportunisitic occupation of human dwellings has resulted in a net increase of the overall population. During migration thousands of swifts will sometimes occupy an unused industrial chimney as a communal roosting site. A flock preparing to roost swirls in unison over the chimney, until at dusk a few birds lead the entire flock of hundreds into the darkened recess (W. J. Norse, S. B. Laughlin, pers. observ.). Such roosts may be used for days during fall migration, and the spectacle repeated year after year.

The danger of the Chimney Swift's nesting site was shown in Winhall, Vermont, where swifts nested in the chimneys of weekend vacation homes in which fires were seldom made. One weekend in early June 1980, when temperatures dropped to -1 °C (30 °F) at night, fires were lit and smoke blossomed out of the chimneys: Chimney Swifts were not seen again around those houses that summer; most of the birds probably perished (W. J. Norse, pers. observ.).

The swift's aerial displays and loud twittering, so often seen and heard in early summer, are courtship behavior. The nest is a shallow, bracketlike cup made of twigs, which the birds break off from tree branches during flight; a gelatinous saliva is used to fasten the twigs together and to cement the nest to the vertical surface inside the chimney. The clutch consists of 4 to 5 pure white eggs. Laying may start when the nest is only half finished. Both adults share the 19- to 21-day incubation chores and the raising of the young. The young take their first flights at 30 days of age (Fisher 1958), but may continue to roost in the chimney for some time thereafter.

Vermont nest building dates range from May 29 to July 1; egg dates from May 17 to July 17 (6 clutches containing 2 to 5 eggs);



No. of priority blocks in which recorded

TOTAL 159 (89%)

Possible breeding:	82 (51% of total)
Probable breeding:	28 (18% of total)
Confirmed breeding:	49 (31% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	29	93	18
Green Mountains	48	89	30
North Central	13	68	8
Northeast Highlands	16	100	10
East Central	19	100	12
Taconic Mountains	12	75	8
Eastern Foothills	22	92	14

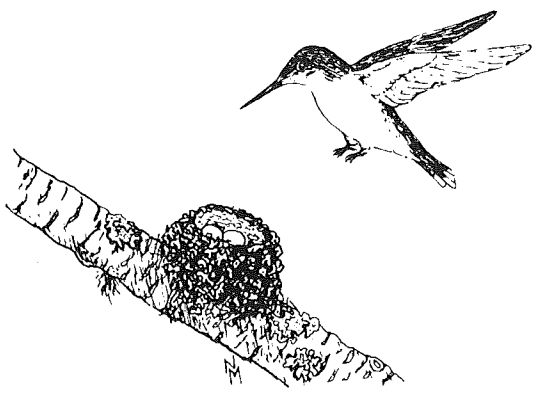
and nests with young from July 26 to August 21 (quite late). As might be expected, most Atlas Project confirmations (51%) were of birds observed entering probable nest sites.

Chimney Swifts occur throughout Vermont, though they may be difficult to locate in areas of unbroken forest where there are no man-made structures. Swifts may feed many miles from their nests. Frequently they may be observed foraging over remote, snag-filled ponds, though whether this means they are breeding locally in some natural cavity or merely feeding is unclear.

WILLIAM J. NORSE
DOUGLAS P. KIBBE

Ruby-throated Hummingbird

Archilochus colubris

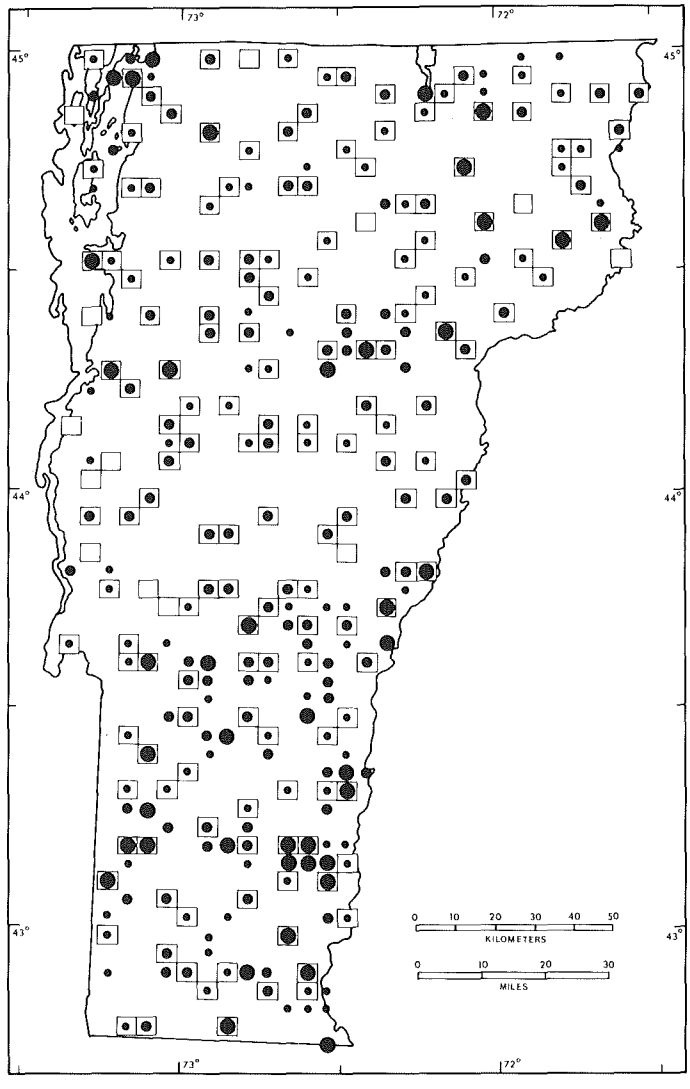


The Ruby-throated Hummingbird is the only one of this large, mostly neotropical family to nest east of the Mississippi River. It breeds from southern Canada to Florida and west to the Great Plains, and winters from Texas and Florida through Mexico to Panama (AOU 1983); many of the birds cross the Gulf of Mexico on the northward flight (Terres 1980). The tiny Ruby-throat, 7.6 cm (3 in) long, shares with the other hummingbirds the unique ability to fly backward, and also can hover while feeding at flowers. Its wings can beat 55 to 75 times a second; its unique wing structure allows the forewing to lead on both the forward and backward strokes (Pough 1946; Terres 1980). The humming noise made by the wings gives the name "hummingbird."

The Ruby-throated Hummingbird, though not common, is widely distributed in Vermont, and was found in 93% of the priority blocks. It occurred in all seven physiographic regions. Hummingbirds return to Vermont during the first week in May (early date, April 24) and become conspicuous in late May when the flowers are open and small flying insects are abundant. They are diurnal migrants and are frequently seen from Vermont hawk-watching lookouts, streaking south like so many little bullets. Most are gone by the end of September, but there are a number of October sighting dates; a late date of October 26, 1976, exists for Woodstock (RVB, Fall 1976). On occasion, late birds are inadvertently brought into houses while roosting in hanging flower pots.

Ruby-throats are difficult to confirm; their tiny, knot-shaped nest is well concealed. However, most of the 27 Atlas Project confirmations came from finding the nest. The birds themselves are most easily located by listening for the distinctive hum of their wings or their high-pitched, squeaky call notes. Often they can be spotted perched on some dead tree snag or utility wire, or feeding in flower gardens. They are very fond of red and orange flowers such as bee-balm, jewelweed, salvia, and trumpet-creeper. They collect nectar and insects from many plants, often feed on sap at sapsucker holes, and are enthusiastic visitors to hummingbird feeders. The diet appears to consist of both flower nectar and insects year-round; a study of wintering Ruby-throats in Costa Rica found them relying on both (Wolf 1970).

The male puts on an impressive courtship display that consists of flying back and forth in a wide arc, swinging as if on a pendulum; at the bottom of the arc, he buzzes his wings. The Ruby-throat will nest in a variety of locales, such as gardens, orchards, roadside thickets, and woodland clearings. The female alone builds the tiny 3.8 cm (1.5 in) lichen-covered nest, which is saddled on a branch at an elevation of 1.5–6 m (5–20 ft), often near or over running water in an open woodland. The nest is built of soft down from ferns, milkweed, fireweed, or thistles, and is held together by spider webs or the web from tent caterpillars' nests (Allen 1930). The female ordinarily returns to the same place every year to nest. The one Vermont nest-building date is June 1. Two tiny white eggs are laid, occasionally 3 (Bent 1940). Seven reports of Vermont nests recorded egg dates ranging from May 29 to August 6; the nests were in sugar maples at 2.1–2.4 m (7–8 ft); in a paper birch at 11 m (36 ft); and in a hemlock at 3.7 m (12 ft), at the edge of a road. The female incubates the eggs for 11 to 16 days (Allen 1930), and the young fledge at 19 to 22 days (Harrison 1978; Terres 1980). Nestling dates run from June 26 to July 13 (three records). Occa-



No. of priority blocks in which recorded

TOTAL 166 (93%)

Possible breeding:	68 (41% of total)
Probable breeding:	71 (43% of total)
Confirmed breeding:	27 (16% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	24	77	15
Green Mountains	54	100	33
North Central	18	95	11
Northeast Highlands	14	88	8
East Central	19	100	11
Taconic Mountains	14	88	8
Eastern Foothills	23	96	14

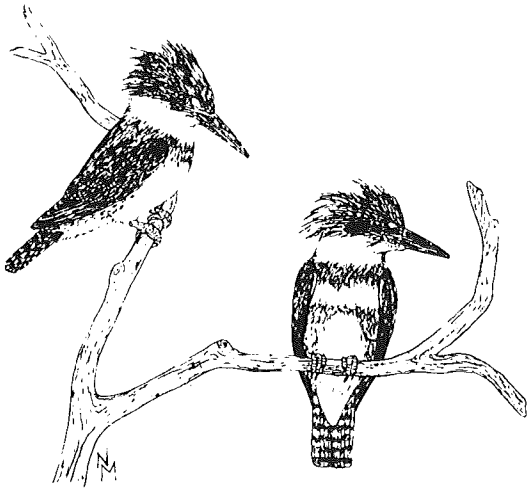
sionally, 2 broods are raised; rarely, 3 (Bent 1940).

At Winhall, Vermont, interesting hummingbird feeding behavior has been observed. Frequently, hawk moths (*Sphingidae*) attracted to floodlights left on during nights in June were found with their ample abdomens eviscerated. One morning a Ruby-throat was observed in the act of eviscerating a large moth, its bill jammed deeply into the moth's abdomen (W. J. Norse, pers. observ.).

WILLIAM J. NORSE
SARAH B. LAUGHLIN

Belted Kingfisher

Ceryle alcyon

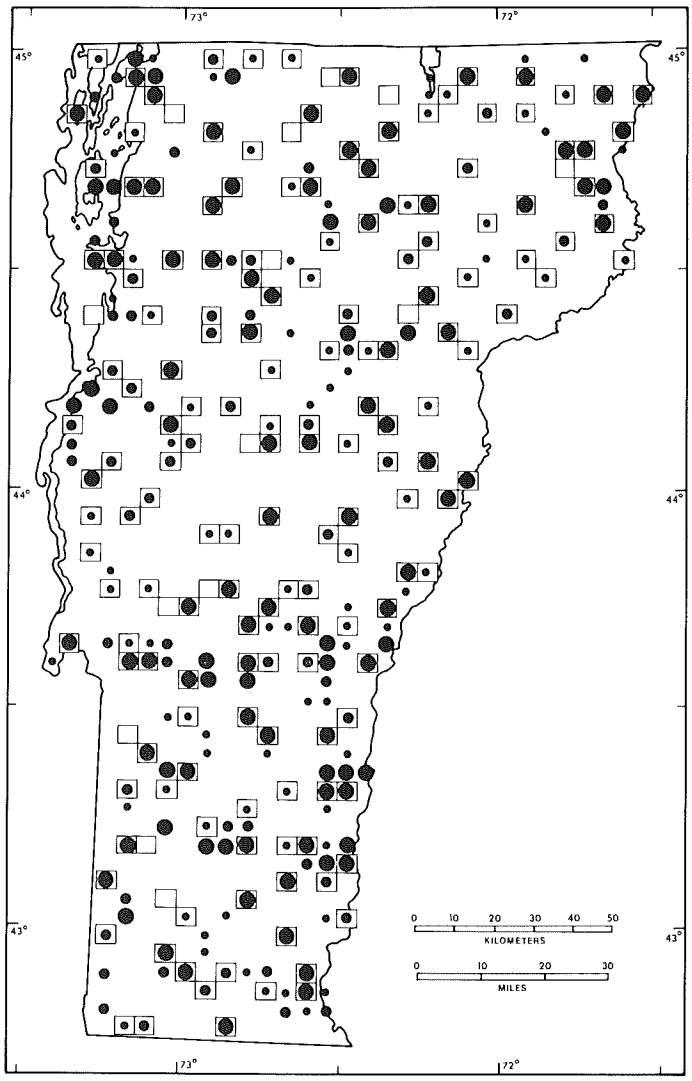


The Belted Kingfisher may be found anywhere there are clean waters well stocked with small fish. During the breeding season, the species is limited by the need for unvegetated earthen banks to serve as sites for nest burrows, which are dug 1–2 m (3–6 ft) into the banks. In districts where such banks do not occur naturally, man-made sites such as road cuts and borrow pits may be utilized. Nests along streams are often located directly above water, but nests associated with lakes and ponds may be up to 1.6 km (1 mi) away from water. Populations are more dense along streams than by lakes (Cornwell 1963), apparently a result of differences in the availability and vulnerability of fish in these habitats. Davis (1982) found that kingfishers prefer to fish in riffles in streams rather than in pools, and postulated that riffles provide cues for habitat selection for the species. Along streams, the territories of this species are linear and usually include the nest site (Davis 1982), while in areas where the nest site and the foraging sites are removed from each other a different arrangement is necessary.

Observing Belted Kingfishers is usually easy. They are high fliers, perch conspicuously on wires and snags, and are noisy. The call, a clattering rattle, is unmistakable once learned. Confirmation of breeding may be obtained in a variety of ways. Many Atlas Project observers located used burrows in gravel pits and along streams in areas of known occurrence; these provided 17% of all proven breedings. Active nests provided most of the confirmations (40%); with most of these records observers used the ON code (28%) to indicate active nests of unknown contents. Sightings of parents with food for young (FY) constituted 31% of confirmed breeding records; since Cornwell (1963) found that some pairs with nests far removed from water commonly traveled up to 3.2 km (2 mi) to forage, a small amount of error may be involved in the use of this code away from stream habitats. Because many fledglings are not evident until late July, dependent young did not provide an important source of confirmation.

A few male kingfishers overwinter along stretches of open water, presumably to hold on to choice territories. Most kingfishers return to Vermont in late March and early April, when major watercourses become free of ice. Burrows are dug or reclaimed in April, and nesting commences in earnest in early May. Six dates for eggs in Vermont range from May 11 to June 15. The eggs are white, and number from 4 to 8; the average size of 31 New York State clutches was 6.1 eggs, with 55% of them containing 7 (Bull 1974). The incubation period is from 23 to 24 days (Bent 1940). Seven dates for nestlings in Vermont range from June 12 to July 16. The young remain in the nest for about a month (Mousley 1938; Bent 1940). Dependent young have been reported in Vermont from July 16 to August 10 (three records). The majority of kingfishers depart from Vermont in the autumn; most are gone by the end of November.

The Belted Kingfisher was located in 92% of the 179 priority blocks in the state. Most of the 14 blocks from which the species was absent lack major streams or ponds, and those that do possess suitable bodies of water seemed to lack nest sites. A survey of historical accounts from Thompson (1853)



No. of priority blocks in which recorded

TOTAL 165 (92%)

Possible breeding:	48 (29% of total)
Probable breeding:	36 (22% of total)
Confirmed breeding:	81 (49% of total)

Physiographic regions in which recorded

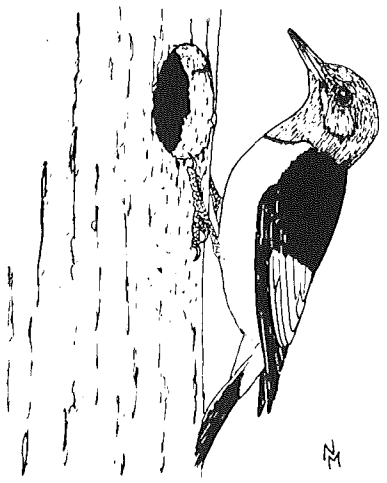
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	29	93	18
Green Mountains	47	87	28
North Central	18	95	11
Northeast Highlands	15	94	9
East Central	19	100	11
Taconic Mountains	13	81	8
Eastern Foothills	24	100	15

to Spear (1976) indicates that the species' status has changed little over time. Most Atlas Project blocks contained one or two pairs. The species' presence in most blocks with adequate water indicates the overall high quality of the state's waters. Hall (1983) stated that the species had disappeared from badly polluted waters in West Virginia. Future monitoring of this species' numbers may provide a clue to water quality in Vermont.

WALTER G. ELLISON

Red-headed Woodpecker

Melanerpes erythrocephalus



Red-headed Woodpeckers breed throughout the southeastern U.S., north to southern Canada, and west to Montana, Colorado, and New Mexico. They spend winters primarily in the southern portion of the range, though some birds occasionally winter in northern sections. Declining numbers for the species have caused concern along the Atlantic Coastal Plain in the Southeast and locally within other regions (Arbib 1982). Declines are believed to result from a number of factors, among them competition with European Starlings for nest cavities (Bull 1974); firewood cutting, clear-cutting, and agricultural practices (Arbib 1982); and mortality as a consequence of collisions with cars while the birds are stooping for insects along roads (Bull 1974). This woodpecker is proposed for Species of Special Concern status in Vermont.

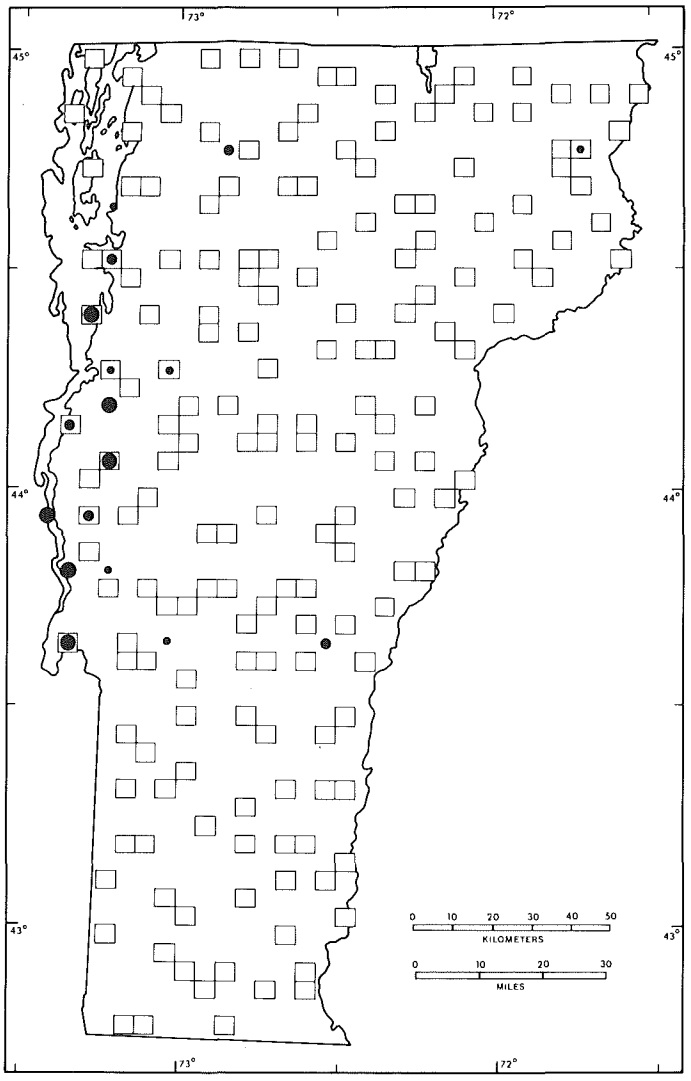
Occurrence of the species in Vermont is mentioned as early as the mid-nineteenth century by Thompson (1853), who stated that "although at present by no means rare in Vermont, [it] is much less common than formerly." In the early twentieth century, Red-headed Woodpeckers were uncommon summer residents (Perkins and Howe 1901). Ross (1927) noted that this woodpecker was declining around Bennington, in his opinion because its preferred trees were being cut down. Forbush (1925) believed that Red-headed Woodpeckers were uncommon to rare in eastern Vermont and common in the western part of the state.

As is obvious from the species map, Red-headed Woodpeckers' nesting activity in Vermont is nearly restricted to the Champlain Lowlands; all confirmations were in this region. Most occurrences were in the Champlain Lowlands.

Limited nesting information is available for Red-headeds in Vermont. Nests with young were seen on June 13 and July 5; fledged young were seen on July 11. In New York, egg dates range from May 16 to June 19, nestling dates from May 31 to August 26, and fledgling dates from July 5 to September 15 (Bull 1974). The average clutch contains 4 eggs, and incubation lasts for 12 days (Jackson 1976). More so than other woodpeckers, Red-headeds obtain much of their food by flycatching or stooping; they are known to flycatch for adult beetles and to stoop for grasshoppers (Jackson 1976). Graber et al. (1977) mentioned densities from 9 to 12 birds per 40.5 ha (100 a) in bottomlands, and 25 birds per 40.5 ha (100 a) in suburban residential habitat.

Summer Red-headed Woodpecker habitat in the Champlain Lowlands includes "open fields liberally dotted with dead elm stubs" (ASR, A. Pistorius), "open farmland interspersed with deciduous windows" (ASR, J. J. Allen), and "mainly open [fields], reverting to natural grasses with scattered bushes and dead trees" (ASR, R. Pilcher). Near Fairfield, a pair was observed in an open, wooded pasture from early July until mid September (ASR, D. Flack). In the Northeast Highlands an adult was observed near a road in an area of cut-over, mixed hardwood-conifer forest (ASR, G. F. Oatman).

Two distinct breeding habitats are evident. One habitat is open, upland meadow or short-grass areas, such as pasture or residential zones with a savannalike dispersion of large deciduous trees or groves of such trees. In these areas at least a few snags or large, dead limbs are necessary. Another habitat is open bottomland swamps or fringes



No. of priority blocks in which recorded

TOTAL 9 (5%)

Possible breeding:	3 (33.3% of total)
Probable breeding:	3 (33.3% of total)
Confirmed breeding:	3 (33.3% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	8	26	88.5
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	1	6	11.5
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

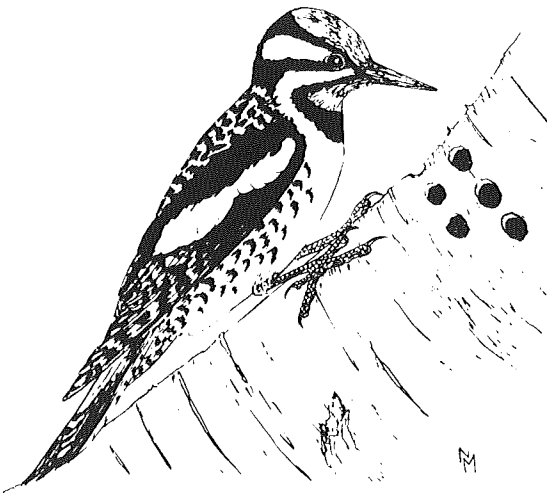
of bottomland forest with numerous snags near or over water.

Both habitat types are well represented in the Champlain Lowlands. As much of Vermont has reverted to second-growth forest over the last half century, the Champlain Lowlands region has served as the main refuge for nesting Red-headed Woodpeckers. Removal of snags and mature trees in open areas or reversion of open habitats to forest will undoubtedly reduce Red-headed Woodpecker nesting habitat in the Champlain Lowlands, and therefore in Vermont, as will removal of snags in open swamp or riparian forests.

CHRISTOPHER FICHTEL

Yellow-bellied Sapsucker

Sphyrapicus varius



Yellow-bellied Sapsuckers breed from Canada south to the northern Great Plains, Missouri, Indiana, New York, and southern New England, and in the mountains to Tennessee and Georgia (Short 1982). In Vermont, spring migrants arrive in late March if the weather is mild, but most appear around the second week in April. In the fall, most migrate by the second week in October. Wintering sapsuckers are found in the southern sections of the breeding range south to the southern U.S., the West Indies, and Central America as far as Panama (Short 1982).

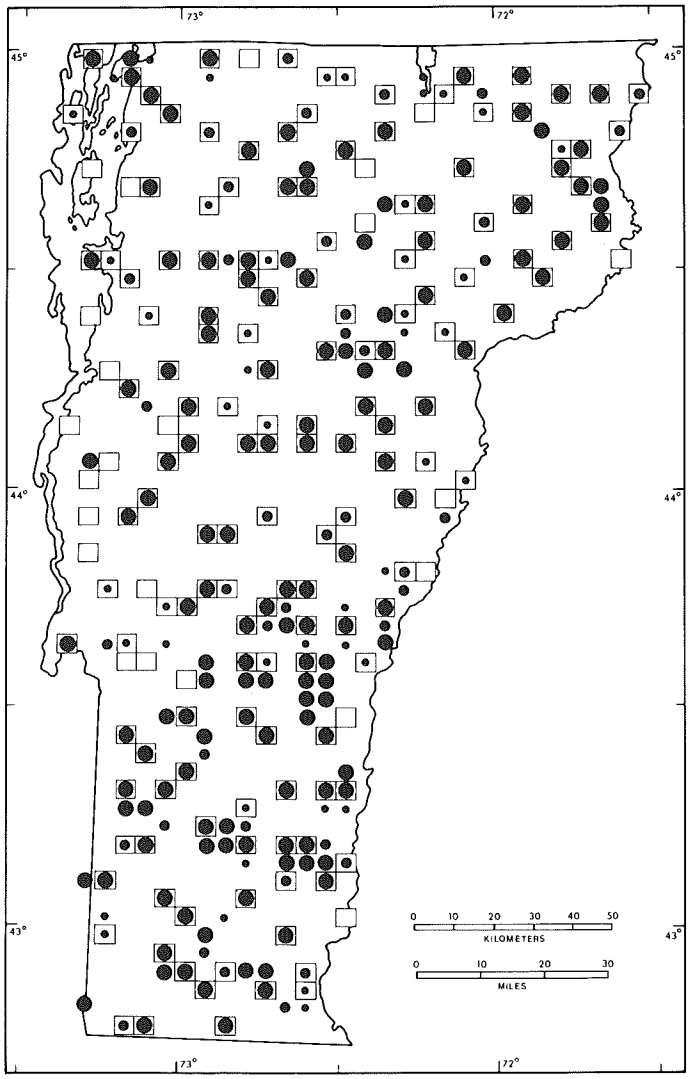
Nesting Yellow-bellied Sapsuckers prefer deciduous or mixed deciduous-coniferous forest and woodlots. Advanced second-growth forests of aspen, paper birch, white pine, hemlock, and American beech are used considerably by this species in Vermont.

In the spring, the Yellow-bellied Sapsucker's calling and distinctive drumming are conspicuous. Drumming begins rapidly and then slows, sounding like a telegraph message: *drr-a-da, da-da, da* (Kilham 1962). The calls are varied; two that are frequently heard are a high-pitched *kwee-urk*, *kwee-urk*, delivered in sets as one bird calls to another or announces his territory, and a *c-waan* or *view* (Lawrence 1967) given when the birds are disturbed (Kilham 1962). Early in the breeding season, sapsuckers engage in courtship flights during which a snipelike winnowing sound is produced by the wings.

Yellow-bellied Sapsuckers select nest sites in early May. They excavate new cavities each year, often using the same fungus-infected aspen for up to seven years (Kilham 1971a). In time, these trees resemble "tenement houses" (Kilham 1971a), and flying squirrels may use abandoned cavities. Competition with Hairy Woodpeckers for nest sites might be greater if it were not for the presence of flying squirrels (see the Hairy Woodpecker species account). Yellow-bellied Sapsuckers appear to coexist harmoniously with flying squirrels (Kilham 1971a).

There are 11 records of nests with eggs in Vermont, with dates ranging from May 12 to June 20. Nestling dates range from June 4 to July 17 (41 records), and fledgling dates range from June 24 to July 13 (9 records). Of 27 Yellow-bellied Sapsucker nest cavities in Vermont, 18 were in aspens, 4 in American beeches, 3 in red maples, 1 in an unidentified maple, and 1 in a hemlock. Kilham (1971a) reported that Yellow-bellied Sapsuckers in New Hampshire will nest in aspens, beeches, and butternuts infected with the tinder fungus (*Fomes igniarius*). This fungus affects only the heartwood, leaving sapwood intact. Lawrence (1967) observed that Yellow-bellied Sapsuckers prefer to nest in live trees. Nest predators include raccoons and red squirrels.

The sapsucker's presence may be indicated by a series of small, evenly spaced holes that appear to spiral around the boles of some trees. Sapsuckers consume both the sap that drains from these holes and insects attracted to the sap flow. Trees used for foraging include birch, basswood, apple, hickory (Williams 1975), and aspen. Insects taken include moths, beetles, and ants (Lawrence 1967). Insects mixed with sap are brought to nestlings. In late summer and fall, sap-



No. of priority blocks in which recorded

TOTAL 156 (87%)

Possible breeding:	28 (18% of total)
Probable breeding:	24 (15% of total)
Confirmed breeding:	104 (67% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	21	68	13
Green Mountains	52	96	33
North Central	17	89	11
Northeast Highlands	15	94	10
East Central	18	95	12
Taconic Mountains	12	75	8
Eastern Foothills	21	88	13

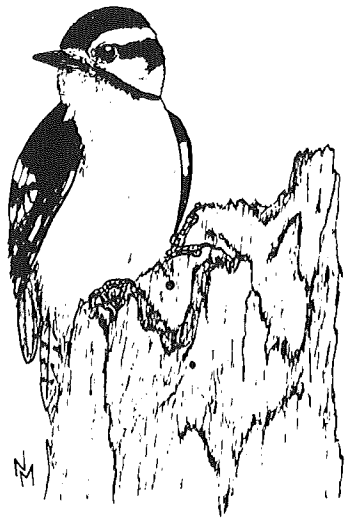
suckers dine on berries; poison ivy berries are a favorite (C. Fichtel, pers. observ.). Ruby-throated Hummingbirds are known to feed at the sapwells drilled by Yellow-bellied Sapsuckers (Lawrence 1967).

The Yellow-bellied Sapsucker breeds in all seven physiographic regions of Vermont. Percentages of their occurrence indicate that sapsuckers are uniformly distributed throughout Vermont's physiographic regions, with lowest numbers in the Champlain Lowlands. The species is fairly common in Vermont, concentrated at higher elevation woodlands (W. J. Norse, pers. observ.). Confirmation of breeding was high; most confirmations were of young in the nest cavity. Food calls of the young are loud, and consequently nests are easy to locate.

WILLIAM J. NORSE
CHRISTOPHER FICHTEL

Downy Woodpecker

Picoides pubescens



The Downy Woodpecker's range is extensive, though not quite as broad as that of the Hairy Woodpecker. Downy Woodpeckers breed from southeastern Alaska across Canada to Newfoundland and south to southern California, the Southwest, and the southeastern U.S. through Florida (Short 1982). Although primarily resident within its range, most northern populations are migratory. In Vermont, it is largely a resident but is sometimes migratory. Downies have been seen moving south during fall hawk watches (W. J. Norse, pers. observ.). In winter, the species is quite common throughout the U.S., but appears to be most abundant in the middle Atlantic states and the Midwest (Plaza 1978). Feeding stations may encourage Downy Woodpeckers to overwinter rather than to migrate (Lawrence 1967).

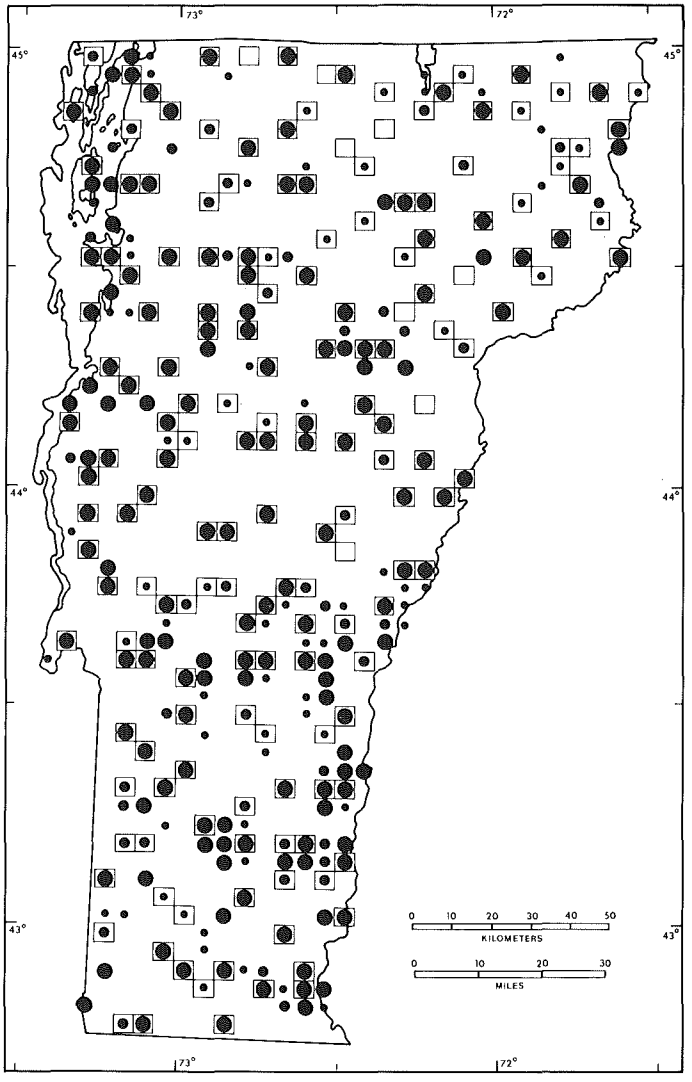
In the eastern portion of its range the Downy Woodpecker inhabits many forest types, including northern hardwoods, oak-hickory, and mixed deciduous-coniferous, as well as edge habitats (Short 1982). It is found in small woodlots and large tracts of forest, as well as in orchards, residential areas, and city parks. Although the Downy's habitat overlaps the Hairy's, the Downy has a wider range of habitats (Conner 1981). More than other woodpeckers, Downy Woodpeckers use woodlands with small basal areas and low canopies (Conner and Adkisson 1977).

The best way of locating Downy Woodpeckers during the breeding season is by their calls and drumming. The commonly heard pik call is usually given in alarm. The territorial signal, a drumming that substitutes for a song and is usually done on a resonant stub, is not as loud as the drumming of the Hairy. Territorial advertisement and aggressive encounters are accompanied by the rattle, "a series [of notes] dropping in pitch and shortening through the call" (Short 1982).

Nests are in cavities in dead trees or stubs of live trees. The Downy often nests in trees of smaller diameter and at lower heights than Vermont's other woodpeckers (Conner et al. 1975). Cavities are excavated in trees having decayed heartwood as a result of fungal attack (Conner et al. 1975).

Breeding activities normally begin in March (in February if the weather is mild) with drumming and the establishment of territories (Kilham 1974). Female Downies initiate much of the breeding behavior (Lawrence 1967). Seven Vermont egg dates range from May 16 to June 2; there were 3 clutches of 4 eggs, 2 of 6 eggs, and 1 of 5 eggs. Bull (1974) reports 4 to 5 eggs for most New York clutches and egg dates of May 6 to June 31. Incubation lasts 12 days (Lawrence 1967) and is shared by both sexes; the male remains in the nest cavity at night (Kilham 1962). Vermont nestling dates range from May 28 to July 16 (11 dates). Young remain in the nest cavity 20 to 22 days, and fledglings are fed by the adults for up to 3 weeks following emergence (Lawrence 1967). Eighteen records of dependent young in Vermont range from June 12 to July 10.

Downy Woodpeckers eat insects and spiders found on and under bark, on branches and twigs, among clusters of newly opening leaves, and on fallen logs. They also eat resident larvae of plant galls (Schlicter 1978) and of dead corn stalks. They will occasionally flycatch in summer, and readily eat



No. of priority blocks in which recorded

TOTAL 171 (96%)

Possible breeding:	28 (16% of total)
Probable breeding:	27 (16% of total)
Confirmed breeding:	116 (68% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	30	97	18
Green Mountains	51	94	30
North Central	18	95	11
Northeast Highlands	16	100	9
East Central	17	89	10
Taconic Mountains	16	100	9
Eastern Foothills	23	96	13

fruits in fall and winter. Downies commonly visit feeding stations in winter. Segregation by sex occurs in foraging niches, as females tend to feed on large limbs and trunks at middle heights while males are prone to feed higher up on smaller limbs and twigs, and on or near the ground (Jackson 1970; Williams 1975). Downies will concentrate foraging efforts on tree species that harbor abundant insect prey such as elm bark beetles (Jackson 1970) or coccids (Kilham 1970). Interspecific competition with Hairy Woodpeckers during the nesting season may be partly reduced by slight differences in habitats (Hairy Woodpeckers are often found in mature forests) and by differences in size classes of trees and limbs used for nesting and foraging (Kisiel 1972).

The Downy Woodpecker was confirmed as nesting in all seven physiographic regions, most often by observing fledged young. This woodpecker is well distributed in Vermont, occurring in 89% to 100% of the priority blocks within the physiographic regions.

WILLIAM J. NORSE
CHRISTOPHER FICHTEL

Hairy Woodpecker

Picoides villosus

The Hairy Woodpecker is one of the most widespread members of its family in North America. This species occurs from the tree line in Alaska and Canada south to Baja California, the mountains of Central America, the Gulf Coast, Florida, and the Bahamas. Eastern populations breed from sea level to timberline (Short 1982). This woodpecker is both migratory and sedentary, wandering outside of its summer territory in fall and winter to find food (Lawrence 1967).

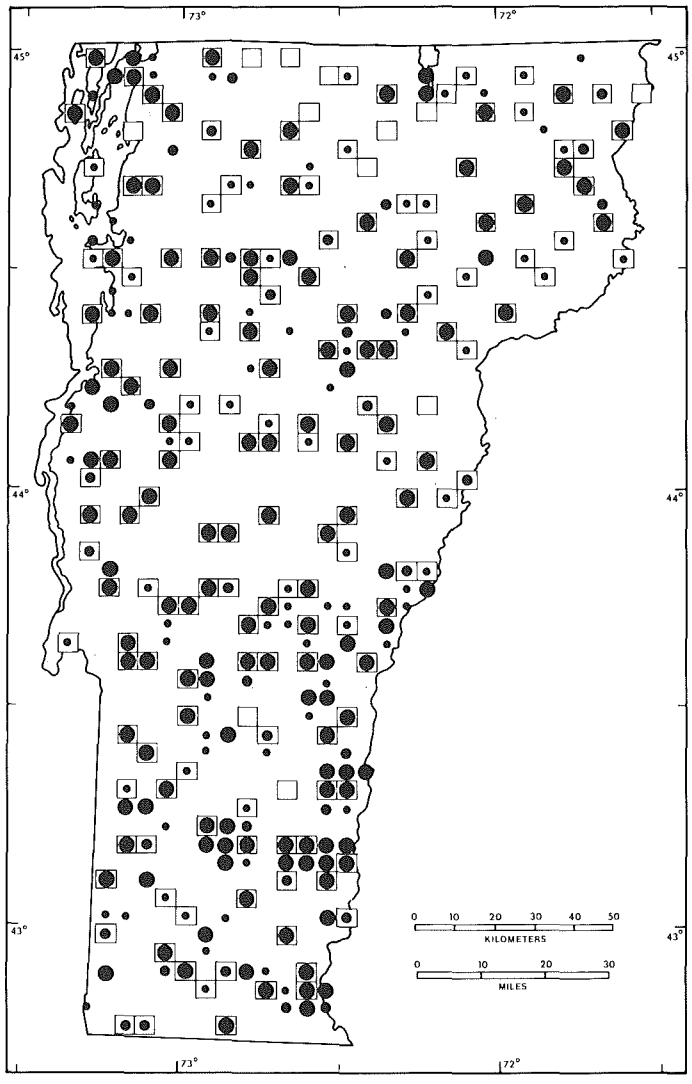
Hairy Woodpeckers are essentially forest dwellers that breed in extensive mature woodlands. They occur sympatrically with Pileated and Downy Woodpeckers, but appear to favor more extensive forest than do Downies. Hairy Woodpeckers will tolerate wide variance in such forest characteristics as basal area, density of stems, canopy height, and distance from clearings (Conner and Adkisson 1977). They will occasionally nest in clear cuts, if some snags or stubs remain for nest sites. Snags and live trees with dead branches are important components of Hairy Woodpecker habitat as they provide suitable nest sites (Conner et al. 1975). Fall and winter habitats include residential areas and strips of timber along streams. In residential areas and towns they are attracted to feeding stations.

The Hairy Woodpecker is often heard before it is seen; its call is a sharp, high-pitched *peek* or a rapid series of notes slurred into a rattle. During the breeding season, the territorial and courtship drumming of the species is heard.

The nest, a gourd-shaped cavity approximately 5 cm (2 in) in diameter at the entrance and 20–41 cm (8–16 in) deep (Forbush 1925), is excavated at a height of 0.9–12.2 m (3–40 ft) in a snag, a dead branch of a living tree, or in a live bole. Females often choose sites proximate to those used in previous years (Kilham 1960). Lawrence (1967) stated that these woodpeckers prefer to nest in live trees, while Conner et al. (1975) reported 50% nesting in snags and 50% in dead sections of live trees. Cavities are excavated in trees infected with fungal heart rots, and often below the stub of a dead branch (Conner et al. 1976). These stubs may provide the woodpeckers with a visual clue to suitable nest trees. Nest cavity openings often face slightly downward, an angle which may shield the nest from rain (Conner 1975).

In Vermont, tree species used for nesting include aspen, white birch, yellow birch, American beech, red maple, and red oak. Two Vermont egg dates are May 6 and June 16. Clutches usually number 4 eggs, although the range is 3 to 6. Incubation lasts 11 to 12 days, and the male broods at night (Harrison 1978). Twenty Vermont dates for nests with young range from May 21 to June 24. May 23 to July 23 is the range of fledgling dates. Nest predators include red squirrels (Lawrence 1967) and flying squirrels (Kilham 1983). Hairy Woodpeckers tend to avoid nesting in trees that host flying squirrels; apparently the flying squirrels displace the woodpeckers from their cavities (Kilham 1983).

The Hairy Woodpecker's diet consists primarily of grubs of wood-boring beetles and larvae, as well as tent caterpillars found during infestation years (Lawrence 1967). In clear cuts, Hairy Woodpeckers feed on in-



No. of priority blocks in which recorded

TOTAL 167 (93%)

Possible breeding:	44 (26.3% of total)
Probable breeding:	19 (11.4% of total)
Confirmed breeding:	104 (62.3% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	29	94	17
Green Mountains	48	89	29
North Central	18	95	11
Northeast Highlands	15	94	9
East Central	18	95	11
Taconic Mountains	16	100	9
Eastern Foothills	23	96	14

sects found under the bark of logging slash (Conner and Crawford 1974). During an elm bark beetle infestation of American elms that were infected with Dutch elm disease, Hairy Woodpeckers fed on beetles (Kilham 1965). In this and other situations, Kilham noticed differences in feeding locations and behavior on the part of male and female woodpeckers. Hairy Woodpeckers also consume fruits and seeds (W. J. Norse, pers. observ.).

The Hairy Woodpecker was confirmed as breeding in all seven physiographic regions. The percentage of occurrence by region ranged from 89% to 100%, indicating a fairly uniform distribution of Hairy Woodpeckers statewide. Most confirmations were made by observing adults carrying food.

WILLIAM J. NORSE
CHRISTOPHER FICHTEL

Three-toed Woodpecker

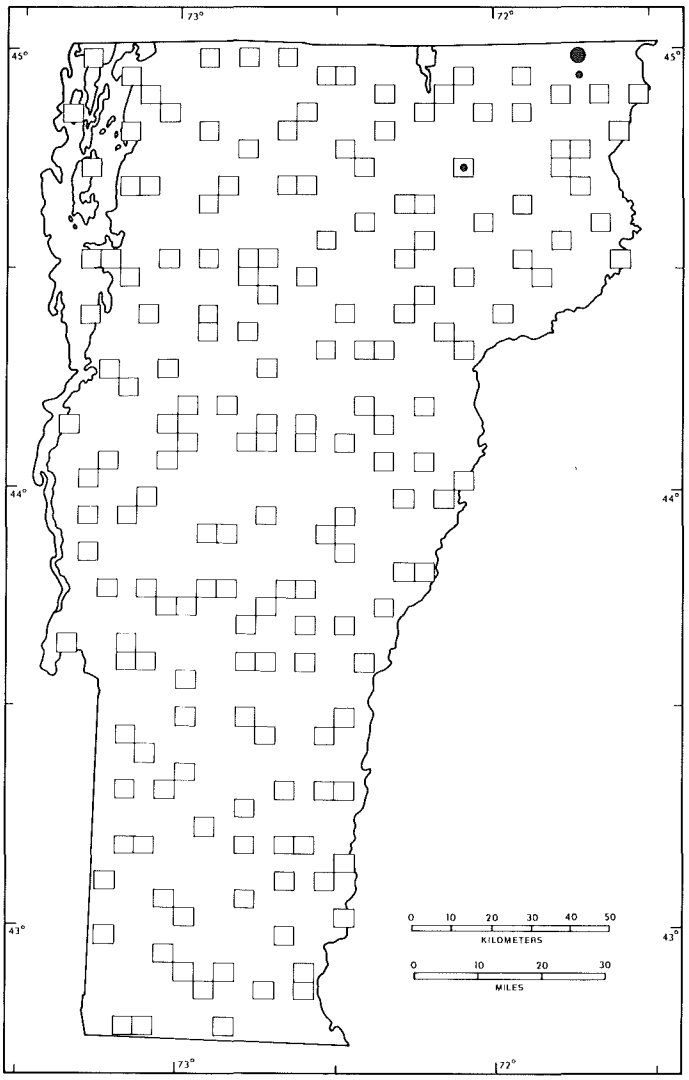
Picoides tridactylus

The Three-toed Woodpecker (formerly the Northern Three-toed Woodpecker) reaches a southern limit of its range in northeastern Vermont and breeds there in only minuscule numbers. The approximately 311 sq km (120 sq mi) area in the Northeast Highlands, bounded on the north by Great Averill Pond and on the south by South America Pond, constitutes the present Vermont range of this species. Clear-cutting now threatens the black spruce-balsam fir forests these woodpeckers require, and the Three-toed is a candidate for Species of Special Concern status in Vermont.

The Three-toed is found in the boreal forest zone across the entire Northern Hemisphere, though it is locally distributed and nowhere very numerous. Largely sedentary, it is less prone to winter wandering than its close relative, the Black-backed Woodpecker. Standing dead conifers in the lower, wetter portions of black spruce-balsam fir forests constitute its rather specialized eastern habitat. Dead or dying conifers are necessary to its livelihood; though the Three-toed takes a few ants, weevils, spiders, wild fruits, acorns, and the inner bark of some trees, wood-boring beetles and caterpillars that attack dead or dying conifers constitute approximately 75% of its food (Bent 1939; Terres 1980). Originally this species depended on the natural mortality of northern conifers resulting from disease, fire, and flooding. Today it can be found in coniferous areas burned over by forest fires or flooded by beaver dams. Man's activities, especially logging, may also have produced favorable habitat. The "avenue" or "lane" cutting that was practiced in the Island Pond area until 1977 left margins of dead or dying spruces which both species of three-toed woodpeckers frequented.

There were only three summer reports of the Three-toed during the five years of the Atlas Project: 1 confirmation and 2 possibles. On July 16, 1981, 2 adults fed a single juvenile between Great Averill and Little Averill ponds; an adult was also seen in the same area on August 3, 1978 (ASR, L. N. Metcalf). An adult male on Wheeler Mountain, near Lake Willoughby, was seen on June 12, 1978 (ASR, E. Cronin). Only 10 additional reports from the Northeast Highlands since 1928 were located (G. F. Oatman, pers. comm.); their dates ranged from October 5 to early April, and all were from the Island Pond area. Some of these reports are probably of winter wanderers from nearby areas of New Hampshire or Quebec. It is also probable that this species was once more numerous in Vermont than at present. Forbush (1927) suggested that its numbers in New England were reduced when much of the region's original spruce forest was logged in the eighteenth and nineteenth centuries. There are four old (1902–28) Vermont reports of Three-toeds at higher elevations in the Green Mountains, some of them from the summer.

The best way to locate either of the two three-toed woodpecker species is by walking or driving slowly through appropriate habitat, listening carefully for the tapping sounds of feeding woodpeckers, or, in spring and summer, for courtship drumming. Any tapping should be traced to its sources, as tapping by either species is quite difficult to distinguish from that of other woodpeckers.



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	1 (100% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	1	5	100
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

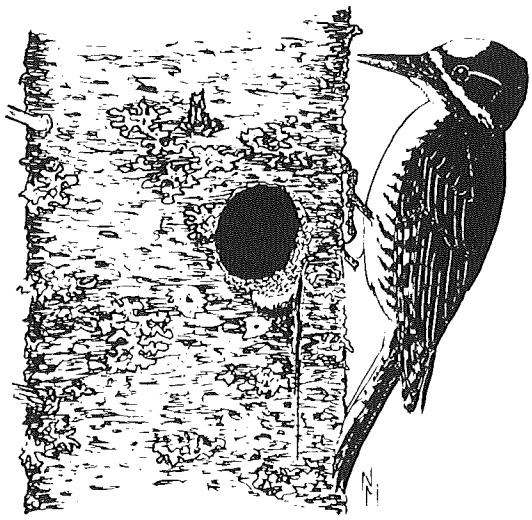
The Three-toed's drumming is distinctive, however: unlike that of most other woodpeckers, Three-toed drumming slows down toward the end; intervals become longer between taps. Once located, Three-toed Woodpeckers are extremely easy to observe, as they show almost no fear of man, even near their nest hole. Although Three-toeds are often described as using an angular bill motion to strip or flake bark pieces from conifers, most Three-toeds seen in the Island Pond area tapped straight into the wood, much in the manner of a Hairy or a Downy Woodpecker.

The nest hole is usually placed 1.5–15 m (5–50 ft) high in a stump or other dead or dying tree, often near water. The entrance hole is about 4 cm by 5 cm (1¾ by 2 in), and the cavity about 25–38 cm (10–15 in) deep (Bent 1939; Terres 1980). Four eggs seem to comprise the normal clutch; both sexes perform incubation, which takes about 14 days (Harrison 1975). No nesting data are available for Vermont, but data for Maine may be roughly applicable: nest construction began on May 31; 2 eggs were observed in the nest on June 5 and June 9; food was observed being carried into the nest cavity on June 16 (Palmer 1949).

G. FRANK OATMAN

Black-backed Woodpecker

Picoides arcticus



The Black-backed Woodpecker (formerly called the Black-backed Three-toed Woodpecker) is a highly localized and scarce resident of Vermont, where it occurs mainly in the boreal black spruce forest of the Northeast Highlands. The Black-backed is a candidate for Species of Special Concern status in Vermont.

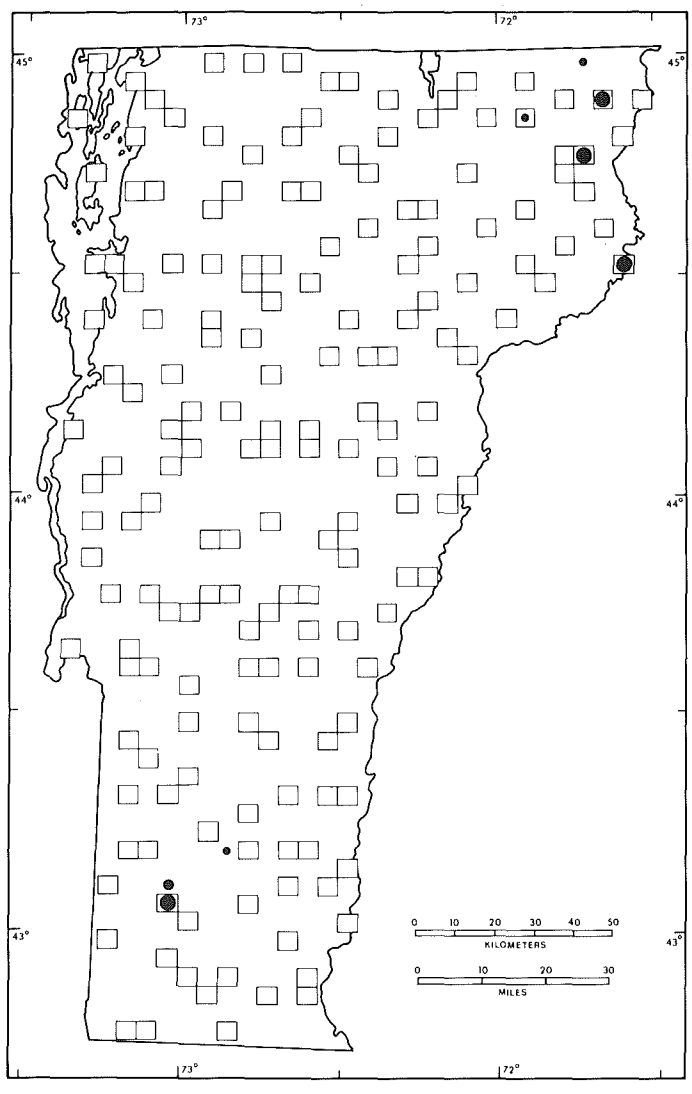
The Black-backed Woodpecker is found across much of the northern part of North America, from central Alaska and the Canadian Pacific to the Atlantic coast, dipping southward in the eastern U.S. to northern Maine, northern New Hampshire, Vermont, and central New York (AOU 1983).

The Black-backed occurs sporadically and quite rarely in coniferous forests at higher and cooler locations in Vermont. Although during the Atlas Project Black-backeds were found only in the southern Green Mountains there are older reports from Pico Peak, Mt. Mansfield, and other places along the length of the Green Mountain chain. Old reports exist from several spots in the North Central region, such as Morgan, St. Johnsbury, Bear Swamp in Wolcott, and Groton State Forest. Although this woodpecker takes some ants, spiders, acorns, nuts, and wild fruits, wood-boring beetles and caterpillars that attack dead or dying conifers constitute more than 75% of its diet (Bent 1939; Terres 1980). Originally this species, like the Three-toed Woodpecker, depended on the natural mortality of northern conifers from disease, fire, and flooding for the standing dead timber that furnishes the insects it eats. Black-backeds are still found in coniferous areas burned over by forest fires or flooded by beaver dams.

By far the best breeding habitat for the species in the state, and the only state area in which the Black-backed breeds regularly, lies in the roughly 311 sq km (120 sq mi) area in the Northeast Highlands bounded on the north by Great Averill Pond, on the south by South America Pond, on the west by Norton and Island ponds, and on the east by the Connecticut River. In this region of boreal forest the Black-backed can be found fairly regularly—though not on every visit—where dead or dying conifers (especially black spruce) occur in stands. As many as 5 adult birds have been seen in a single day in this area (G. F. Oatman, pers. observ.).

The Black-backed is a more vocal bird than the Three-toed. Especially during the breeding season, a distinctive sharp *kik* sound, louder than that of the Three-toed, can often be heard and helps to locate breeding pairs. Other soft chucking and rattling calls and a loud, shrill flight call have also been described (Pough 1946).

The Black-backed Woodpecker nests principally where windfalls, fires, flooding, or timbering have produced open areas with plenty of standing dead conifers. The nesting cavity is excavated in a living or dead tree, usually 0.6–4.6 m (2–15 ft) above the ground, but exceptionally up to 24 m (80 ft) high. The entrance hole is about 4–5 cm (1.5–2 in) in diameter, with the lower side often beveled to form a platform for the birds. The cavity is about 25 cm (10 in) deep. A clutch may number 2 to 6 eggs, though 4 is usual. Only 1 brood is produced per season (Bent 1939). No egg dates are available for Vermont, but data for Maine



No. of priority blocks in which recorded

TOTAL 5 (3%)

Possible breeding:	1 (20% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	4 (80% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	1	2	20
North Central	0	0	0
Northeast Highlands	4	25	80
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

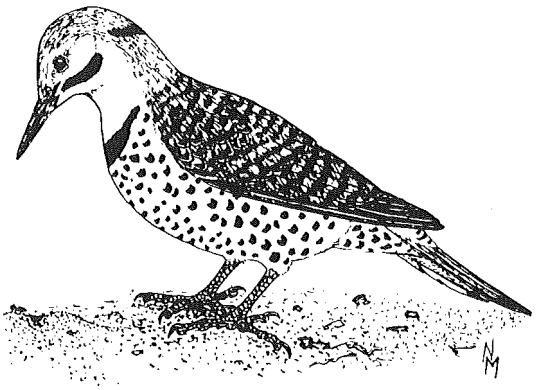
and New York are probably applicable: in eight records eggs were observed from May 18 to June 12 (Bent 1939). Incubation is performed by both sexes and takes about 14 days (Harrison 1978). The age when the young first fly is still unknown. In Vermont, fledglings have been seen as early as June 24; adults have been seen feeding young in two different nest cavities on July 4 and July 7.

Black-backed Woodpeckers are known to wander away from their breeding territories periodically in winter. In some years such wandering may reach the level of large irruptive flights, and Black-backeds may turn up well south of their normal range, including just about anywhere in Vermont. These events are rare, however; no major irruption has been recorded in Vermont within the past 10 years.

G. FRANK OATMAN

Northern Flicker

Colaptes auratus



Once considered three species, the eastern "Yellow-shafted," the western "Red-shafted," and the southwestern "Gilded" flickers are now combined by the American Ornithologists' Union into one species called the Northern Flicker (AOU 1983). In the East, the Northern Flicker breeds from Labrador and the tree line south to Florida and the Gulf Coast. The northern and high-elevation populations are migratory; as diurnal migrants, they are much in evidence from hawk lookouts and along the waterways, lake shores, and beaches, where they tend to concentrate. They do not winter in large numbers in Vermont, as they do in the southeastern U.S., but on 1981 Christmas Bird Counts 13 Northern Flickers were seen in Vermont.

Recent U.S. Fish and Wildlife Service breeding bird surveys indicate that the Northern Flicker population in the East has been declining (BBS, 1974–79). There may be several reasons for this decline: recent cold winters in the flicker's main wintering areas (Fahrenheit temperatures down to the teens in northern Florida) may have increased mortality rates among these largely insectivorous, ground-feeding birds; the heavy use of certain pesticides for ant control in the South may be a factor; flicker populations may be limited by competition with other hole-nesting birds for suitable nesting sites. However, L. Kilham (pers. comm.) has stated that Northern Flickers winter well as far north as Maryland, and will feed on berries, corn scavenged in farm fields, and a variety of insects found in old logs; Kilham believes that brief cold spells would have little effect on wintering flickers.

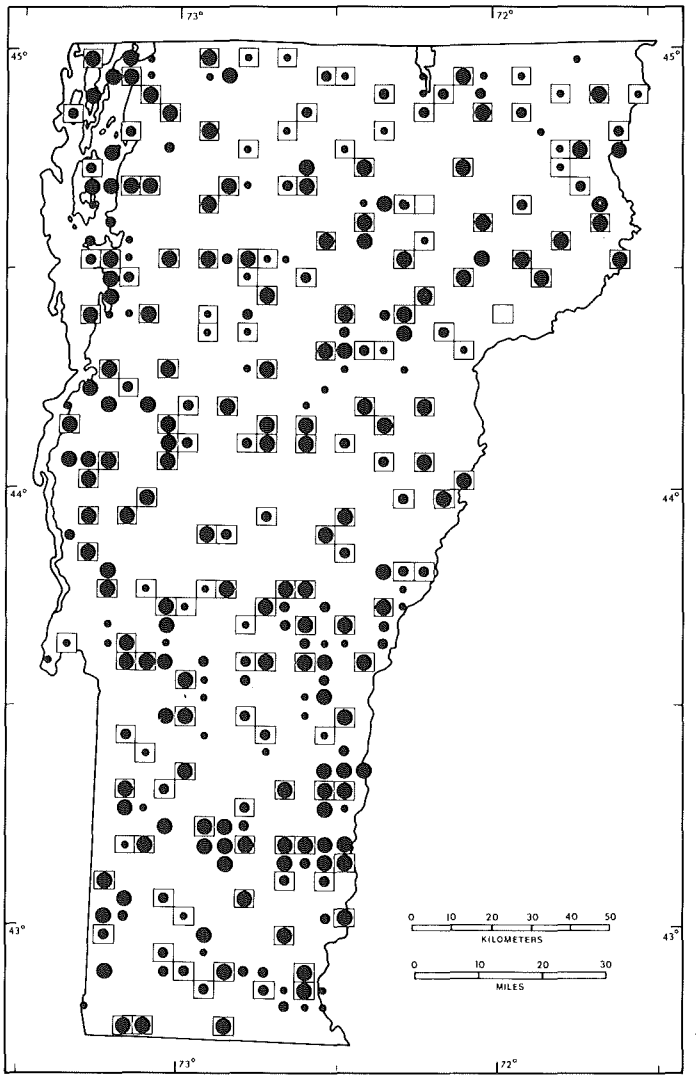
The Northern Flicker favors fairly open country, such as old orchards, woodlots, villages, and suburban areas. It does not occur in heavy forests, and is generally quite adaptable to settled areas.

As with many species, spring arrival dates for Northern Flickers vary widely with the severity of the season; most arrive in Vermont in April (March 25 being the earliest date). They are reluctant to migrate to elevated areas when the snow still covers the ground (W. J. Norse, pers. observ.). Most depart in the fall during the second half of September, though stragglers may stay until November. Occasional birds winter over at low elevations.

Nesting data in Vermont include thirteen reports of egg dates, ranging from May 1 to June 20. The clutch generally consists of 6 to 8 white eggs; the incubation period lasts 11 to 12 days (Harrison 1978). For six records of nests with young, dates run from June 13 to July 15. Six dates for fledglings range from June 30 to July 12.

The Northern Flicker nests in a cavity roughly 1–27 m (3–90 ft) from the ground; the entrance hole is about 7–8 cm (2.8–3 in) in diameter. The cavity is excavated by both birds; preexisting sites are often used. Species of trees that are favored include apple, various maples, and elm. Most nests discovered near Winhall, Vermont have been in dead maples (W. J. Norse, pers. observ.). In a large dead sugar maple near Winhall, a pair of Northern Flickers, several pairs of European Starlings, and a pair of American Kestrels utilized different cavities and apparently coexisted amicably.

Flickers feed on terrestrial insects, especially ants. Consequently, they usually forage on the ground, unlike most other woodpeckers. They will also feed on a wide range of wild fruits and berries. They will, when hungry enough, take cracked corn and millet at birdfeeders.



No. of priority blocks in which recorded

TOTAL 177 (99%)

Possible breeding:	29 (16% of total)
Probable breeding:	45 (26% of total)
Confirmed breeding:	103 (58% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17.5
Green Mountains	54	100	30.5
North Central	18	95	10.2
Northeast Highlands	16	100	9.0
East Central	18	95	10.2
Taconic Mountains	16	100	9.0
Eastern Foothills	24	100	13.6

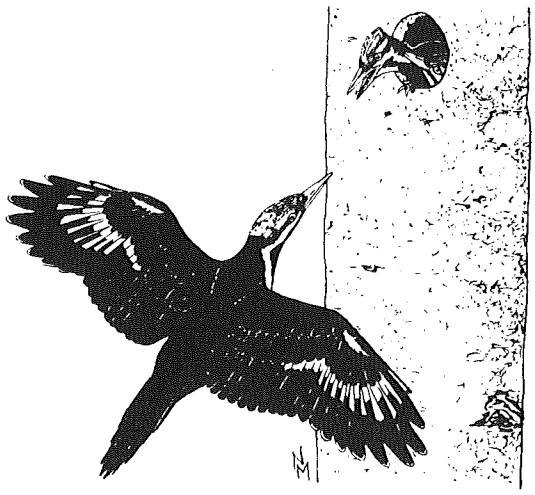
The Northern Flicker is easily located by listening for its characteristic call notes: the *wick-wick-wick* series is given in the spring, and the slurred *kee-you* note or *kinu*, expressive of mild alarm, is given year-round (Kilham 1983). Like other woodpeckers, the male makes a loud drumming with the bill on hollow limbs, tin roofs, and other potentially noisy surfaces.

The Northern Flicker was confirmed in 58% of the priority blocks in which it was recorded. It is a noisy, conspicuous bird, and its nests are not difficult to find: most flickers were confirmed by finding the nest. The most frequently used code was ON, for observation of the bird entering its nesting hole. The species was reported and confirmed in all seven Atlas Project physiographic regions. The confirmations were heaviest in less forested regions, such as the Champlain Lowlands (74%).

WILLIAM J. NORSE

Pileated Woodpecker

Dryocopus pileatus



Assuming the Ivory-billed Woodpecker to be extinct, the Pileated is North America's largest woodpecker. The Pileated is found over most of eastern North America south of Hudson Bay, west through the forests north of the Great Plains, and south through British Columbia, Washington, and Oregon to northern California.

The Pileated generally inhabits extensive woodlands, including coniferous, mixed, and deciduous forests. In woodland openings it feeds on the ground and on downed trees. It is a very secretive species, difficult to see for a bird its size; many Pileateds are heard for every one seen. The Pileated has increased in numbers markedly in recent years. Following the extensive logging of the eastern forests in the 1800s, this bird became quite scarce, holding on in the few remaining stands of heavy timber (Forbush 1927). Within the last 50 years it has become much more tolerant of disturbance; Atlas Project workers recorded it nesting even at the edges of cities and towns.

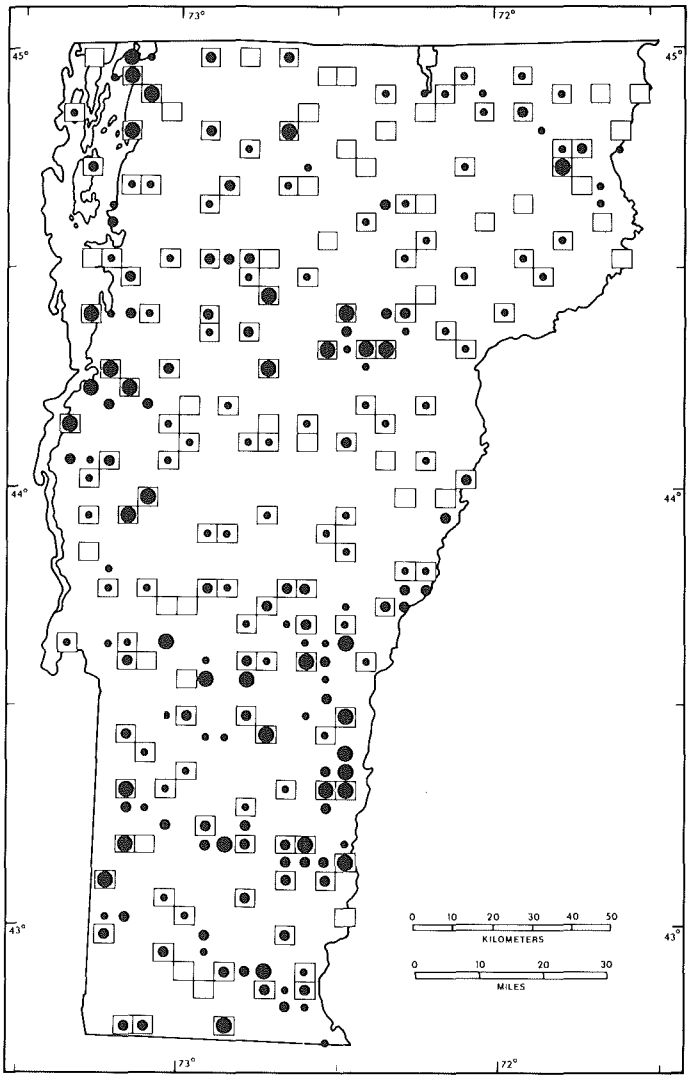
The Pileated is essentially a resident, nonmigratory species, although some altitudinal migration may take place in Vermont, with individuals dropping to the valley areas during the worst of the winter months and returning to the higher elevations in the early spring (W. J. Norse, pers. observ.). Some dispersal takes place in April, with Pileateds turning up in areas where they are not ordinarily seen (Bull 1964). Forty-one Pileated Woodpeckers were recorded in Vermont by Christmas Bird Counts in 1981 (CBC 1981–82).

The Pileated Woodpecker can most easily be located by the loud calls that it gives frequently during the spring and early summer. It is a surprisingly silent bird at other times of the year. The hammering it makes when feeding is louder and carries farther than that of other woodpeckers. The presence of Pileateds in an area is often revealed by their distinctive rectangular feeding holes, 10–20 cm (4–8 in) deep; a pile of fresh chips is usually found below.

The Pileated Woodpecker has two main calls. One resembles the flicker's *wick wick* call, but is louder; the notes are spaced somewhat irregularly, with hesitation between the notes. The most frequently heard call resembles a flicker's rolling stacatto, but is louder, stronger, and slower; it begins with a rising inflection and concludes with a falling one at the end of the series. The Pileated's resonant, rolling drumming, which speeds up and fades away at the end, is distinctive.

This species is difficult to confirm, as it generally nests in heavy timber and is silent around its nest tree, slipping in and out of the nesting area unobtrusively (W. J. Norse, pers. observ.). Nonetheless, in 17 of 38 Vermont confirmations (45%) active nests were located. The families are more conspicuous after the young are out of the nest; consequently, 34% of Vermont Atlas Project confirmations were of recently fledged young.

The nest is a cavity with an entrance hole about 8 by 9 cm (3.1 by 3.5 in); the cavity is cut in a dead tree or stub 5–21 m (15–70 ft) above the ground, in dense shade below the main canopy of the forest. The nest tree is generally 38–51 cm (15–20 in) in diameter, and is usually located in a dense stand of trees. Many species of trees are used: poplars, maples, and various conifers.



No. of priority blocks in which recorded

TOTAL 140 (78%)

Possible breeding:	70 (50% of total)
Probable breeding:	42 (30% of total)
Confirmed breeding:	28 (20% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	26	84	19
Green Mountains	42	78	30
North Central	13	68	9
Northeast Highlands	9	56	6
East Central	15	79	11
Taconic Mountains	12	75	9
Eastern Foothills	23	96	16

Nesting information from Atlas Project workers suggests that dates for tending the nest range from May 14 to June 19. The incubation period is 15 to 16 days (Kilham 1983). The normal clutch is 4 white eggs, although 3 of 4 Vermont nests contained clutches of 3 eggs. One nest found 30 feet up in a poplar contained 3 eggs; another nest contained 4 eggs. Dates of three nests with young (NY) ranged from June 10 to 29. Fledglings were reported from June 20 to July 14; an observer at Winhall on the latter date found a brood out of the nest and able to fly.

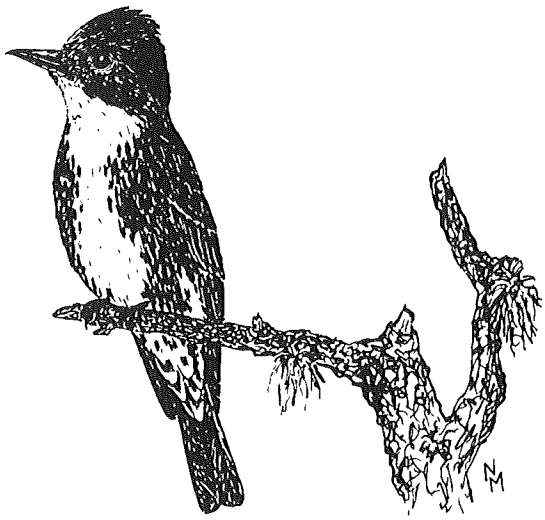
The Pileated Woodpecker's favorite food is carpenter ants, excavated directly from trees; it also takes wood-boring beetles, both grubs and adults. Wild fruits and acorns are this species' only vegetable foods.

During the Atlas Project the Pileated Woodpecker turned out to be widely distributed in Vermont. It was not confined to heavy forests or high mountain areas. Confirmations may have been more numerous in the Champlain Lowlands and Connecticut River valley because of the open nature of these regions.

WILLIAM J. NORSE

Olive-sided Flycatcher

Contopus borealis



Olive-sided Flycatchers nest in open boreal forests in Alaska, Canada, the mountain ranges of the western U.S., the northern portions of the Great Lake states, and northern New England, and in the Appalachians southward into Tennessee and North Carolina. In winter they migrate south into Central America and the mountains of western South America (AOU 1983). Olive-sided Flycatchers are early fall migrants, gone from Vermont before the end of September. Spring arrivals appear during the second and third weeks of May.

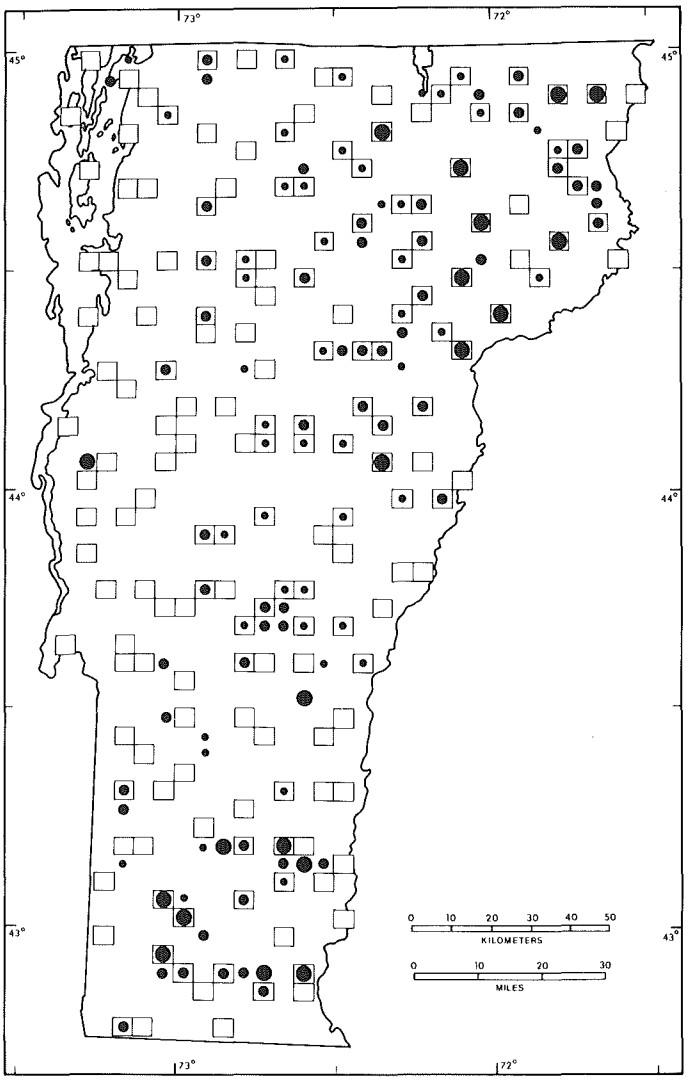
In the late 1800s, the Olive-sided Flycatcher was considered common in Vermont in the Londonderry area in June and July (Allen 1909). Perkins and Howe (1901) considered the species common during the summer months. G. H. Ross (1906a), writing of birds in Rutland County between 1888 and 1906, mentioned that Olive-sided Flycatchers were found in summer "chiefly around mountain ponds." L. H. Ross (1914) noted Olive-sideds were rare in the vicinity of Bennington, in the Valley of Vermont. Writing of birds that occurred during the summer in the Green Mountains, Davenport (1908) found Olive-sided Flycatchers "common about all swampy areas to the base of [Mt. Mansfield]." Spear (1976) alluded to the species being infrequently encountered.

Summer habitats of Olive-sided Flycatchers in Vermont include high-elevation wetlands (Davenport 1907), slashed and burned forests in the mountains (Eaton and Curry 1926), coniferous forests and bogs at elevations between 457 and 762 m (1,500–2,500 ft) (Spear 1976), and boreal forest in the Northeast Highlands (RVB, Summer 1975). Bull (1974) mentioned that they breed in the higher mountains of New York State. Olive-sided Flycatchers are often seen perching on conspicuous treetops, on snags, or live trees with dead crowns, uttering their loud, three-note call *quick-three-beers*.

The Olive-sided Flycatcher nest is placed most often in a conifer at 1.5–21 m (5–70 ft) above the ground, usually near the end of a horizontal limb in clusters of upright twigs. It is a cup with a loose foundation of dead twigs, and is made of grasses, mosses, lichens (often *Usnea*), straw, rootlets, and pine needles (Harrison 1978; Terres 1980). Clutches consist of 3 or 4 eggs, although usually 3 are laid. The eggs are cream-white, buff, or pink, lightly wreathed at the broad end with brown or gray blotches (Harrison 1978). Vermont nesting information for Olive-sided Flycatchers is scanty: there is one egg date for a 3-egg clutch on June 14; a nestling date on July 9 (the nest at 10.7 m [35 ft] on an outer branch of a large fir); and fledgling dates of July 22 and 26 and August 2. New York egg dates range from June 9 to July 27; there is one nestling date for June 22; and fledgling dates range from July 10 to July 24 (Bull 1974). Incubation lasts from 16 to 17 days (Walkinshaw and Henry 1957a).

Olive-sideds usually hunt from a high exposed perch, and dash out to capture the flying insects which make up their diet: honeybees, winged ants, and parasitic wasps (Beal 1942), as well as carpenter ants, click beetles, wood borers, leaf chafers, bark beetles, and cicadas (McAtee 1926).

Though apparently not abundant in Vermont, Olive-sided Flycatchers do occur



No. of priority blocks in which recorded

TOTAL 86 (48%)

Possible breeding:	37 (43% of total)
Probable breeding:	34 (40% of total)
Confirmed breeding:	15 (17% of total)

Physiographic regions in which recorded

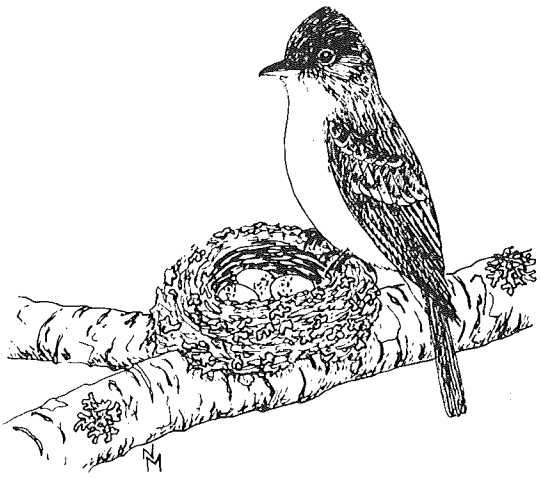
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	5	16	6
Green Mountains	29	54	34
North Central	17	89	20
Northeast Highlands	11	69	13
East Central	16	84	18
Taconic Mountains	1	6	1
Eastern Foothills	7	29	8

regularly during the breeding season in suitable habitats. Their statewide distribution closely parallels the distribution of coniferous wetlands and intermediate- to high-elevation forests such as those found in Northeastern Vermont and the Green Mountains. Logging activity in some areas has probably increased the amount of habitat for Olive-sided Flycatchers by creating openings in these forests.

CHRISTOPHER FICHTEL

Eastern Wood-Pewee

Contopus virens



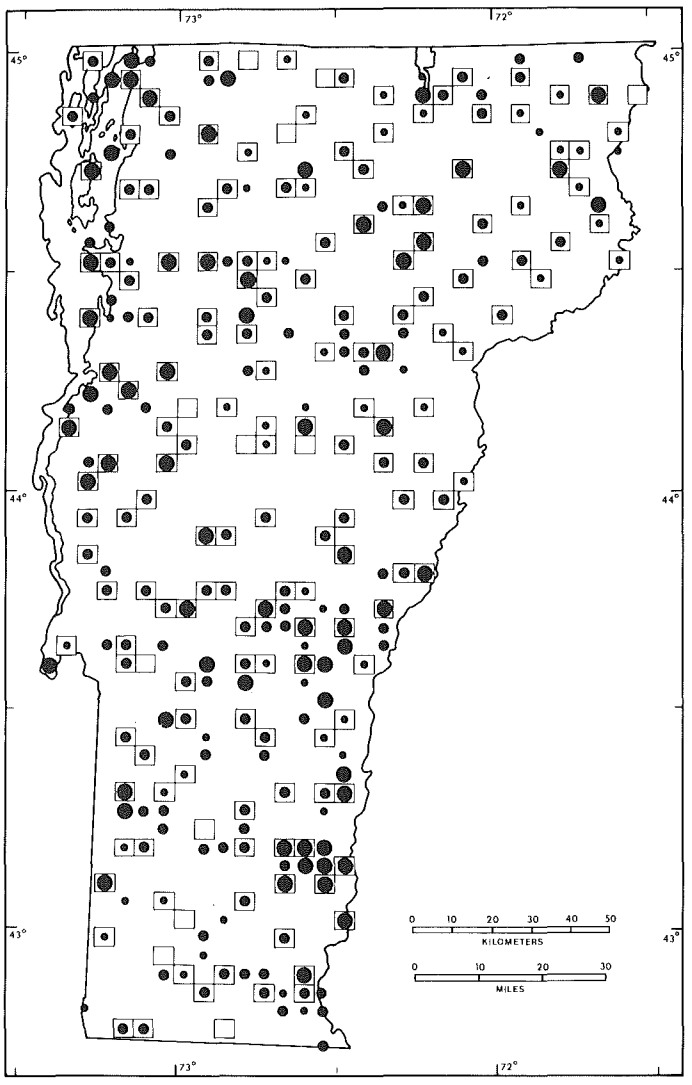
Eastern Wood-Pewees inhabit clearings in and at the edges of forests and woodlots, stands of shade and fruiting trees, and open woodlands with sparse canopy layers. The species is rare or absent in exclusively spruce-fir forest. In a study of flycatcher habitat selection in eastern North America, Hespenheide (1971) found that few pewee territories had uniform vegetative cover, and concluded that the Eastern Wood-Pewee is essentially an edge species.

The Eastern Wood-Pewee's plaintive three-note whistle is the first indication of the species' presence for most observers. This modestly plumaged flycatcher tends to forage at high levels in trees and therefore may be difficult to see. Fortunately, its long aerial forays after flying insects make it easier to see than some more abundant birds (e.g., the Red-eyed Vireo). This species is difficult to confirm as a breeder. A patient observer may obtain breeding confirmation by keeping a careful watch on a pair until one member, usually the female, reveals the nest's presence. Active nests accounted for 33% of all Atlas Project breeding confirmations, parents with food accounted for another 33%, and dependent young for 23%.

The Eastern Wood-Pewee arrives in Vermont during mid May, often by the third week of the month. It is among the latest migrants to return to Vermont, largely because it catches insects on the wing during the breeding season. Nest building commences in early June. Six dates for nest construction in Vermont range from June 1 to June 11; a few pairs may start nests in late May. The nest is a delicate structure of fine plant fibers held together with spider webbing and cocoon silk, and decorated with bits of birch bark and lichen. The nest is usually placed on a branch fork well out from the trunk of a deciduous tree, and resembles a knot on the limb. Fifteen Vermont nests were placed 5.5–16.8 m (18–55 ft) above the ground, with the average height being 10 m (33 ft).

The wood-pewee's eggs are white with a wreath of reddish to purplish brown spots about the large end. Clutch size ranges from 2 to 4 eggs; the norm is 3 (Bent 1942). All recorded Vermont clutches contained 3 eggs. The incubation period lasts from 12 to 13 days (Bent 1942). Seven Vermont dates for nests containing eggs range from June 10 to June 27; fledgling and nestling dates suggest that eggs may be found in Vermont nests from late May to mid July. Ten dates for nestlings from Vermont range from June 14 to August 2. The young remain in the nest from 15 to 18 days (Bent 1942). Three dates for dependent young in Vermont are between June 20 and July 5. The autumn migration appears to peak in mid to late August, and a few birds remain until late September in most years.

Eastern Wood-Pewees probably experienced a late nineteenth century population decline, as did other woodland birds at the height of land clearing, but had recovered enough by the turn of the century for Perkins and Howe (1901) to consider the species a common summer resident. Forbush (1927) described it as a "common summer resident except on the higher elevations of northern New England." Atlas Project data indicates that this is still true today, as wood-pewees were located in only 85% of the priority blocks in the Green Mountains, compared to 94% to 100% of blocks in all other regions. In Vermont, the Eastern Wood-Pewee



averaged between 4 and 6 birds per route on U.S. Fish and Wildlife Service Breeding Bird surveys between 1966 and 1979 (BBS, 1966–79), and it showed no significant population changes during that period (Robbins 1982b).

WALTER G. ELLISON

No. of priority blocks in which recorded

TOTAL 167 (93%)

Possible breeding:	41 (24.5% of total)
Probable breeding:	81 (48.5% of total)
Confirmed breeding:	45 (27.0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	30	97	18
Green Mountains	46	85	28
North Central	19	100	11
Northeast Highlands	15	94	9
East Central	18	95	11
Taconic Mountains	15	94	9
Eastern Foothills	24	100	14

Yellow-bellied Flycatcher

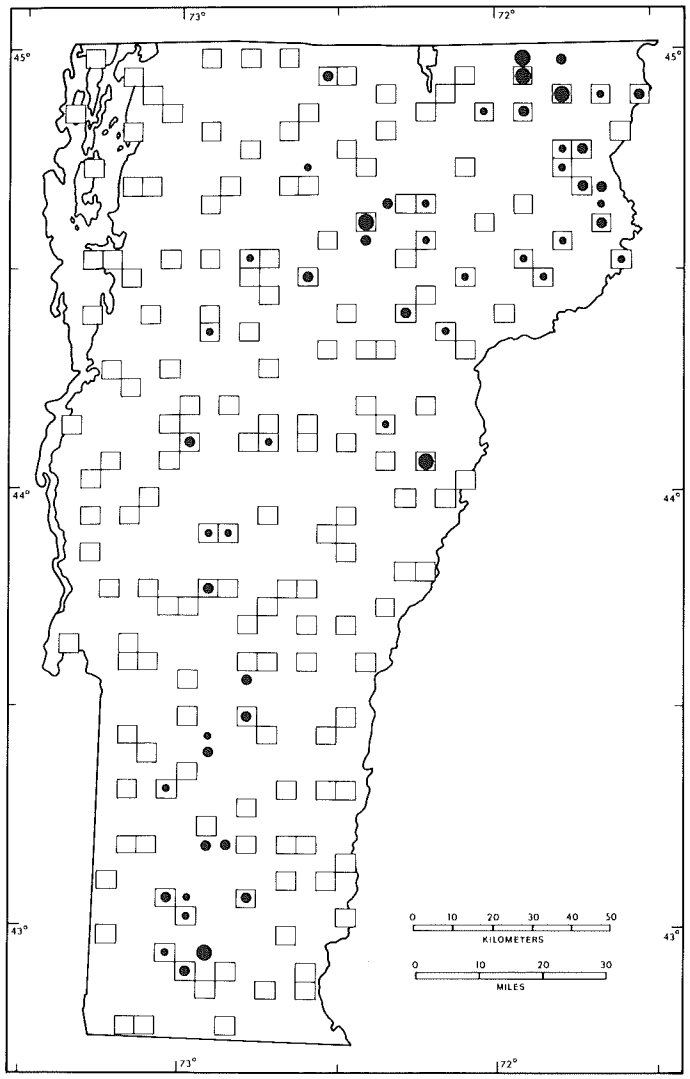
Empidonax flaviventris

The Yellow-bellied Flycatcher's breeding range lies largely in Canada, extending as far northwest as Mackenzie, with the southern edge dipping into the U.S. in the northeastern and north central states; isolated breeding has occurred in the mountains of Virginia (AOU 1983). In Vermont, the Yellow-bellied is near the southern limit of its normal breeding range. The Yellow-bellied is one of Vermont's latest-appearing spring flycatchers: migrants begin to arrive during the third or fourth week of May (an early date is May 6) and continue coming well into June. It is on the move early in the fall, with southbound individuals turning up in late July or early August; a migrating juvenile bird was banded at the Vermont Institute of Natural Science's banding station on July 27. Most of these birds move on in late August or early September; some stragglers stay until the third week of September. Yellow-bellied Flycatchers winter in Mexico and Central America south to western Panama (AOU 1983).

The breeding habitat of the Yellow-bellied Flycatcher consists of boreal forest and coniferous bogs or swamps. Yellow-bellied Flycatchers have been found in mountain habitats described as spruce forest (Eaton and Curry 1924); deep woods at elevations of 762–1,067 m (2,500–3,500 ft) (Howell 1901); and shady slopes carpeted with mosses (Bull 1974). In addition, the species has been observed during the summer at various high elevation sites in the southern part of Vermont (RVB, Summer 1980), and has been heard singing at elevations of 853 and 1,006 m (2,800 and 3,300 ft) on Camels Hump in northern Vermont (ASR, C. Shultz). Smith (1946) reported that these flycatchers were heard singing on the slopes of Mt. Mansfield and were commonly heard on Camels Hump as well. Preferred wetland areas include spruce-tamarack or spruce-fir bogs with small openings or widely scattered trees and a ground layer of sphagnum moss and bog shrubs (Walkinshaw and Henry 1957b). Wetland habitats in Vermont where Yellow-bellied Flycatchers have been heard singing include Peacham Bog and Bear Swamp (in Wolcott). Common to all habitats are mosses of various types carpeting the ground.

Among members of the genus *Empidonax*, this flycatcher is easiest to identify by plumage, but it is difficult to locate. A reclusive, inconspicuous bird, it is frequently overlooked. Its two primary vocalizations closely resemble the notes of other flycatchers. The song is a *kill-ink* or *pee-wick* repeated several times a minute, and the call is a much sharper *kill-ink* or *pee-wick*. During migration, Yellow-bellieds are silent.

Nests are located on the ground on the side of a mossy hummock or amid the roots of a fallen tree. A Vermont nest discovered by Eaton and Curry (1924) on Kirby Mountain (Addison County) was tucked into a hummock of moss, roots, leaves, and stones left when a spruce tree uprooted. A Michigan nest in a spruce-tamarack bog was located at the base of a black spruce "sunken into sphagnum moss with no overhead cover" (Walkinshaw and Henry 1957b). The nest is a rather bulky cup of moss and rootlets, lined with grasses and rootlets. Vermont nesting information for Yellow-bellied Flycatchers is scant. One egg date is June 20 for a clutch of 4 eggs; eggs are white, sparsely dotted with light brown (especially about the large ends). Three to 4 eggs is the usual clutch



No. of priority blocks in which recorded

TOTAL 39 (22%)

Possible breeding:	21 (54% of total)
Probable breeding:	14 (36% of total)
Confirmed breeding:	4 (10% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	15	28	38
North Central	6	32	15
Northeast Highlands	14	88	36
East Central	3	16	8
Taconic Mountains	1	6	3
Eastern Foothills	0	0	0

size (Bent 1942). New York egg dates range from June 10 to 27 (Bull 1974). A fledgling date for Island Pond is July 12.

These flycatchers feed low in the canopy or near the ground, picking up ants, caterpillars, flies, small hemipterans, other insects, and spiders. Flying ants make up a good portion of the diet, at least in certain areas (Forbush 1925). Yellow-bellieds are fond of mountain ash berries and possibly of other fruits (Stickney 1942).

Yellow-bellied Flycatchers were not found breeding in the Champlain Lowlands or the Eastern Foothills during the Atlas Project. The highest occurrence was in the Northeast Highlands, a region of coniferous forests and bogs. The occurrence in the North Central region is explained by the region's numerous pockets of boreal wetlands, and that in the Green Mountains indicates the region's suitable spruce or spruce-fir habitat at higher elevations. Few pockets of boreal vegetation occur in the Taconic Mountains or in the East Central region, as is reflected in the lower occurrence of the species in those regions. The Yellow-bellied Flycatcher is secretive, and its nests are difficult to locate; all 4 priority block confirmations were of adults carrying food to the nest.

WILLIAM J. NORSE
CHRISTOPHER FICHTEL

Alder Flycatcher

Empidonax alnorum

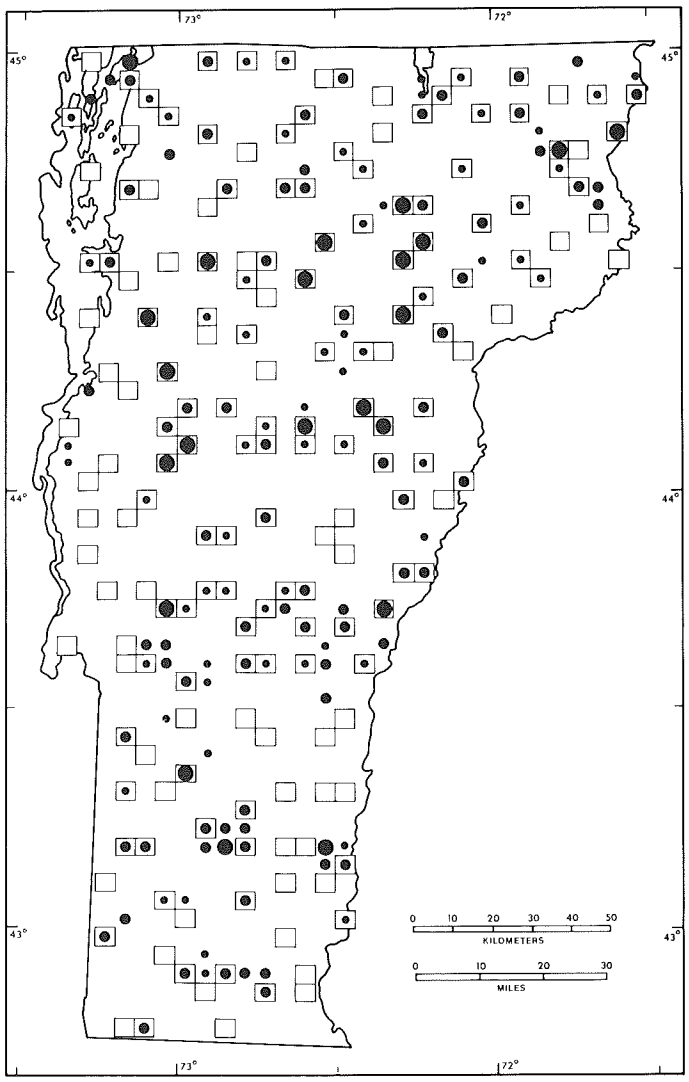
The Alder Flycatcher is a widely distributed Nearctic species that breeds from Alaska and northwestern Canada east through the northeastern U.S. The southern limit of its range in the Northeast is somewhat south of Vermont, extending at higher elevations into the Appalachians. The older literature on this species and the Willow Flycatcher is clouded by the fact that until recently the two forms were considered one species called "Traill's Flycatcher." The bird now known as the Willow Flycatcher was considered the western subspecies; its range was to the south and west of the Alder's, from the Mississippi drainage to California and the Southwest, and there was little apparent overlap between the ranges. In the last 50 years the Willow Flycatcher has spread dramatically north and east and in some areas may be replacing the Alder.

The habitat of the Alder Flycatcher is generally composed of upland alder swamps, brushy stream banks, and boggy, shrubby boreal coniferous forest regions (Aldrich 1953). In Vermont, the Alder Flycatcher is usually found at higher elevations, inhabiting primarily alder and willow swamps. Despite their preference for somewhat different habitats, Alder and Willow flycatchers may be found singing side by side (*way-bee-o* and *fitz-bew*, respectively) in both the West Rutland Marsh and Dead Creek Wildlife Management Area. Research by Stein (1958, 1963) indicated that the two forms were separated more by differences in voice and nidification than by morphology.

The Alder Flycatcher's nest is a coarse, loose, untidy structure similar to a Song Sparrow's, usually 0.6–1.2 m (2–4 ft) above the ground on the upright fork of a swamp shrub or, occasionally, in a fern clump. The nest is suspended above the crotch, rather than set down in it like that of the Least Flycatcher. The 7.6–8.9 cm (3–3.5 in) nest is loosely woven, with many hanging ends, generally of grasses, weed stems, and bark; it is lined with a well-constructed cup of fine grass and fiber. The loose structure, dangling nest material, and low nest placement were diagnostic criteria that Stein (1958) found distinguished the Alder's nesting behavior from the Willow Flycatcher's. The clutch consists of 3 to 4 creamy white eggs, usually with a few brown dots. Incubation takes 2 weeks, and the young fledge in an equivalent period of time. Arrival dates indicate Alders generally arrive slightly ahead of or concurrent with Willow Flycatchers. Alder nests with eggs have been found from June 2 to June 30; the only fledgling dates are for June 25 and 26.

The Alder Flycatcher winters from Mexico to Panama, generally farther north than its sibling species, the Willow Flycatcher, and is one of the later arrivals in spring; it usually does not appear until late May (an early date is May 17). Since neither species can be identified with certainty when silent, the Alder's fall departure is more uncertain. Singing generally stops by August 1, and most Alders are gone by the first of September. Seventy-four percent of the "Traill's Flycatchers" banded at the Vermont Institute of Natural Science between 1970 and 1983 were recorded between August 16 and September 2; extreme dates are August 2 and September 30.

The Alder Flycatcher was found to be relatively well represented in all the physiographic regions except the Eastern Foothills and Champlain Lowlands. Lower ele-



No. of priority blocks in which recorded

TOTAL 115 (64%)

Possible breeding:	43 (37% of total)
Probable breeding:	53 (46% of total)
Confirmed breeding:	19 (17% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	14	45	12.0
Green Mountains	40	74	35.0
North Central	18	95	16.0
Northeast Highlands	11	69	9.5
East Central	13	68	11.0
Taconic Mountains	8	50	7.0
Eastern Foothills	11	46	9.5

vations and the absence of boreal habitat presumably account for the species' scarcity in those regions. Because their breeding habitats typically occur as relatively small patches, Alder Flycatchers are nowhere abundant in the state, though they may be locally common in suitable habitat. Unobtrusive, with a weak song, they are easily overlooked. Although Stein (1958, 1963) suggested that the expansion of the Willow Flycatcher into the Northeast has been at the expense of the Alder, Atlas Project results indicate little evidence that the Alder's range is contracting. Perkins and Howe (1901) considered the "Traill's Flycatcher" (presumably the Alder) an uncommon resident in Vermont. The Willow Flycatcher has only become evident in the state in the past two to three decades, however, and displacement of the Alder may not yet be apparent. The two species were found coexisting in 40 survey blocks; whether either or both species will continue to occur in these blocks remains to be seen. In any event, Atlas Project data provide an excellent standard against which to measure future distributional changes.

DOUGLAS P. KIBBE
WILLIAM J. NORSE

Willow Flycatcher

Empidonax traillii

The Willow Flycatcher was recently distinguished from the Alder Flycatcher; formerly, both were known as one species called "Traill's Flycatcher" (see Alder Flycatcher species account). The single identity clouded the history of the Willow Flycatcher in Vermont before the split.

The Willow Flycatcher's original range was south of the Alder Flycatcher's. The Willow's range is extensive in the West and Southwest, the Ohio River valley, and the Mississippi River drainage; recently its range has expanded into the Northeast. There are now large areas of overlap or sympatry in the ranges of the two sibling species. The Willow Flycatcher apparently began to spread into Vermont from the south and southwest during the 1960s. It now breeds mainly at lower elevations in the Champlain Lowlands, Connecticut River valley, Eastern Foothills, and Taconic Mountains. Both Willow and Alder flycatchers have been found singing side by side at the West Rutland Marsh, Dead Creek Wildlife Management Area, and, occasionally, at higher locations such as South Londonderry along the West River.

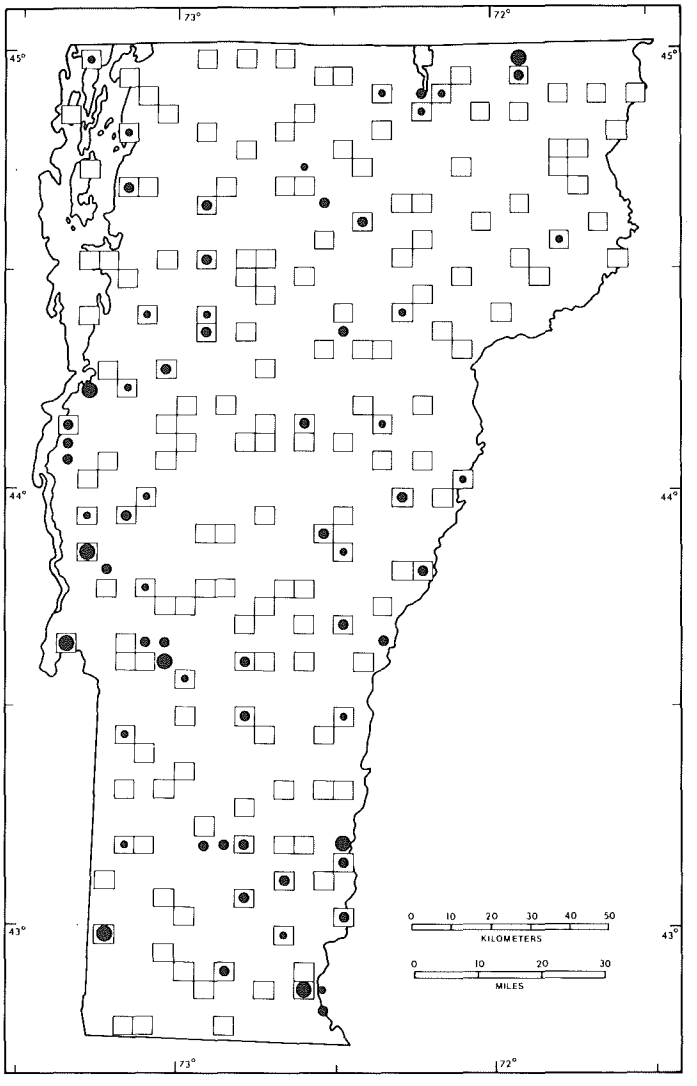
The Willow Flycatcher is found in dry upland pastures thickly overgrown with hawthorn and shrubs, in dense roadside growth, and along streams and lake edges in grassland areas where shrubs are available for nesting. Generally, the Willow Flycatcher is found in drier locations than the Alder, but these distinctions do not always hold.

The Willow winters farther south than the Alder, migrating to Peru and Argentina (Gorski 1969, 1971). Willow Flycatchers also arrive late in the spring, not reaching Vermont until around May 20; many do not appear until June. The species' fall departure date, obscured by the difficulty of identifying silent *Empidonax* flycatchers, is probably late August to early September.

The Willow Flycatcher's nest is neat and compact, while that of the Alder is coarse, loose, and untidy. The Willow's nest is saddled on a tree limb, as much as 6 m (20 ft) from the ground, while the Alder's is usually in a fork of a shrub only 0.6–1.2 m (2–4 ft) up. Differences in nidification provided key points in the research by Stein (1958, 1963) that resulted in the division of "Traill's Flycatcher" into two species. Willow Flycatchers probably commence nesting in early June in Vermont, although no nests have been discovered before June 23. Three nests found had 3 to 4 white, brown-spotted eggs, a typical number for this species. Incubation of the clutch lasts 13 to 15 days (Harrison 1978). July 13 is the only nestling date for Vermont.

The Willow Flycatcher is an aggressive species, and it may be expanding its range at the expense of its close relative. It is not clear, however, whether or not expansion is occurring in Vermont. The Willow seems to be spreading through the valley areas—the Lake Champlain and Connecticut River valleys—while the Alder seems to be holding its own in the Green Mountains and Northeast Highlands. Both species occurred in 135 (75%) of all priority blocks, but occupied the same block in just 20% of these 135 blocks.

Unless an observer is familiar with the Willow Flycatcher's buzzy song—a dry, disyllabic *fitz-bew*, a whistle imposed on



No. of priority blocks in which recorded

TOTAL 47 (26%)

Possible breeding:	21 (45% of total)
Probable breeding:	22 (47% of total)
Confirmed breeding:	4 (8% of total)

Physiographic regions in which recorded

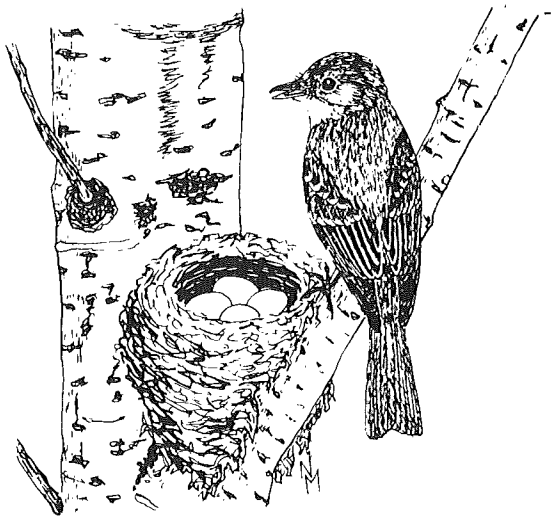
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	13	42	28.0
Green Mountains	9	17	19.0
North Central	4	21	8.5
Northeast Highlands	2	12	4.0
East Central	4	21	8.5
Taconic Mountains	5	31	11.0
Eastern Foothills	10	42	21.0

a buzz—this species may be easily overlooked. Willows were recorded in only 26% of the priority blocks in the state. Confirmations proved difficult to obtain, probably because of the species' retiring manner and preference for dense shrubbery. Only 8% of the priority block records resulted in confirmations. The confirmations were concentrated at the lower elevations.

WILLIAM J. NORSE

Least Flycatcher

Empidonax minimus



Flycatchers of the genus *Empidonax*, with the exception of the Yellow-bellied, cannot be distinguished with certainty in the field except by song or calls. There are visual differences among them, but individual variations are sufficient that fall birds, if silent, will be recognized only as *Empidonax* (species) unless measured by bird-banders in the hand. The relationships among the various species that occur in the U.S. and in Mexico are quite complex and have yet to be satisfactorily established.

The Least Flycatcher is an eastern species, breeding as far south as New Jersey and North Carolina (in mountains), west to British Columbia and Montana, and north to the Yukon, northern Ontario, and the prairie provinces. It winters from northern Mexico to Panama (AOU 1983).

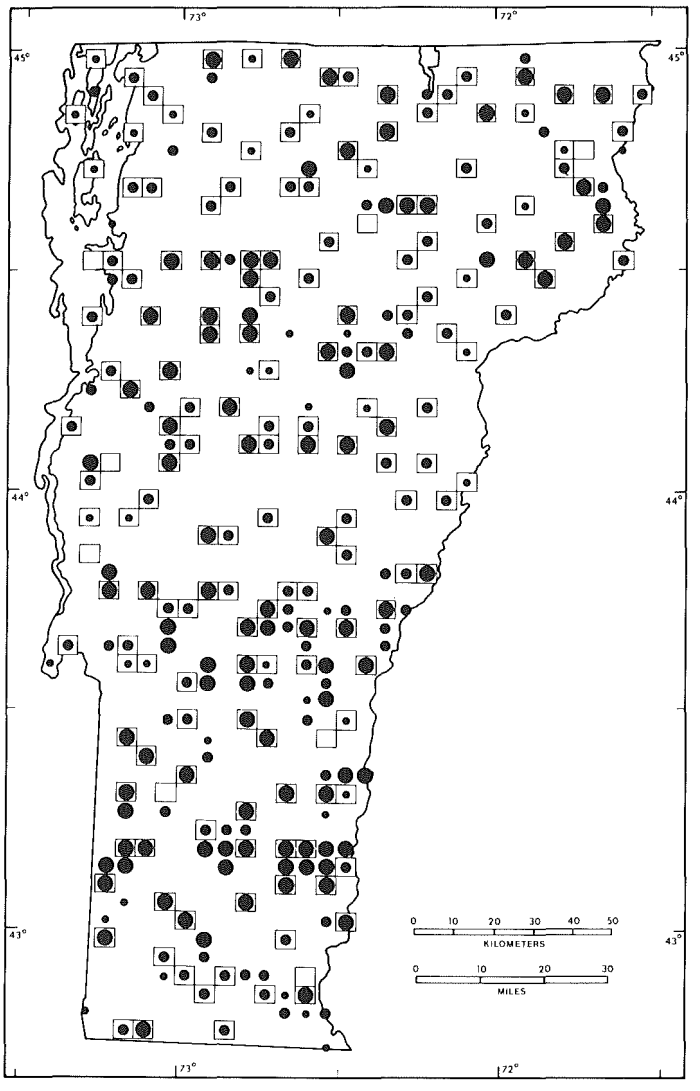
The Least Flycatcher's habitat requirements are not as rigid as those of other members of its genus; consequently, it is more generally distributed. It is found in open deciduous woodlands and is often abundant around orchards, gardens, towns, and parks. It does not favor heavy woods or extensive conifer stands, and is therefore less numerous at higher elevations. Breckenridge (1957) found that the species appears to select habitat with open midstories and fewer branches and tall saplings.

The Least Flycatcher reaches Vermont from its wintering grounds in early May (early date, April 29) and becomes conspicuous by its constant singing about the middle of the month. Fall departures are more difficult to ascertain, as was noted, since these flycatchers cannot be accurately identified when silent. However, most fall *Empidonax* flycatchers are undoubtedly Least Flycatchers, by far the commonest species. Late banding records from the Vermont Institute of Natural Science show a range of departure dates from September 11 to October 1. Migration studies of the Least Flycatcher in Ontario (Hussell 1981) discovered that in the spring migration the males preceded the females by an estimated six days. In the fall no differences in timing of migration existed between sexes; however, fall migration by immatures averaged at least a month later than that of the adults.

The Least Flycatcher was found nesting in all seven physiographic regions of the state. Breeding was confirmed in more than half of the priority blocks in the Green Mountains, Taconic Mountains, Northeast Highlands, and Eastern Foothills; confirmation was lowest in the more open Champlain Lowlands, occurring in fewer than one-quarter of the priority blocks.

The earliest state record for nest building is May 15; Least Flycatchers have been seen building as late as June 26. Completed nests with eggs have been found as early as May 20 and as late as June 29. Eighteen records from Vermont show the size of the clutch ranging from 2 to 4 eggs. The first reported date for a nest with young was June 19, the latest Atlas Project record was for July 9; however, these dates are undoubtedly not inclusive. Recently fledged young have been reported on six dates between June 28 and August 3.

The nest is a rather deep, thinly walled cup about 7 cm (2.75 in) across, made of bark fibers and weed stems. It is lined with fine grass and hair, and placed firmly in a



No. of priority blocks in which recorded

TOTAL 171 (96%)

Possible breeding:	24 (14% of total)
Probable breeding:	72 (42% of total)
Confirmed breeding:	75 (44% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	28	90	16.0
Green Mountains	54	100	31.5
North Central	18	95	10.5
Northeast Highlands	15	94	9.0
East Central	19	100	11.0
Taconic Mountains	15	94	9.0
Eastern Foothills	22	92	13.0

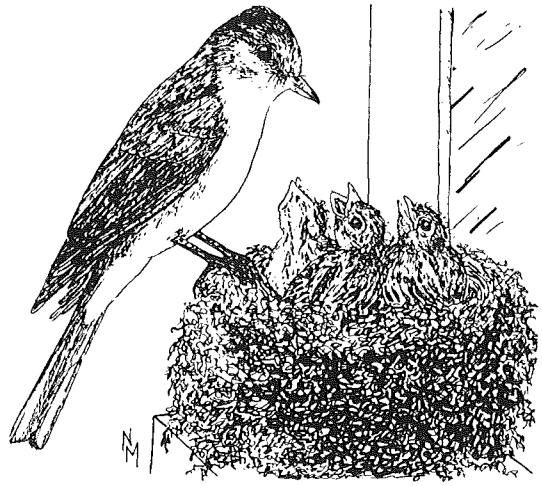
crotch of a tree or on a branch between 1.6 and 6.6 m (5 to 20 ft) high, occasionally 0.7 to 19.7 m (2 to 60 ft) high (Harrison 1978). Deciduous trees are typically chosen for nest sites; birches, maples, and apples are frequently used in Vermont. The flycatcher's diet consists of small insects and spiders, usually taken off leaves while hovering (Sherry 1979). The Least Flycatcher prefers to forage beneath the canopy rather than from the treetops like some of its relatives (Sherry 1979).

Studies by Sherry (1979) in New Hampshire uncovered interspecific competition between the Least Flycatcher and the American Redstart (*Setophaga ruticilla*), two unrelated passerines that forage similarly. Coexistence of the two seems to be controlled by the more plastic, adaptable behavior of the redstart, as well as by slight differences in their habitat preferences and life history characteristics.

WILLIAM J. NORSE
DOUGLAS P. KIBBE

Eastern Phoebe

Sayornis phoebe



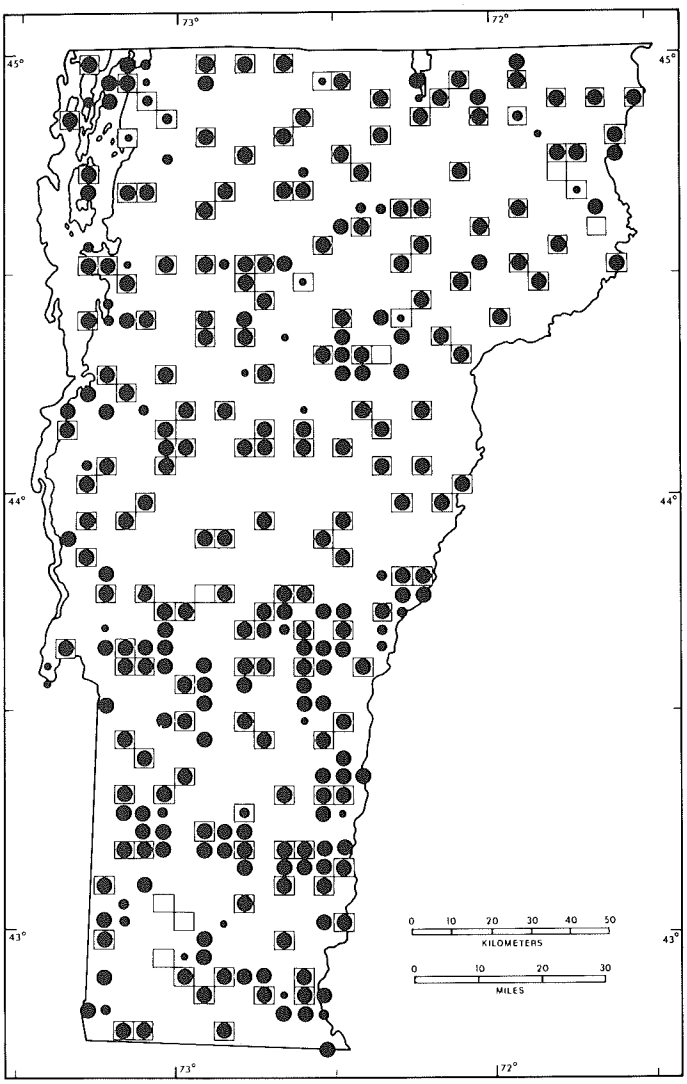
The Eastern Phoebe is a common species, breeding from central and eastern Canada south to central Texas and Georgia and wintering from the southern extremity of its breeding range south to Florida, the Gulf Coast, and southern Mexico (AOU 1983). A Vermont nestling banded in June at Wells River was recovered in Louisiana in November of the same year (Smith 1942). This is the hardiest of Vermont's flycatchers and the first to arrive in the spring. Eastern Phoebes generally return in late March or early April. Territorial displays may begin within a week of arrival on the breeding grounds. The last phoebes have departed in the fall by the third week of October.

Eastern Phoebes inhabit farmlands, towns, roadsides, and streamsides. Before human habitation, these phoebes nested on rock shelves or in cavities on the sides of steep ravines. They still nest in such natural situations, as well as in crevices in boulder talus where the vegetation has been logged off or burned (C. Fichtel, pers. observ.); but today they nest mainly on man-made structures such as bridge girders, rafters in open buildings, window sills, and under eaves. Weeks (1979) suggested that the Eastern Phoebe was able to expand its range into new regions as man-made dwellings and other structures became available. He found bridges and culverts were used extensively as nest sites. These sites were close to woodland edge that probably provided perches from which to sally forth for insect prey.

The Eastern Phoebe's call is distinctive, given as *phoebe* or *wheepy* (Bent 1942) while the bird sits at its perch flicking its tail. Insect prey includes beetles, dragonflies, moths, flies, bees, and wasps. Phoebes will also consume caterpillars, fruits, and seeds (Bent 1942).

Eastern Phoebes build both statant and adherent nests (Weeks 1979). Adherent nests are built on smooth-surfaced structures (e.g., culverts), and are secured firmly to the structure with mud by the female. Statant nests are built under eaves or on bridge supports. Nests are built of moss and mud, lined with grass and hair. Female Eastern Phoebes will occasionally use old nests rather than build new ones (Weeks 1978). Nest-building dates for Vermont are April 15 through May 18 (seven records); Smith (1942) reported 3 to 6 days for nest building in Vermont. At Wells River, females were seen attempting to build as many as 15 nests in a season before completing one (Smith 1942). Nests with eggs were found between April 28 and July 24 (68 records); clutches ranged from 2 to 6 white eggs (the average was 4.2). Smith (1942) recorded incubation as 14 to 17 days. The mean incubation period was reported to be 16 days (Weeks 1979); the species is usually double-brooded. Hatching occurs between May 30 and June 16 (four records) (Smith 1942). The nestling period is 16 days (Smith 1942; Weeks 1979); dates in Vermont range from May 21 to July 30 (52 records). Dates for fledged young range from June 16 through August 4 (16 records).

Because they return early in the spring, Eastern Phoebes may suffer from spring snowstorms. Weeks (1979) reported that temperature is a factor governing nest building, as phoebes may curtail their activities when the temperature is below a certain level. Brown-headed Cowbirds occasionally



No. of priority blocks in which recorded

TOTAL 172 (96%)

Possible breeding:	5 (3% of total)
Probable breeding:	4 (2% of total)
Confirmed breeding:	163 (95% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	18.0
Green Mountains	50	93	29.1
North Central	18	95	10.5
Northeast Highlands	14	88	8.1
East Central	19	100	11.0
Taconic Mountains	16	100	9.3
Eastern Foothills	24	100	14.0

parasitize the nests of Eastern Phoebes. Nest predators include black rat snakes, white-footed mice, and raccoons (Weeks 1979).

Eastern Phoebes breed in all seven physiographic regions of Vermont. Population density appears to be lowest at the higher elevations where suitable nest sites, particularly man-made structures, are scarce (W. J. Norse, pers. observ.). This species was confirmed in 95% of the priority blocks.

WILLIAM J. NORSE
CHRISTOPHER FICHTEL

Great Crested Flycatcher

Myiarchus crinitus

The Great Crested Flycatcher is the eastern Nearctic representative of the genus *Myiarchus*, which consists of 22 species distributed over much of North and South America (Traylor and Fitzpatrick 1982). Great Crested Flycatchers summer from southern Canada south to Texas, the Gulf Coast, and Florida; they winter from southern Florida to northwestern South America (AOU 1983).

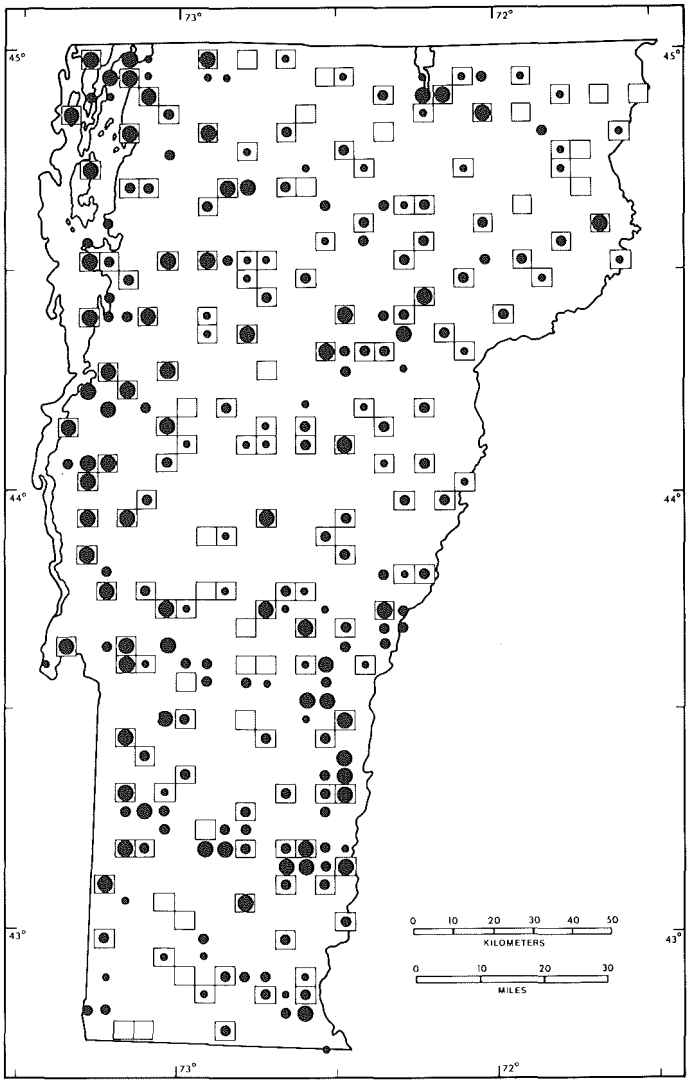
The Great Crested Flycatcher inhabits mature, open, deciduous woodlands and edge. In Vermont, it prefers abandoned orchards, swamps, floodplain forests, the edges of woodlots and forests, and clear cuts and selectively cut woodlands.

Great Crested Flycatchers are most easily located on breeding territory by their persistent vocalizations. The common call is a loud, clear, whistled *wheeep* often followed by a few raucous notes. These flycatchers can be heard calling for about two months; the species falls largely silent by mid July. Although it is a large songbird, the crested flycatcher is inconspicuous when silent. It spends much less time foraging from exposed perches than most other large flycatchers, preferring to forage within the canopy. This unobtrusiveness resulted in confirmation in only 33% of the priority blocks. The Great Crested Flycatcher is a cavity nester. Careful observation of the adults will usually reveal the nest's location, since it is rarely hidden behind branches or foliage. In about 44% of all breeding confirmations for Vermont the nest was detected. Adults with food for young accounted for 22% of confirmed breedings, and recently fledged young led to another 21% of confirmations.

Great Crested Flycatchers arrive in Vermont during the first or second week of May; May 1 is an early date. Nesting commences in late May. Nest building has been recorded in Vermont as early as May 24. The nest is located in a natural cavity, in a hole excavated by a woodpecker, or in a nest box. Deep cavities are filled with any available material to the desired depth from the entrance. The nest is hollowed out from this mass of material, which may include leaf litter, twigs, stems, rootlets, hair, feathers, grass, man-made objects, and, often, a snake skin. Nest heights vary with the height of available cavities; the average height of 11 Vermont nests was 4.8 m (16 ft).

The 4 to 7 eggs are buff, streaked with purple. The average size of seven Vermont clutches was 4.7 eggs. Dates for these sets ranged from June 2 to June 20. The incubation period lasts from 13 to 15 days (Bent 1942). Only four reported nestling dates exist for Vermont, ranging from June 18 to July 1. The nestling period lasts about 14 to 15 days (Harrison 1978). Dependent young have been encountered in Vermont as early as June 24, but no satisfactory late fledgling date exists for the state. The autumn migration of this species in Vermont peaks in early to mid August; a few Great Cresteds are seen each year during September.

The Great Crested Flycatcher is widespread in the Green Mountain State and was recorded in 85% of the 179 priority blocks. However, the Great Crested Flycatcher prefers a warm, temperate climate and is near the northern extreme of its range in Vermont. It was recorded in just 63% of the priority blocks in the Northeast Highlands and 70% of the priority blocks



No. of priority blocks in which recorded

TOTAL 153 (85%)

Possible breeding:	41 (27% of total)
Probable breeding:	62 (40% of total)
Confirmed breeding:	50 (33% of total)

Physiographic regions in which recorded

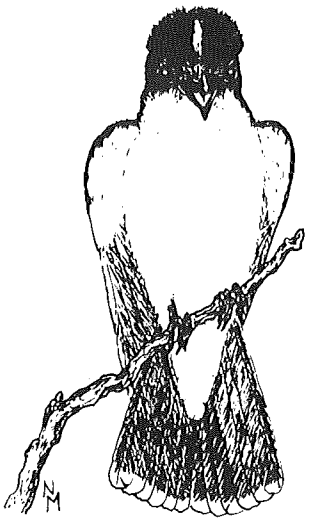
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	30	97	19.6
Green Mountains	38	70	24.8
North Central	18	95	11.8
Northeast Highlands	10	63	6.5
East Central	18	95	11.8
Taconic Mountains	15	94	9.8
Eastern Foothills	24	100	15.7

in the Green Mountains, indicating lower populations in the cooler, often conifer-dominated woodlands of these regions. Although it is widespread, the Great Crested Flycatcher does not occur in large numbers anywhere in the state. The species requires large territories—1.6–3.2 ha (4–8 a) in Maryland (Stewart and Robbins 1958). From 1966 to 1979, the species averaged between 1 and 2.5 per route on U.S. Fish and Wildlife Service Breeding Bird surveys (BBS 1966–79).

WILLIAM J. NORSE
WALTER G. ELLISON

Eastern Kingbird

Tyrannus tyrannus



The Eastern Kingbird is a widespread Nearctic species that ranges over almost all of eastern and central North America. The species winters in northern South America (AOU 1983).

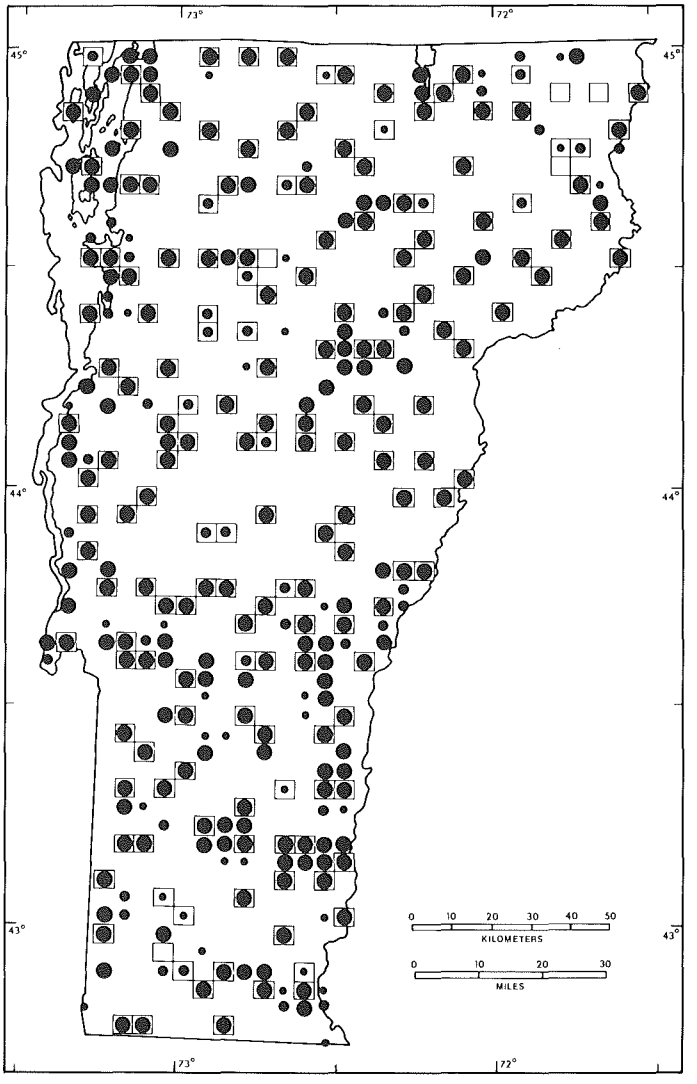
The Eastern Kingbird inhabits all manner of edge habitats, frequently near water (Smith 1966). In Vermont, kingbirds may be found in pastureland, hedgerows on cultivated land, orchards, and the edges of woodlands; on floodplains and lakeshores; in swales and bogs, and around beaver ponds.

The kingbird is a noisy and conspicuous bird. It may often be seen sitting on wires or fence lines along country roads. The Eastern Kingbird is very aggressive toward other birds, particularly large species such as crows and raptors, which it often hounds out of its territory. The kingbird is a skilled flier, seeming to fly on the tips of its wings—an effect created by its rapid, shallow wing beats. Nests are usually placed fairly low and are not as well hidden as those of other songbirds. The species was confirmed in 86% of the priority blocks in which it occurred. Fifty-one percent of breeding confirmations were of active nests. Dependent young accounted for another 16% of confirmations, and parents feeding young led to a further 25% of confirmations.

Most kingbirds arrive in Vermont from their tropical wintering grounds in mid May. The average arrival date at Bennington over 51 years was May 9 (L. H. Ross, Field notes). Nesting commences during the second and third weeks of May. The nest is a rather loose mass of sticks, straws, weed stems, and other material, lined with a well-constructed cup of fine grass, rootlets, and hair. The average height of 14 Vermont nests was 4.9 m (16 ft). Kingbirds tend to build on side forks of small trees; more than half of 65 nests in a Montana study were located well out on side limbs (Davis 1955). More than 50% of 11 Vermont nests were located in apple trees. Kingbirds often will build over water; 29% of 14 Vermont nests were either surrounded by or over water.

The eggs of the Eastern Kingbird are creamy white with red-brown speckling and gray blotching. In Vermont, clutch size ranged from 3 to 5 eggs in 14 clutches, with an average of 3.7 eggs; egg dates as determined from 23 sets ranged from May 19 to July 2. The incubation period lasts about 16 days (Davis 1941). Dates of the 18 records of nests with young for Vermont ranged from June 17 to July 26. Nestlings depart from the nest at 14 to 17 days of age (Morehouse and Brewer 1968). Fledglings may remain dependent on their parents for food for more than a month (Morehouse and Brewer 1968). Dependent young have been reported in Vermont on 12 dates from June 29 to August 4. The species' major southward movement occurs during August. Kingbirds become scarce by early September; the latest departure date is October 5 (W. G. Ellison, pers. observ.). Large concentrations of migrants may be seen in favored locations each autumn; more than 200 have been seen on a given day in August at Dead Creek Wildlife Management Area.

The Eastern Kingbird was recorded in more than 95% of the priority blocks in six of the seven physiographic regions of Vermont. It was recorded in 81% of the priority blocks in the Northeast Highlands, where it was not present in three heavily



No. of priority blocks in which recorded

TOTAL 174 (97%)

Possible breeding:	7 (4% of total)
Probable breeding:	18 (10% of total)
Confirmed breeding:	149 (86% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	18
Green Mountains	52	96	30
North Central	19	100	11
Northeast Highlands	13	81	7
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	14

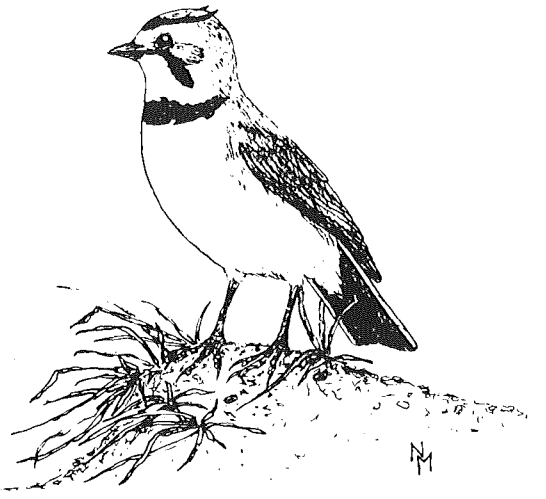
forested blocks. It was also not located in two well-forested blocks of medium elevation in the Green Mountains.

The Eastern Kingbird is a very successful species in Vermont, where it should continue to prosper as it is capable of adapting to a variety of edge habitats. It remains to be seen if inevitable changes in its riparian forest wintering habitat in the Amazon River basin will have a telling effect on the numbers of Eastern Kingbirds breeding in eastern North America (Fitzpatrick 1980).

WALTER G. ELLISON
WILLIAM J. NORSE

Horned Lark

Eremophila alpestris



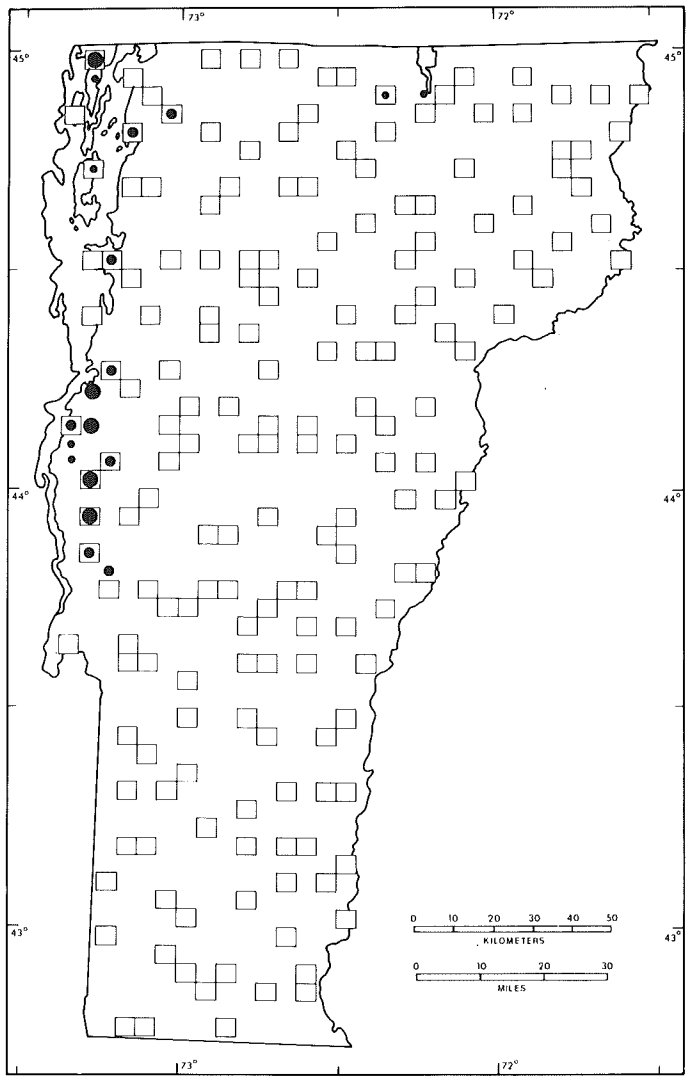
The Horned Lark is the only native North American member of the true larks (Alaudidae) and, like most related Old World species, inhabits open, sparsely vegetated areas. Pickwell (1942) suggested that the major requirement for nesting is bare ground. The Horned Lark's habitat in Vermont includes the cropped grass of airports and athletic fields, harrowed fields, freshly turned sod, and overgrazed pastureland. But because it requires largely unvegetated barrens, overall this species is thinly distributed. These pale brown groundbirds that blend into the landscape, often scurrying behind furrows or simply moving to match the background, were probably overlooked in some priority blocks. Another factor contributing to low confirmation and detection is the species' early breeding schedule. Many pairs have young out of the nest by early May.

Observers can locate these larks most effectively by listening for their weak, high-pitched songs and tinkling flight calls. The nest is a hollow made by the female and lined with grass or other fine, stringlike material, often protected from wind by a tuft of vegetation, a dirt clod, or a rock. A female will normally leave a nest when an intruder is 50–100 m (164–328 ft) away from it; the bird will skim over the field and take up a station where she may eye the intruder. With patience an observer may sometimes wait out her return to the nest. Distraction displays occur when a female is flushed from a nest repeatedly or at close quarters. The young are flightless for a 3- to 4-day period after leaving the nest, which may be the best time for confirming breeding.

Horned Larks occur in Vermont in two well-marked geographic forms: the Arctic-breeding Northern Horned Lark (*E. a. alpestris*), which is a transient and winter visitor, and the paler, partly sedentary Prairie Horned Lark (*E. a. praticola*), which breeds in Vermont, arriving in force to set up territories in mid to late February. Egg dates for 4 nests from Vermont range from April 7 to April 30. Fledglings have been sighted as late as July, indicating that June and July clutches are laid. Three nestling records for Vermont are dated between April 17 and May 6, and dependent young have been reported on seven dates from May 14 to July 25. Eggs number from 2 to 7, but clutches of 3 and 4 are most frequent.

The Horned Lark is a recent colonist in the East. The ancestral distribution of *praticola* probably included much of the eastern Great Plains, east to Wisconsin and Illinois (Hurley and Franks 1976). The Horned Lark's expansion into eastern North America was apparently in response to the appearance of suitable habitat—cropland and pastureland. The species was first noted nesting in New York State in 1875, and was breeding in eastern sectors of that state by the 1880s (Bull 1974). Forbush (1927) indicated that the first breeding known for New England was in Cornwall, Vermont, in June 1889. Subsequent Vermont areas colonized included Ryegate in 1900 (Brock 1907), Rutland and Poultney in 1905 (Ross 1906b), and Bennington in 1906 (L. H. Ross, Field notes).

Early in the twentieth century the Horned Lark was distributed over much of Vermont. The decline of agriculture and the accompanying reforestation of Vermont has severely contracted the species' breeding distribution. The Horned Lark is presently



No. of priority blocks in which recorded

TOTAL 12 (7%)

Possible breeding:	2 (17% of total)
Probable breeding:	7 (58% of total)
Confirmed breeding:	3 (25% of total)

Physiographic regions in which recorded

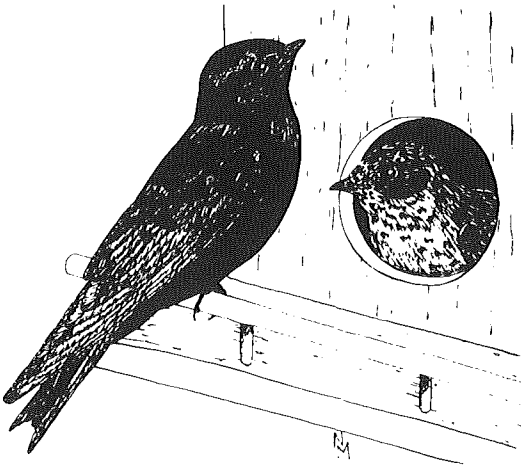
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	11	35	92
Green Mountains	1	2	8
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

largely confined to the Champlain Lowlands. Almost all the priority blocks in which the species occurs are within the Champlain Lowlands, which contains large areas devoted to agriculture. The single priority block in which the species occurs outside of this region is in northern Orleans County, where there are also extensive dairy farms. The topography of the inhabited blocks indicates a preference for flat areas. The species' distribution also shows a striking correlation with the major drainage systems of the southern Champlain Valley, such as the Lemon Fair and Dead Creek.

WALTER G. ELLISON

Purple Martin

Progne subis



The Purple Martin is a colonial, cavity-nesting bird that has benefited from human activities. Before European settlement, Native Americans often provided the species with nest cavities in the form of hollowed-out gourds (Bent 1942). Two major factors that influence the species' habitat selection are preexisting cavities for nesting and extensive open areas for foraging. At this time it is likely that all Purple Martins in Vermont nest in specially constructed multiple-roomed martin houses.

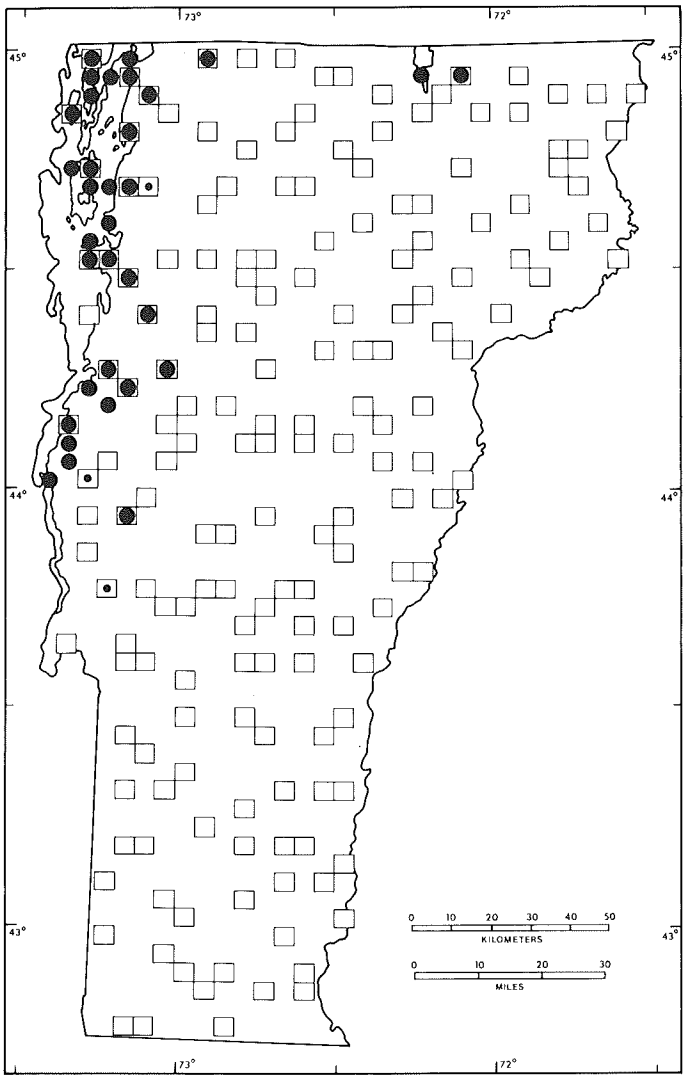
The pleasant chirruping voice of the Purple Martin is often an observer's first indication of its presence. The species may also be seen foraging aloft, or perched on wires and snags in open areas. Once martins are located, it is usually a simple matter to find an occupied martin house in the vicinity. For this reason, martins were confirmed as nesters in 86% of the priority blocks in which they occurred, despite their limited Vermont distribution. Eighty-eight percent of all confirmations related to the location of an active nest.

After wintering in South America, Purple Martins arrive in Vermont during mid April; the mean arrival time in Rutland from 1904 to 1935 was April 15 (dates ranged from April 8 to May 8) (Kirk, Field notes). Rooms in martin houses are claimed and pair bonds established during the first week after arrival. The base of the nest is built during the next 2 to 4 weeks (Finlay 1971). The nest is made of sticks, grass, weed stems, and mud, and lined with fresh green leaves.

The eggs are laid from 1 to 2 months after martins have returned. Purple Martin eggs are dull white and number from 3 to 8 per clutch; the average of 11 Vermont sets was 4.5. Fourteen Vermont egg dates range from June 11 to July 9. The incubation period lasts from 15 to 18 days (Allen and Nice 1952; Finlay 1971). Nine Vermont nestling dates range from July 2 to August 1. The nestling period is quite long, lasting about 28 days (Allen and Nice 1952). There are no Vermont records of dependent young, but New York State records range from late July to mid August (Bull 1974). Much of the species' autumn migration occurs in August. Purple Martins are scarce in Vermont by September; an extreme date is September 18.

The Purple Martin was apparently much more widespread and numerous in Vermont during the nineteenth century (Cutting 1884). By the turn of the century the species had declined considerably (Perkins and Howe 1901). In June of 1903 a prolonged cold and rainy period took a heavy toll of adults and nestlings, eliminating the species from many areas (Forbush 1929). Horton (1908) stated that there were "several" colonies in Brattleboro around 1880 that had dwindled to one by 1903; no martins bred at Brattleboro after 1903 despite reintroduction attempts. A survey by Horton (1910) located colonies in seven communities in the Champlain Lowlands, and one colony in Lyndonville.

The present distribution of the Purple Martin in Vermont is almost entirely restricted to the Champlain Lowlands. Ninety percent of the priority block records of the species were from this region. Two records in the North Central region, including one for a priority block, reflect a small population found in the dairylands near Lake Memphremagog. Reasons for this restricted distribution remain speculative; most im-



No. of priority blocks in which recorded

TOTAL 21 (12%)

Possible breeding:	3 (14% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	18 (86% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	19	61	90
Green Mountains	0	0	0
North Central	1	5	5
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	1	6	5
Eastern Foothills	0	0	0

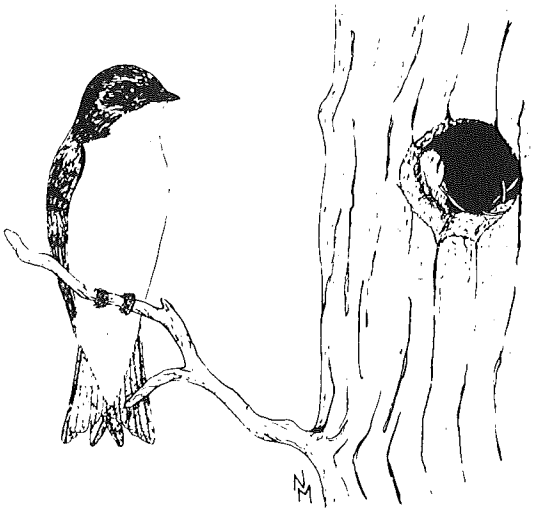
portant among these may be climate. The Champlain Lowlands region is the warmest and driest in the state and lacks some of the climatic extremes in other parts of the state. The reforestation of Vermont, which started during the nineteenth century, may have reduced the available open land needed by the species for foraging. Also pernicious, though manageable, are the effects of European Starlings and House Sparrows competing for martin houses (Jackson and Tate 1974; Brown 1981).

If the Purple Martin is to be retained in Vermont, present colonies should not be allowed to deteriorate. The most controllable detrimental factor, competition from introduced species, can be manipulated by taking martin boxes down in winter or blocking the compartments until the martins' return in spring. It is difficult to eliminate House Sparrows and starlings, however. An active nest box placement scheme in the Champlain Lowlands and the Newport area might encourage the martin population to expand.

WALTER G. ELLISON

Tree Swallow

Tachycineta bicolor



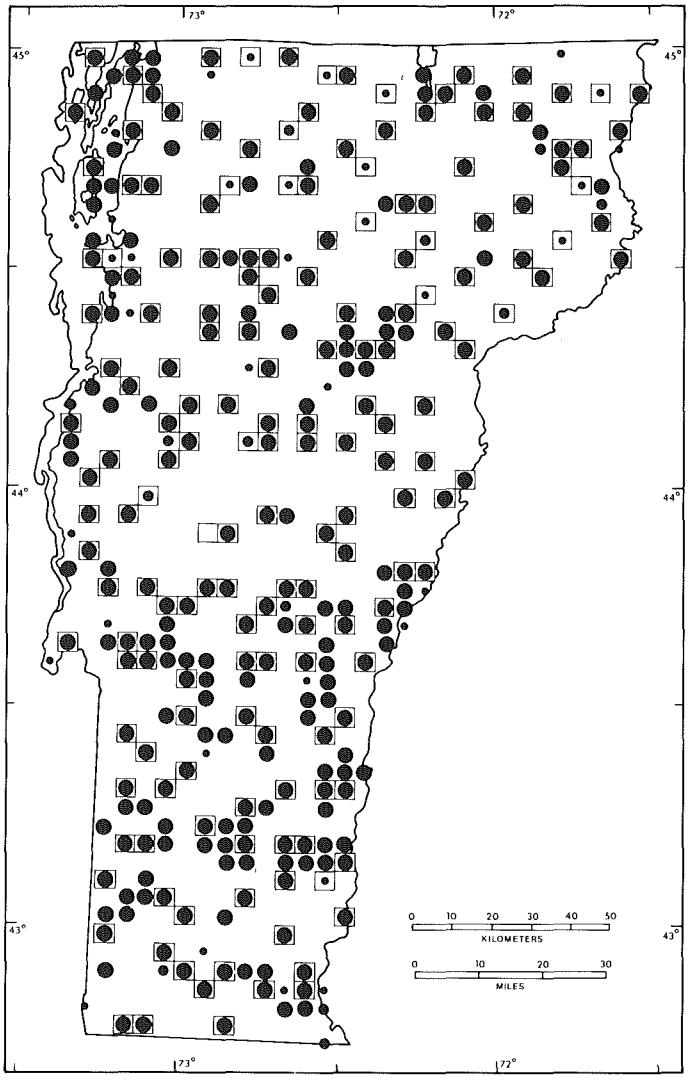
Tree Swallows are among the most familiar Vermont birds. Their breeding habitat is usually, but not always, located near water; it includes farmland, wet meadows, marshes, and brooks, as well as villages near meadows, streams, or ponds. Nests are often placed in dead snags that project above the water of a lake or pond. The Tree Swallow's affinity for water habitats is related to the abundant insect life in such areas. The other major requirement for nesting habitat is the presence of cavities suitable for nest sites—primarily natural cavities, old woodpecker holes, and nesting boxes. Although highly territorial at the nest site, Tree Swallows sometimes nest in close proximity if suitable nest boxes or trees with old woodpecker holes are present. Single pairs will sometimes take up residence at remote beaver ponds.

Swallows are active birds and are found in open habitats where observation is not difficult. The Tree Swallow, widely distributed in Vermont, was found in 178 of the 179 Atlas Project priority blocks. Since their nests are often located near foraging areas, confirmation was fairly easy. The location of active nests, indicated by the Atlas Project codes ON (entering nest box), NE (nest with eggs), and NY (nest with young), represented 71% of all confirmations.

The Tree Swallow is the hardiest of Vermont's six species of swallows, moving north from its southern U.S. coastal wintering areas to its breeding grounds in Vermont in early April; it breeds in the northern and central United States and much of Canada. Occasionally early birds, perhaps vanguard scouts (J. KixMiller, pers. comm.), arrive in Vermont in late March.

Courtship by the Tree Swallow centers around the nest site. The male frequently gives a chirruping song and approaches the female with a hovering or fluttering flight. Both members of a pair also perform a bowing display at or near the nest. Swallows actively defend their nests from potential predators by circling over and diving at intruders while uttering a sharp, clicking call (Stokes 1979). The nest, built by the female, is a collection of dry grasses or pine needles lined with feathers, 90% of which are white. Tree Swallows are sometimes observed flying low over a domestic duck and plucking a feather from its back (M. Metcalf, pers. observ.). Several pairs nesting near each other may compete for feathers. Nest building may take as long as a month, but average construction time is 2 to 3 weeks (Stokes 1979).

Egg laying usually begins as soon as the nest is completed. Clutch size usually ranges from 4 to 6 eggs (Bent 1942); the average of 186 Vermont clutches was 5.5 eggs. Stokes (1979) gave incubation (done by the female only) as 14 to 15 days. J. KixMiller (pers. comm.) has documented incubation at 12 to 14 days, and has noted that the male also sits on the eggs for brief periods. Egg dates for 213 Vermont nests range from April 25 to June 29. The young have a very short fledgling phase; they are strong fliers as soon as they leave the nest 16 to 24 days after hatching (Bent 1942). Nests with young have been recorded in Vermont from June 3 to August 1, and fledglings have been reported from June 19 to August 1. Tree Swallows have one brood each breeding season; later nesting dates probably represent renestings that occurred after failed first attempts, or delayed nesting by late-arriving birds.



No. of priority blocks in which recorded

TOTAL 178 (99%)

Possible breeding:	13 (7% of total)
Probable breeding:	5 (3% of total)
Confirmed breeding:	160 (90% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17
Green Mountains	53	98	30
North Central	19	100	11
Northeast Highlands	16	100	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	13

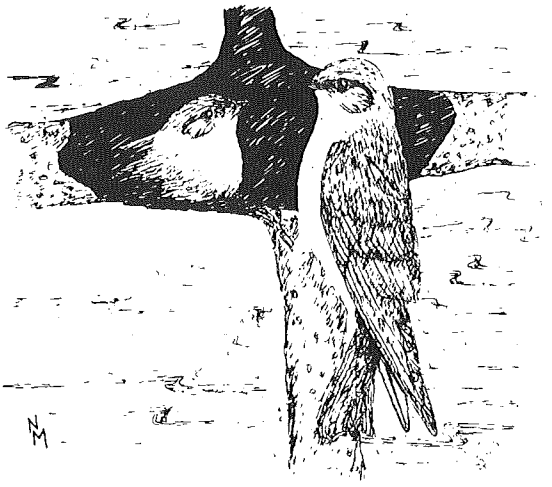
From late July to early September Tree Swallows gather by the hundreds to commence their fall migration; adults precede juveniles. In Vermont, the largest concentrations are found in the Champlain Lowlands, particularly around the marshes of Dead Creek Wildlife Management Area, where counts of up to 5,000 swallows have been reported (RVB, Fall 1982). During migration Tree Swallows often gather near wetlands, where they may roost by the thousands in cattails, reeds, or bushes over water.

The Tree Swallow has apparently been fairly common in Vermont since early human settlement. Its distribution today includes nearly all of Vermont, with the exception of the highest mountain elevations, where there are no beaver ponds. Tree Swallows often compete successfully for nesting boxes intended for Purple Martins and Eastern Bluebirds, a situation best remedied by placing additional boxes nearby, since the swallows will allow bluebirds to occupy other houses within their territory. As Vermont loses habitat to development, Tree Swallows are more fortunate than some species, having adapted to the man-altered environment and to using nest boxes.

MARION F. METCALF
NANCY L. MARTIN

Northern Rough-winged Swallow

Stelgidopteryx serripennis



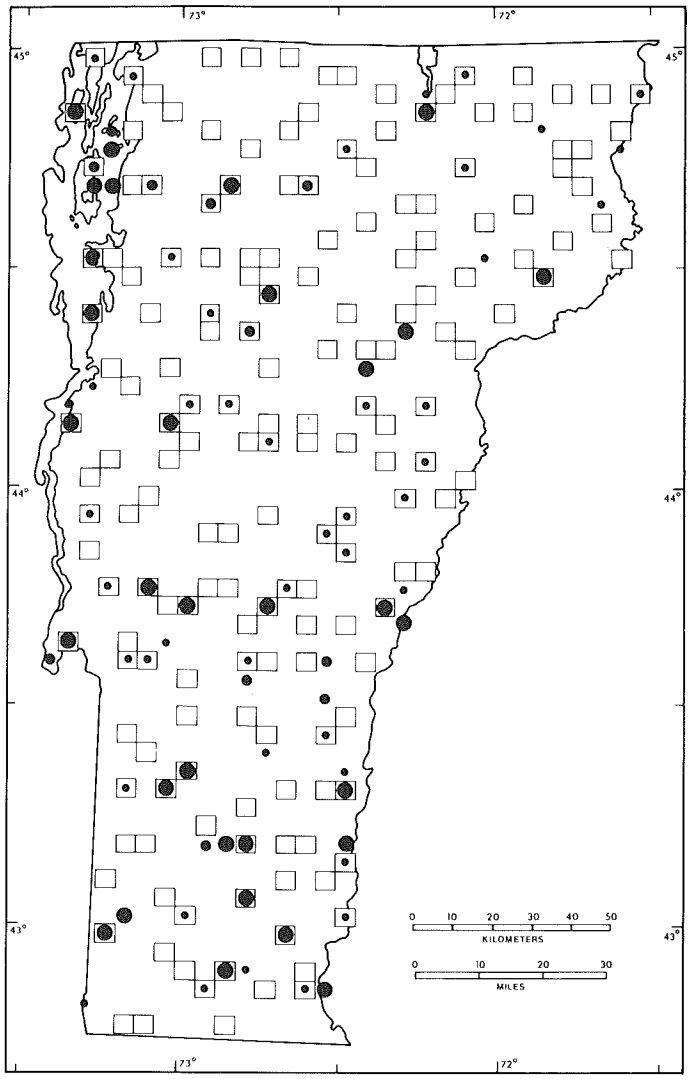
In the East the Northern Rough-winged Swallow breeds from Florida and the Gulf Coast to just north of the U.S.–Canadian border. Vermont, therefore, lies near the northern limit of its eastern range. In winter a few Rough-wingeds remain in Florida, but most migrate to Central America (AOU 1983). The species has been moving northeastward in recent years (Bull 1974). Formerly a rare nester in Vermont, the Rough-winged Swallow has now been confirmed nesting as far north as the Canadian border.

Blake (GMAS records, F. G. Blake), who provided the first reference to the nesting of this species in Vermont, reported that a pair nested along the Connecticut River at Norwich in 1905 and 1906. A specimen was taken during the nesting season in Rutland County in 1906 (G. H. Ross 1906a). L. H. Ross (1914) in his review of birds of the Bennington area reported that from one to three pairs of Rough-wingeds were seen each year. Potter (1944) documented nesting in Vergennes, Hubbardton, and Wallingford, and believed that the species was extending its range in western Vermont. W. P. Smith (GMAS records) stated in 1946 that Rough-wingeds were extending their range north toward Wells River. Spear (1976) referred to the Rough-winged as "the least known and most uncommon of Vermont swallows," although he lists the species as a "regular breeder."

Northern Rough-winged Swallows can usually be located by checking potential nest sites along rivers with steep banks and around bridges and dams. The species has benefited by man's activities and makes use of artificial structures for nesting. Not typically a colonial nester, it may nest singly or in loose colonial groups of up to a dozen pairs. Northern Rough-winged Swallows usually nest near water—under bridges, in culverts, pipes, and holes in retaining walls, and in burrows in steep banks. Rough-wingeds are known to nest in burrows dug by other species (DeGraaf et al. 1980).

Recent Vermont nesting information includes reports of nest building on May 28 at Barton River; nests with eggs in burrows in the banks of the West River at South Londonderry, May 15 to June 20; and an adult carrying a fecal sac in Rutland County, June 24 to 25 (Atlas Project data). Clutch size is typically 6 to 7 eggs, and the incubation period is 15–16 days (Harrison 1978). There are four reports of fledglings out of the nest from June 30 to July 20; on July 20 in South Londonderry young were being fed while perched on a utility wire; they departed soon after. Observers discovered a nesting site at Ball Mountain Dam in Jamaica; one or two pairs were thought to be nesting in the brickwork of the dam (Atlas Project data).

The Northern Rough-winged Swallow is not as easy to confirm as other swallows, but most observers who did confirm it found the nest site and saw the adults entering the burrow. These swallows were confirmed in all seven physiographic regions, but were scarce in the Northeast Highlands section. In conjunction with this swallow's tendency to spread north up the major river valleys, confirmations were concentrated in the Champlain Lowlands, Connecticut River valley, and Valley of Vermont. Several confirmations came from the southern Green Mountains.



No. of priority blocks in which recorded

TOTAL 58 (32%)

Possible breeding:	31 (53% of total)
Probable breeding:	5 (9% of total)
Confirmed breeding:	22 (38% of total)

Physiographic regions in which recorded

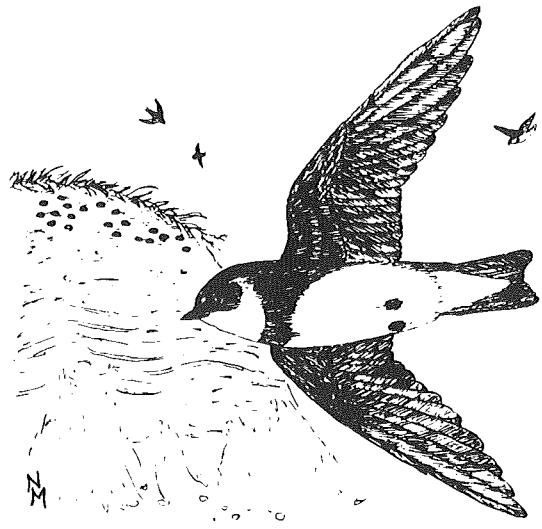
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	13	42	22.5
Green Mountains	18	33	31.0
North Central	4	21	7.0
Northeast Highlands	2	13	3.5
East Central	7	37	12.0
Taconic Mountains	7	44	12.0
Eastern Foothills	7	29	12.0

The Northern Rough-winged Swallow arrives in Vermont in about the third week of April; there is an early date of April 12. When the young can fly well, Rough-wingeds begin their migration. They are generally gone from Vermont by the second week in September.

WILLIAM J. NORSE

Bank Swallow

Riparia riparia



The Bank Swallow (known as the Sand Martin in Great Britain) is a widely distributed Holarctic species, breeding in temperate parts of the Northern Hemisphere and wintering in the tropics. In North America, the species breeds from Alaska, northwestern Canada, central Quebec, and southern Labrador, south to southern California, southern Texas, Tennessee, and Virginia (AOU 1983). The Bank Swallow winters in northern South America.

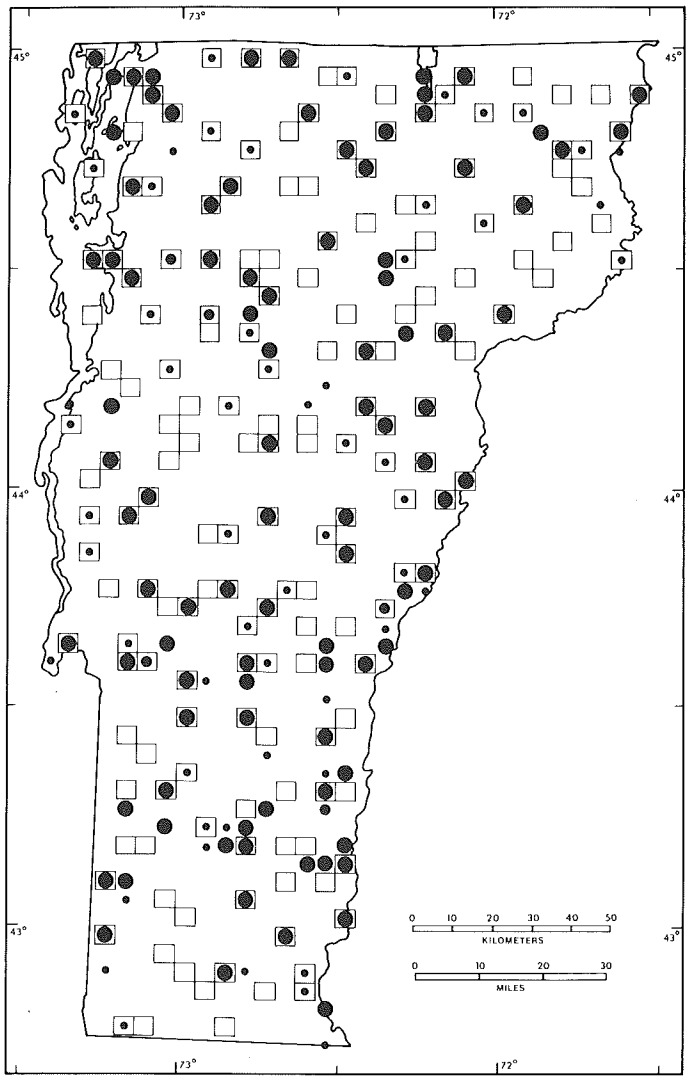
Bank Swallows are generally found in open areas, most often near water. These birds nest exclusively in vertical banks of sand, clay, and sandy loam. Earthen banks seldom remain sufficiently steep for nesting unless their bases are being constantly cut away by water or human activity. Sites used include riparian cut-banks, sand and gravel pits, and such transient sites as mounds of stockpiled sand for winter use at town highway garages. The Bank Swallow is highly colonial; larger colonies may contain more than 100 pairs, and most colonies contain between 30 and 50 pairs. Estimates of colony size based on burrow counts are usually inaccurate because not all burrows are in use in a colony at a given time. The species occupies and abandons colonies regularly because of the transient nature of nesting sites.

The Bank Swallow is a conspicuous aerial forager with a distinctive husky voice. Once Bank Swallows are known to be in an area, a careful check of banks and borrow pits may lead to breeding confirmations. The species tends to forage several kilometers away from colonies and may have been recorded as possible breeders in some atlas blocks where their presence was for feeding rather than breeding. In more than 80% of all breeding confirmations active nests were located.

At many colony sites in Vermont Bank Swallows do not appear until May. In most years a few arrive in late April; the range of arrival dates over the last decade runs from April 12 to May 2 (RVB, Spring 1973–83). Breeding behavior starts within a week of arrival. Bank Swallows dig their own burrows, and often reuse burrows from previous years. Burrows are 38.1–119.4 cm (15–47 in) deep (Harrison 1975); tunnel depth varies with soil compaction and texture (Petersen 1955). The nest is a pile of grasses and rootlets to which a lining of feathers is added during incubation.

Bank Swallow eggs are pure white, and number from 2 to 6 per clutch, with an average of about 5 (Petersen 1955). Seven dates for eggs in Vermont range from May 18 to July 10. The incubation period lasts about 15 days (Petersen 1955). Six nestling dates for Vermont range from June 16 to July 6, and egg dates indicate that earlier and later dates are probable. The nestling period is long, averaging 22 to 23 days (Petersen 1955; Turner and Bryant 1979). Two reported dates for dependent young for Vermont are June 28 and July 20. The young remain dependent on their parents for food for about 5 days after fledging (Turner and Bryant 1979). The autumn migration begins in mid to late July and peaks in August. Bank Swallows are scarce in Vermont by September and gone by midmonth (RVB, Fall 1973–83).

The Bank Swallow's distribution is restricted by the availability of suitable nest sites. The species was recorded in 60% of the priority blocks, and the distribution is



No. of priority blocks in which recorded

TOTAL 108 (60%)

Possible breeding:	38 (35% of total)
Probable breeding:	4 (4% of total)
Confirmed breeding:	66 (61% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	26	84	24.0
Green Mountains	29	54	27.0
North Central	11	58	10.1
Northeast Highlands	7	44	6.5
East Central	14	74	13.0
Taconic Mountains	9	56	8.3
Eastern Foothills	12	50	11.1

noticeably clumped and patchy even when the clumping of priority blocks is taken into account. In the East Central region and Champlain Lowlands the species occurred in 74% and 84% of the priority blocks, respectively. The latter area contains more available habitat and more suitable soil for colonies than do other regions. The distribution correlates somewhat with the valleys of such rivers as the Connecticut, Waits, and West. There is also a marked north-south pattern of occurrence in the Valley of Vermont and along the eastern edge of the main ridge of the Green Mountains.

WILLIAM J. NORSE
WALTER G. ELLISON

Cliff Swallow

Hirundo pyrrhonota

Breeding by the Cliff Swallow is limited to areas that offer open areas for foraging, vertical surfaces with an overhang for nest sites, and mud for nesting material (Emlen 1954). In Vermont, the species is most frequently encountered in open farmlands near large barns or other buildings suitable for nest sites. The species has been found nesting in forested areas, such as the base lodge at Jay Peak, where adjacent ski trails presumably provide the prerequisite open foraging areas. Although the eaves of buildings provide by far the most common sites in Vermont, the species has been recorded nesting under highway bridges, on one-story shopping malls, on houses, and inside sheds. Originally the species nested on cliffs, but there has been no reference to cliff nesting in Vermont since Cutting (1884).

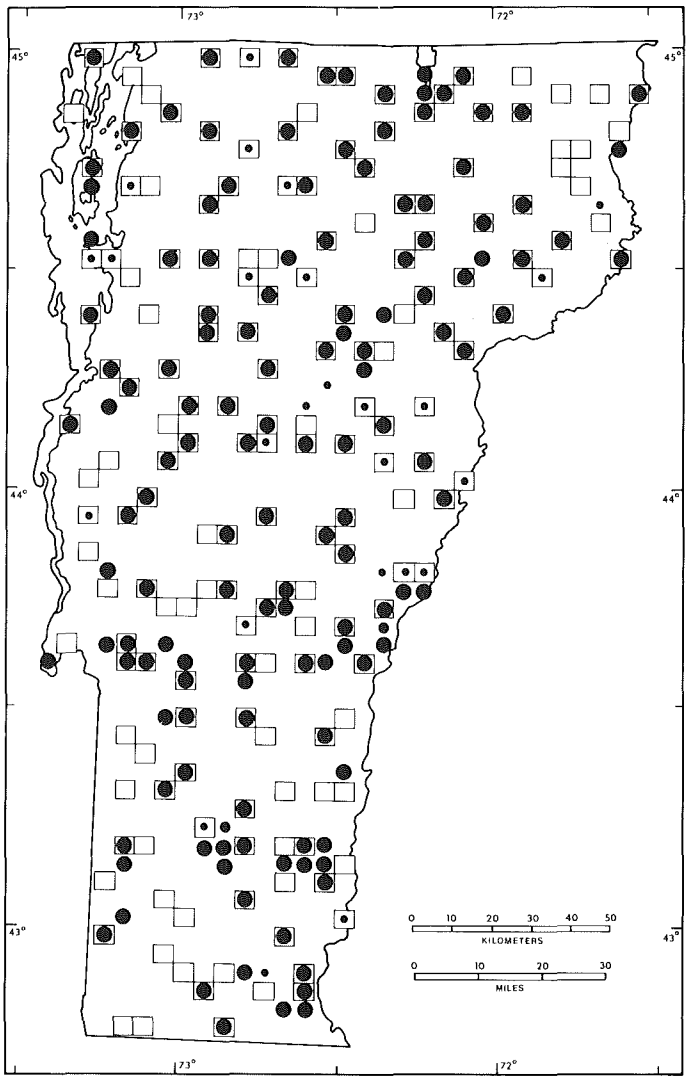
Cliff Swallows are frequently conspicuous as they hawk insects over hayfields and bodies of water. Groups of these swallows gathering mud, all with wings held high over their backs, also call attention to the species. Once an observer has located the swallows, it is usually an easy matter to find the nests under the eaves of nearby buildings. Such ease is reflected in the high number of confirmations of nesting recorded by the Atlas Project. In more than 71% of breeding confirmations, active nests were located.

The Cliff Swallow arrives in Vermont in late April; the average arrival date between 1973 and 1983 was April 27 (RVB, Spring 1973–83). Pair formation begins almost immediately upon return to the colony site and takes place at the nest site (Emlen 1954). Cliff Swallows may reuse old nests or construct new ones. Nest building or repair has been noted in Vermont as early as May 2.

The eggs are white with brown spotting (Gross 1942); clutch size ranges from 3 to 6 eggs, with most containing 3 or 4 eggs (Grant and Quay 1977). Nine dates for eggs in Vermont range from May 23 to July 30. The incubation period lasts about 15 days (Samuel 1971). Twenty-seven dates for nestlings in Vermont range from June 11 to August 12. The nestling period lasts about 24 days (Samuel 1971). There are only two reported dates for dependent young for Vermont—July 16 and August 8; egg and nestling dates indicate that dates for dependent young should range from the first week of July to the fourth week of August. The autumn migration peaks in August. A few Cliff Swallows are seen during September each year; an extreme date is September 28.

During the eighteenth century, the Cliff Swallow was apparently so local in the East that no ornithologist reported it; first reports were in the early nineteenth century. Some of the earliest records of the Cliff Swallow in eastern North America were from Vermont; the species was reported from Randolph in 1817, Burlington in 1836, and Coventry in 1837 (Gross 1942). It appears likely that the arrival of European settlers opened up an array of new nesting sites for the species during the nineteenth century, thereby allowing a local species to increase to a relatively common one.

Although the species is considered scarce and local over much of its eastern range (AOU 1983), this swallow appears to be doing relatively well in upstate New York (Bull 1974) and in Vermont. Cliff Swallows were recorded in 68% of the Vermont priority blocks, and records were from all physiographic regions. The 68% of occurrence



No. of priority blocks in which recorded

TOTAL 122 (68%)

Possible breeding:	20 (16% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	102 (84% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	21	68	17.2
Green Mountains	37	68	30.3
North Central	16	84	13.0
Northeast Highlands	7	44	6.0
East Central	17	89	14.0
Taconic Mountains	9	56	7.3
Eastern Foothills	15	63	12.2

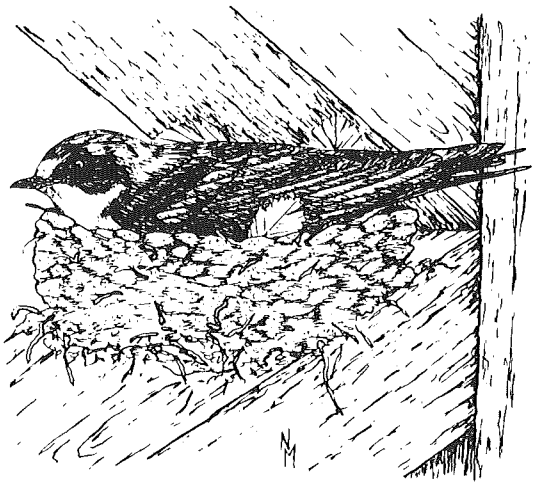
in the apparently suitable Champlain Lowlands may reflect high amounts of clay in the soil. Kilgore and Knudsen (1977) found that the soil types most preferred by Cliff Swallows range from sandy loam to loam with low quantities of clay. Cliff Swallows are markedly absent from areas of high elevation and heavy forest cover in Vermont, such as portions of the Northeast Highlands and the southern Green Mountains.

Factors that may cause declines in the Cliff Swallow population include competition with House Sparrows, construction and painting of buildings during the breeding season, and deliberate destruction of nests by homeowners and farmers who view the birds as nuisances. New coats of paint may prevent nests from adhering to walls (Gross 1942). Many modern barns have eaves lower than the 2.4 m (8 ft) minimum height for nesting cited by Emlen (1954). Although all of these factors have caused disruption of nesting by Cliff Swallows in Vermont, the species continues to be fairly common, if local, in the state.

WILLIAM J. NORSE
WALTER G. ELLISON

Barn Swallow

Hirundo rustica



The Barn Swallow, like the Bank Swallow, is a widely distributed Holarctic species whose Western Hemisphere population winters in South America. The eastern North American population breeds from Labrador and Ontario south to the Gulf Coast. Thompson (1853) wrote that Barn Swallows were widely distributed in Vermont, and that they were "better known than either of the other species." Perkins and Howe (1901) stated that they were common summer residents. Many people who are not otherwise interested in birds eagerly await the first Barn Swallow of the spring.

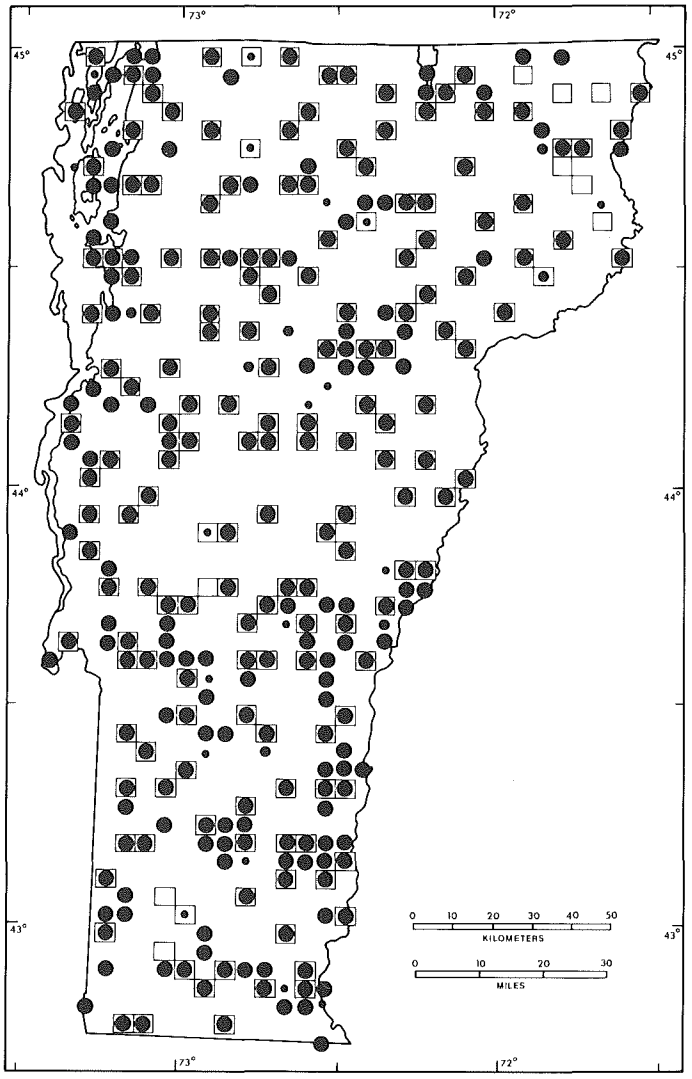
Barn Swallows are birds of the open country—farms, fields, marshes, and lakes—with nearby habitation. Their original nesting sites, before Europeans settled this continent, were located in caves, in crevices, or beneath overhangs on rocky cliffs (Bent 1942). Such sites are still used, but the species has adapted to using man-made structures for nesting. DeGraaf et al. (1980) concluded that such man-made structures as barns now represent a critical habitat requirement. Barn Swallows nest singly or in colonies. In New York, Snapp (1976) determined that colony size increased in proportion to the size of the barn or other structure and/or the number of entry sites.

Barn Swallows usually arrive in Vermont from mid to late April (April 10 is an early date), though in some cold, wet springs they may not appear until the first of May. Like many birds, they arrive first in the major valleys (Connecticut River valley and southern Lake Champlain valley) where plants and insects emerge somewhat earlier than in other sections of Vermont. In late July, after the breeding season, Barn Swallows begin to collect in large numbers on wires and trees and in marshes as they prepare to depart for their wintering grounds. They are on the move during August and early September; occasionally individuals may be seen later. Hawk watchers see them moving in groups down the ridges.

Because the Barn Swallow nests most frequently inside buildings, it is one of the easiest breeding birds to confirm; most Atlas Project workers found nests with young. This species was confirmed nesting in all seven physiographic regions; the few areas where it was not found in the Northeast Highlands and the southern Green Mountains were probably in heavy woods at high elevations.

The nest, built of mud bonded with grass and lined with soft grasses and feathers, is plastered against a vertical or horizontal surface; it may be placed under bridges or in barns, sheds, or other old buildings that have openings large enough to permit the swallows to enter and leave. The clutch of 4 to 5 white eggs, variably marked with reddish brown spots, is incubated 16 to 23 days by both parents (Harrison 1975). Young leave the nest at 18 to 23 days, and remain with their parents for 11 days after leaving the nest (Terres 1980). The parents usually raise a second brood. Vermont nesting information includes 8 reports of birds seen building their nests from May 8 to June 19; 59 reports of nests with eggs from May 20 to August 3; 86 reports of nests with young from June 1 to August 27; and 33 reports of fledglings from June 25 to August 25.

The Barn Swallow's calls are described as "a series of energetic, bubbly, twittering notes at different pitches; liquid, distinctive, and not melodious"; and as "a soft 'wit' or



No. of priority blocks in which recorded

TOTAL 170 (95%)

Possible breeding:	5 (3.0% of total)
Probable breeding:	1 (0.6% of total)
Confirmed breeding:	164 (96.4% of total)

Physiographic regions in which recorded

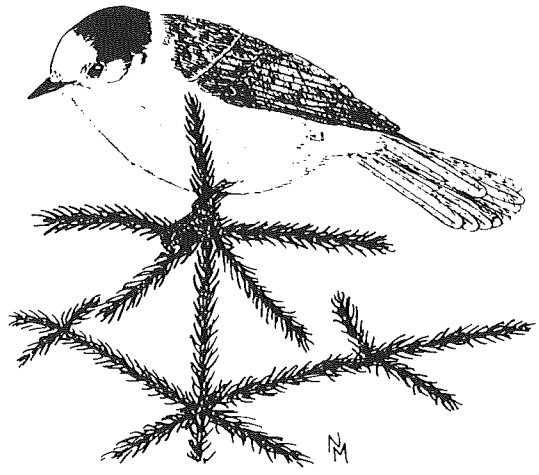
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	18.2
Green Mountains	51	94	30.0
North Central	19	100	11.2
Northeast Highlands	10	63	6.0
East Central	19	100	11.2
Taconic Mountains	16	100	9.4
Eastern Foothills	24	100	14.0

'kwit kwit'" (Pough 1946). These birds are often seen skimming low over lakes and other waterways and over cultivated fields in pursuit of flying insects. Like other birds that feed on flying insects, Barn Swallows are probably vulnerable to unseasonably cold weather in the spring, and some may starve during prolonged cold spells (although this has not been documented).

WILLIAM J. NORSE

Gray Jay

Perisoreus canadensis



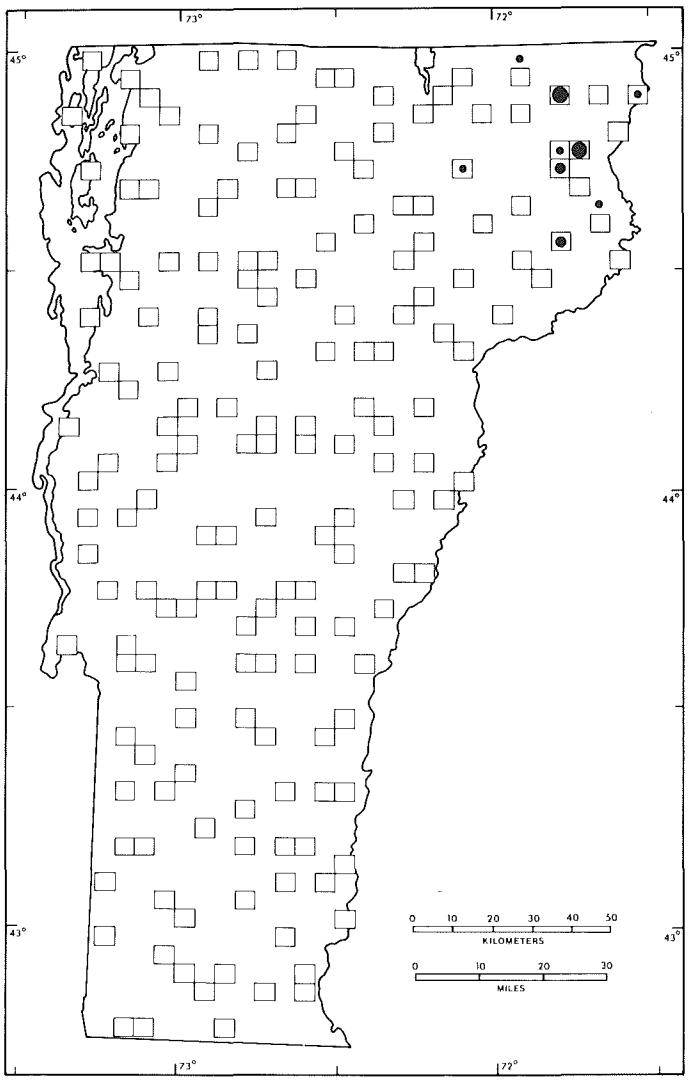
The Gray Jay is something of a paradox. Though primarily an inhabitant of northern conifer forests and surviving poorly near human settlements, it is at the same time extraordinarily curious and will behave boldly toward humans who penetrate its boreal habitat. Its soft plumage, short bill, and silent, gliding flight are unjay-like characteristics. The cool, coniferous forests of the Northeast Highlands and a small section of the North Central region constitute its very restricted range in Vermont. These two areas are currently being extensively clear-cut; consequently, Vermont's small population of resident Gray Jays is nominated for Species of Special Concern status in the state.

The Gray Jay's eastern range dips from Canada down to northern New York State and northern New England. Historically it has been recorded as a rare and limited breeder in the northern section of Vermont (Perkins and Howe 1901; Allen 1909; Spear 1976). However, breeding notes on the species did not exist until 1975, when 2 adults were seen feeding 2 to 3 fledged young on June 28 in Ferdinand (G. F. Oatman, pers. observ.). Only three other breeding confirmations exist for Vermont, all from Ferdinand: on June 13, 1976, 2 adults were seen feeding several fledglings (ASR, G. F. Oatman and W. Scott); on June 12 and June 29, 1978, young were seen being fed near Moose Bog (ASR, C. Schultz); and on March 31, 1981, adults were observed working on a nearly completed nest at Moose Bog (ASR, C. Schultz and D. Cargill). The Island Pond Christmas Bird Count, which covers a large part of the species' Vermont range, provides an index to its population. In the 10 years of the count from 1974 to 1983, the following Gray Jay counts were made: 6, 6, 3, 10, 11, 7, 9, 7, 27, and 4 (CBC 1974–83).

Gray Jays usually winter in or near their breeding territories, though individuals may wander southward during some winters, and large irruptive flights are known to occur (Bent 1946). There are infrequent winter reports from most sections of Vermont.

Few North American birds have received such a variety of colorful nicknames as the Gray Jay; many of them point to the jay's fondness for scavenging camp scraps: Camp Robber, Venison Bird, Meat Bird, Moose Bird, Canada Jay, Whiskey John, Whiskey Jack. The latter two do not reflect its drinking tastes but, rather, are a corruption of its Algonquin and Ojibwa Indian names, Whiska-tjon and Wiskejak (Bent 1946). As omnivores, Gray Jays will take almost anything that seems edible. Insects seem to constitute their principal food in summer; this diet is supplemented by small mammals and the eggs and young of other birds (Ouellet 1970; Goodwin 1976). Later in the season berries and seeds are taken, both from the ground and from trees. These birds will also carry off such inedibles as matches, pencils, and plug tobacco (Terres 1980).

Gray Jays have the largest salivary glands of any passerine bird (Bock 1961); apparently this is an adaptation to facilitate food storage. Food to be hidden is formed into a bolus, coated and permeated with sticky saliva so that it adheres better to conifer needles, the forks of branches, crevices or holes, or old squirrel nests (Goodwin 1976). The jay hides a great deal of food when it is plentiful. This habit may partly account for



No. of priority blocks in which recorded

TOTAL 7 (4%)

Possible breeding:	3 (43.0% of total)
Probable breeding:	2 (28.5% of total)
Confirmed breeding:	2 (28.5% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	1	5	14
Northeast Highlands	6	38	86
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

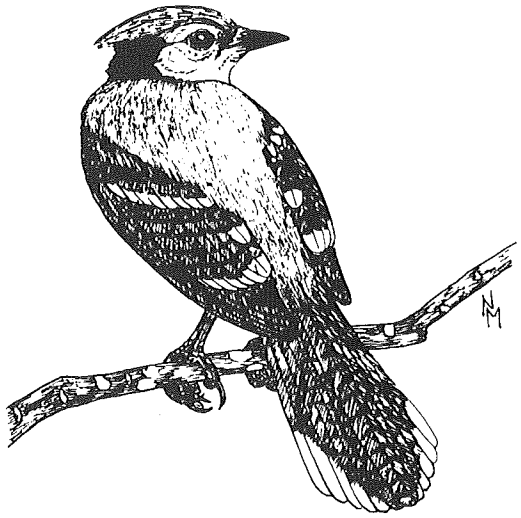
its ability to sustain young in early spring before vegetable and animal life are abundant. Nesting normally begins in February and March (Goodwin 1976). Gray Jays become very quiet and retiring during the nesting period.

The fairly bulky nest is placed 1–9 m (4–30 ft)—usually 2–5 m (6–15 ft)—up on a horizontal branch or upright crotch. It is 15–25 cm (6–10 in) in diameter, constructed of twigs, bark, leaves, grass, or moss, and lined substantially with softer materials. Two to 5 (usually 3 to 4) grayish white eggs, spotted or speckled with brown, are laid; the female incubates for 16 to 18 days (Bent 1946; Goodwin 1976). Both parents provide partly digested food for the young (Goodwin 1976). Young are fledged at about 15 days of age (Bent 1946).

G. FRANK OATMAN

Blue Jay

Cyanocitta cristata



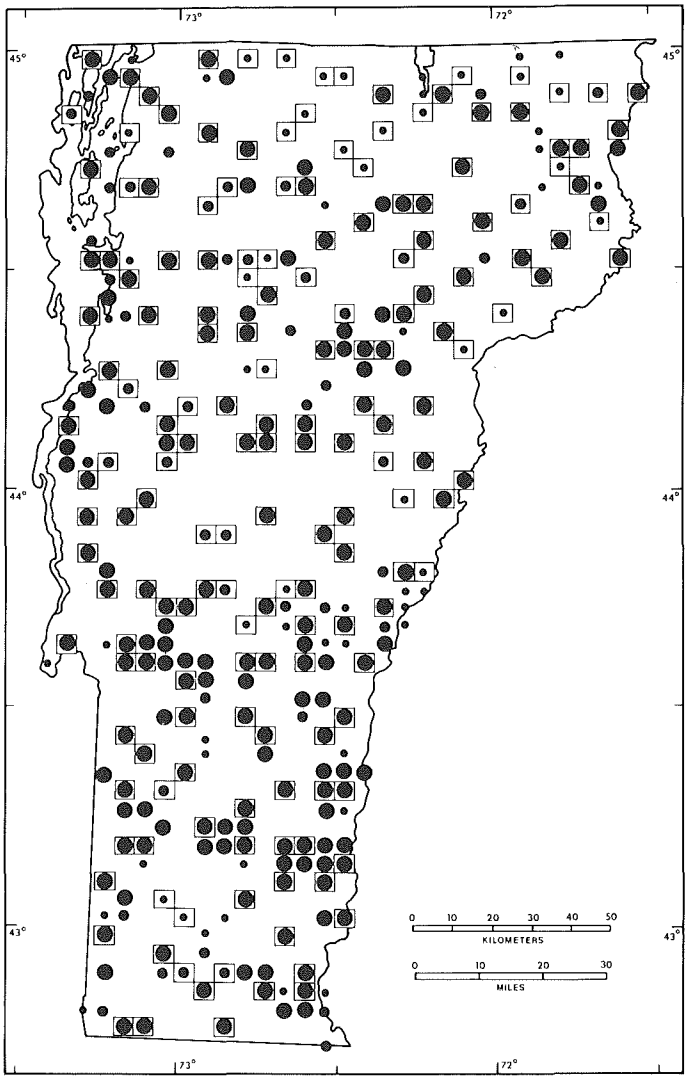
The Blue Jay is an abundant, eastern Nearctic species that is expanding westward. It now occurs regularly as far west as Colorado, where it has been found to hybridize with the Steller's Jay. It is one of the most common, conspicuous, and well-known birds in the Northeast and has certainly benefited from the post-World War II bird-feeder explosion. Although inhabiting both deciduous and coniferous woods, it is quite tolerant of humans and will nest in towns and suburbs. It is still, however, essentially a woodland bird, and is most abundant in oak and beech forests.

Although an opportunistic omnivore, the Blue Jay's diet is three-quarters vegetarian: acorns, beech nuts, and corn are its staple food. In the summer its diet becomes mostly insectivorous, and at all times of the year it is a sharp-eyed scavenger. The Blue Jay's habit of taking food and storing it in a crevice or other hiding place makes it an unwelcome visitor at some feeding stations.

The Blue Jay breeds in all regions of Vermont. It is not, however, a sedentary resident species. Blue Jays are highly migratory, and large numbers of them may be seen in September and October migrating along mountain ridges. Whether all locally breeding birds participate in these southward movements remains to be established. Certainly feeding stations host many jays from more northern localities—birds that leave each spring for breeding areas north of Vermont; and the arrival and/or passage of birds from more southerly wintering areas can be detected well into June. Jays may nest locally throughout the migratory period, however, indicating that some local breeders remain throughout the winter.

Blue Jays may nest in either coniferous or deciduous trees. The nest is a bowl of twigs in a tree crotch or on branches near the main trunk, about 3–5 m (10–15 ft) from the ground. Both members of the pair construct the nest, which is made of sticks, with grass and other soft material in the center to form a deep cup. The eggs (4 to 7 per clutch) are buff or greenish spotted with brown (more heavily at the large end). Of 18 clutches, none had more than 5 eggs. Although Blue Jays are noted for their vocal alarm calls, during the breeding season they become furtive and quiet. When predators appear the territorial *tea cup* call is given, and predators are assailed; but around the nest the pair is the picture of stealth. The female is usually responsible for the 16- to 18-day incubation tasks, but the male may feed her during this period (Harrison 1978; Terres 1980). Both tend and aggressively protect the young during the 17- to 21-day nestling period. Noisy family groups of fledglings and adults are quite conspicuous, and were one of the principal methods of confirming breeding in Vermont during the Atlas Project.

Vermont dates for recorded nest building extend from May 27 to July 1, but nesting commences much earlier than these dates indicate. Sample nesting sites include a nest at Union Village being built about 12 m (40 ft) up in a sugar maple; a nest at Grafton 3 m (10 ft) up in an American beech; and also at Grafton a nest 8.5 m (28 ft) up on a white pine branch. Vermont nests with eggs have been found from April 20 to July 1; most dates are in May and early June. Most



No. of priority blocks in which recorded

TOTAL 179 (100%)

Possible breeding:	27 (15% of total)
Probable breeding:	22 (12% of total)
Confirmed breeding:	130 (73% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17
Green Mountains	54	100	30
North Central	19	100	11
Northeast Highlands	16	100	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	13

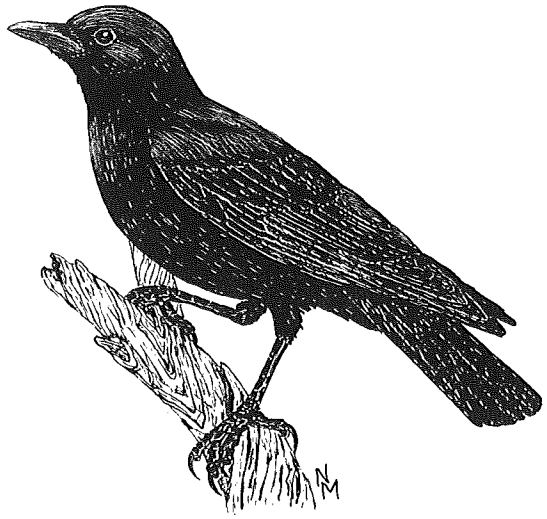
of the nests found were in conifers, hemlock, pine, or spruce. Dates for nests with young range from May 15 to July 5. Fledgling dates range from June 3 to August 14. Many late nestings may represent renesting after failure of an earlier attempt.

The Blue Jay apparently has always been and is likely to remain a common species in Vermont. Its omnivorous eating habits and its ability to occupy disturbed and suburban areas have stood the species in good stead in the face of man's perturbations of the natural environment.

WILLIAM J. NORSE
DOUGLAS P. KIBBE

American Crow

Corvus brachyrhynchos



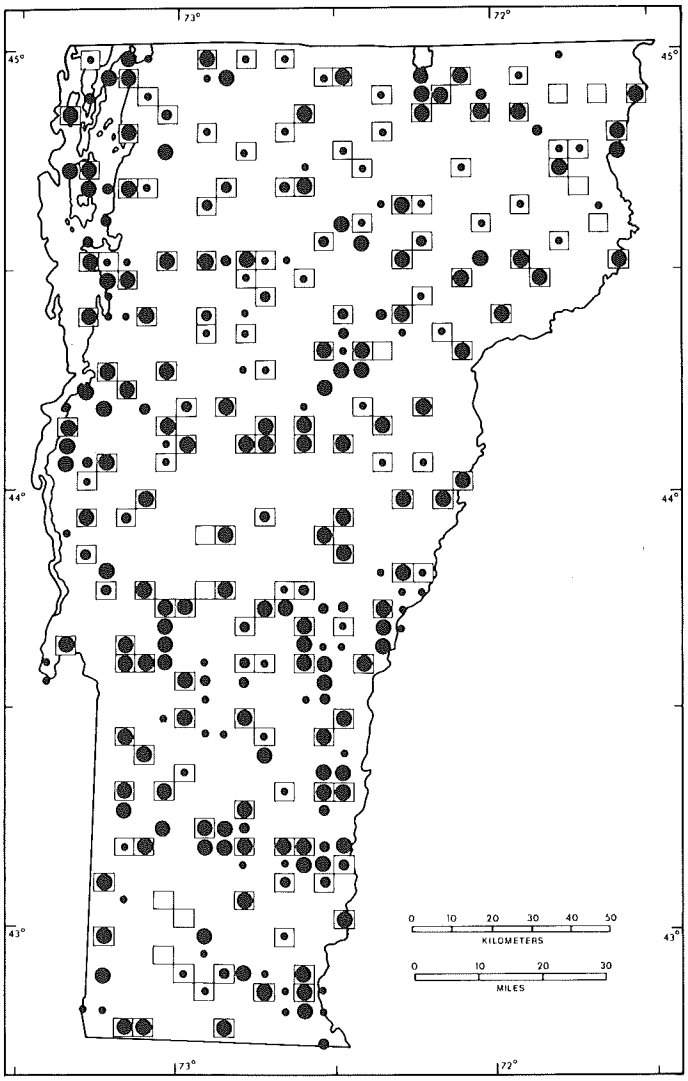
American Crows require open areas for feeding and trees for nest sites. They favor areas with extensive fields and small- to medium-sized woodlots over extensive woodlands and open landscapes (Johnston 1961). The species is principally a terrestrial forager. Flocks and small groups will feed on the ground, with one or more birds on nearby lookouts to give warning of approaching danger. This species' broad diet includes large insects, carrion, small rodents, the eggs and nestlings of birds, fruits, nuts, and other seeds.

The American Crow is quite common in Vermont. However, its nest, though large, is difficult to locate as the birds become almost unnaturally silent during incubation and immediately afterward. Only 16% of the Atlas Project confirmations were for nests with eggs or young. The begging calls of fledglings are very distinctive; these calls are nasal and harsh—*karr* rather than the familiar *caw* of adults—and are given in series that ends in a throaty, gargling sound if the young are being fed. Observers must interpret this call cautiously, as Townsend (1927) found that adult females may give a similar call during incubation. The most frequently used code for confirming this species in Vermont was *FL*, for recently fledged young; these accounted for 59% of all confirmations.

American Crows reside in Vermont throughout the year, although their populations vary seasonally at high elevations. Large migrating flocks, sometimes numbering several thousand birds, are seen in early spring and mid-autumn; however, the migratory behavior among crows in Vermont has never been determined. In early spring flocks of crows break up into small groups of two to five birds, which apparently include the young of previous years and parents (Stokes 1979). This is also a period of intergroup fighting and of aerial territorial chases. Nest building is usually under way by late March or early April. The nest is a bulky structure of sticks, weed stalks, and vines lined with a variety of soft, fibrous materials. Nests are normally placed in the trunk fork of a tall tree, occasionally in the fork of a sturdy side limb. Crows seem to prefer coniferous trees, when available, as nest sites. The average height of eight Vermont nests was 13 m (42 ft).

The eggs are blue to blue-green with variable dark brown and gray blotches and spots. The clutch size of 18 Vermont nests ranged from 3 to 8 eggs, with an average of 5.1. Dates for 19 Vermont nests containing eggs range from April 9 to May 17. The incubation period lasts about 18 days (Bent 1946). The three dates for nestlings on record for Vermont range from June 3 to June 21. According to Bent (1946), young crows are fully feathered at 4 weeks and depart the nest within the following week. Young remain with their parents all summer and even into the next breeding season (L. Kilham, pers. comm.). Eighteen Vermont dates for dependent young range from June 11 to July 5.

Because of the rural character of the Vermont landscape, the American Crow is common in the Green Mountain State. It appears to be most common in the Champlain Lowlands, Connecticut River valley, Valley of Vermont, and northern Orleans



No. of priority blocks in which recorded

TOTAL 169 (94%)

Possible breeding:	47 (28% of total)
Probable breeding:	21 (12% of total)
Confirmed breeding:	101 (60% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	18
Green Mountains	49	91	29
North Central	18	95	11
Northeast Highlands	12	75	7
East Central	19	100	11
Taconic Mountains	16	100	10
Eastern Foothills	24	100	14

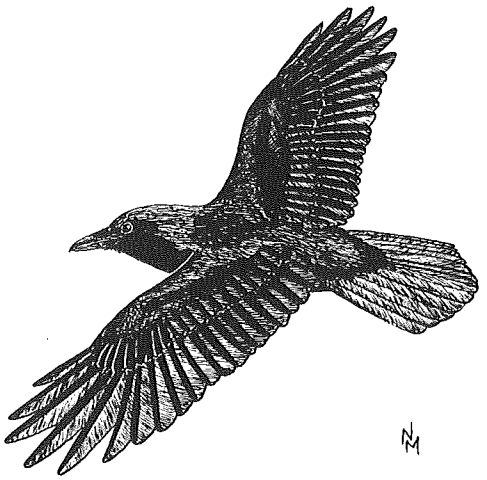
County, where mixtures of open and closed habitats occur. Least numerous in the Northeast Highlands, it was undetected in 25% of the region's Atlas Project priority blocks. The species also appears to be less common in the Green Mountains.

Breeding Bird Survey data collected through the U.S. Fish and Wildlife Service from 1966 to 1979 indicate a 3% annual decline in numbers of the American Crow on 21 Vermont survey routes; this decline is in direct contrast to the positive trend indicated for the 500 total routes for the northeastern U.S. (Robbins 1982b). The recent reforestation of much of Vermont, which has reduced the amount of suitable habitat available to support a large crow population, is probably responsible. Regardless of recent declines, this adaptable bird will most likely remain a conspicuous part of the Vermont avifauna.

WALTER G. ELLISON

Common Raven

Corvus corax

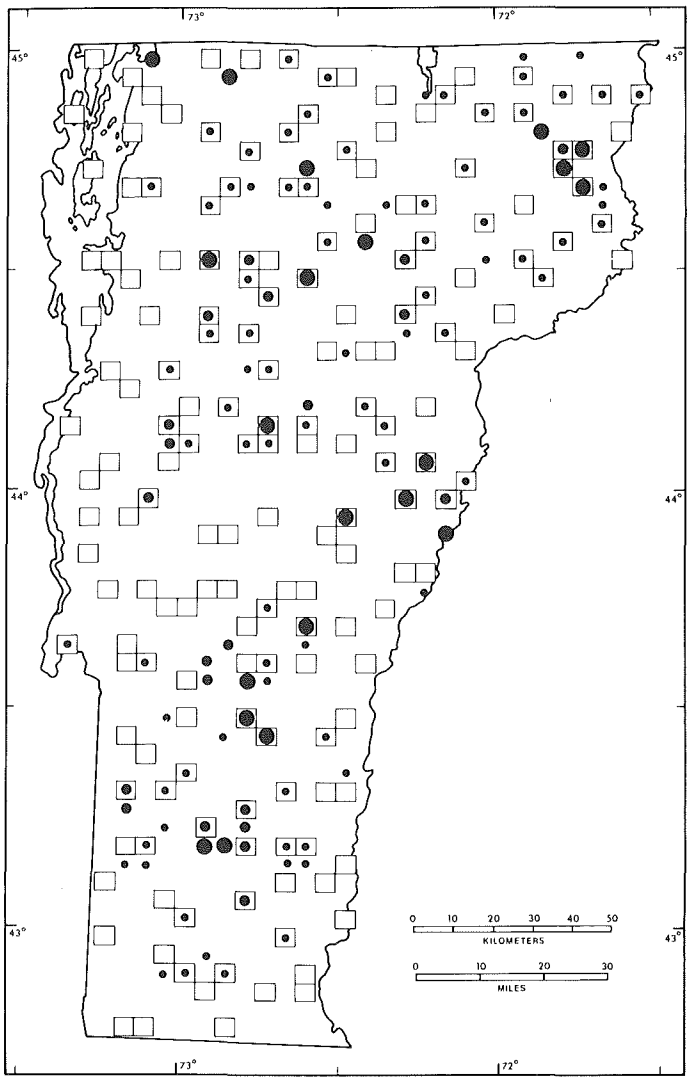


The status of few native Vermont birds has vacillated as much as that of the Common Raven. Absent from Vermont for decades, the raven has only reappeared and recolonized Vermont in the past 20 years. This recovery continues, and the Common Raven is fairly prevalent over most of the state where cliffs provide favorable nest sites.

In the eastern U.S. at the time of European settlement, the raven was found over most of New England and New York (Bull 1974). The raven "soon became known as a killer of sickly sheep and new-born lambs, and the settlers waged a relentless warfare upon it" (Forbush 1927). Little information is available on its status through the 1700s, but by the beginning of the nineteenth century the raven was virtually extirpated from most of New England, including Vermont. Thompson (1842) wrote: "It has for several years been less frequently seen in Vermont than formerly, and it is always a rare bird here compared to the Crow." Samuels, in his more careful 1872 work, said that "this bird is an extremely rare resident of New England. I have never heard of its breeding here." A few ravens were reported in Vermont during the first 12 years of the twentieth century (Perkins and Howe 1901; Fortner et al. 1933), but those birds may have been wanderers from the Adirondack Mountains of New York, where ravens were probably not extirpated until the end of the 1920s (Bishop 1980). There is only one Vermont report of the raven between 1912 and 1961, at Westmore on June 30, 1938 (Morgan 1938).

During the period of its lowest population in Vermont, the raven was observed along the coast of Maine (Palmer 1949); Vermont's repopulation may have begun with a westward expansion of those Maine ravens. The current raven recovery dates from 1961, when a group of 8 to 10 ravens were seen on June 29 in Peacham (J. D. Stewart, pers. comm.). There are three to four other records from the Northeast Highlands from 1962 to 1965, and at least a few ravens were breeding there by the mid-1960s. On May 28, 1965 a young raven that fell from a nest containing three young (near Sutton) was brought to the Fairbanks Museum in St. Johnsbury. Ravens were reported as resident and breeding in numbers up to 12 in the Newport-Morgan-Westmore area by 1969 (Eldred, Field notes). From the Northeast Highlands the raven population has steadily increased and spread over most of the state; the most dramatic increases have occurred since 1972.

Though Common Ravens utilize open areas for scavenging, they require shaded and undisturbed forest retreats for nesting. Vermont's forest acreage shrank from approximately 82% of the state's area in 1790 to a low of about 36% around 1880 (Garland 1977). At that time, when forest land was limited, what remained was extensively utilized—factors which would have eliminated the undisturbed nesting sites that the species requires (Bishop 1980). White-tailed deer were also virtually wiped out in Vermont during the period of heaviest forest exploitation (Garland 1977). The reforestation of the state and the resurgence of the deer herd during the mid-twentieth century, with the consequent increase in winter die-off of deer (creating carrion for the raven to eat) no doubt contributed to the raven's re-establishment in Vermont.



No. of priority blocks in which recorded

TOTAL 85 (48%)

Possible breeding:	59 (69.5% of total)
Probable breeding:	14 (16.5% of total)
Confirmed breeding:	12 (14.0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	7	23	8
Green Mountains	33	61	39
North Central	12	63	14
Northeast Highlands	13	81	15
East Central	9	47	11
Taconic Mountains	4	25	5
Eastern Foothills	7	29	8

The raven is an omnivore, and "almost any kind of animal food it can catch, kill or find is grist to its mill" (Bent 1946). Ravens sometimes follow plows in spring to catch exposed insects, and often eat berries in fall.

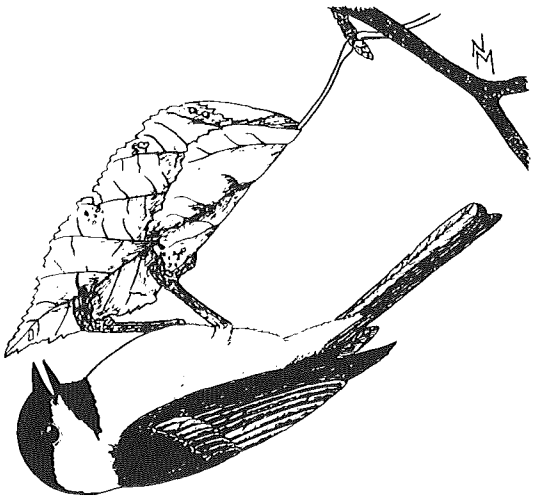
Pairs mate for life. The nest is a large mass of sticks lined with various soft materials. Nests may be used for many years; they may be 0.6–0.9 m (2–3 ft) across and up to 1.2 m (4 ft) deep. Cliff nests are normally placed in a dark, well-shaded area with a rock overhang to protect the nest from above and with a vertical cliff face below. The much scarcer tree nests are usually in tall emergent trees 14–30 m (45–100 ft) high. Pairs normally nest several miles apart. Nest building has been observed in Vermont from March 24 until April 24. The one record in the state of a nest containing eggs is for April 30; nests containing young have been reported from April 29 to June 16, and fledged young have been seen on June 17.

Three to 7 (usually 4 to 6) eggs are laid. Incubation is by the female, and takes 18 to 20 days (Bishop 1980; Terres 1980). The male feeds the female on the nest, and both parents feed the young and bring them water in their throats. The young fly 35 to 42 days after hatching (Terres 1980). Only one brood is produced in a season, though pairs may renest if the first attempt fails.

G. FRANK OATMAN

Black-capped Chickadee

Parus atricapillus



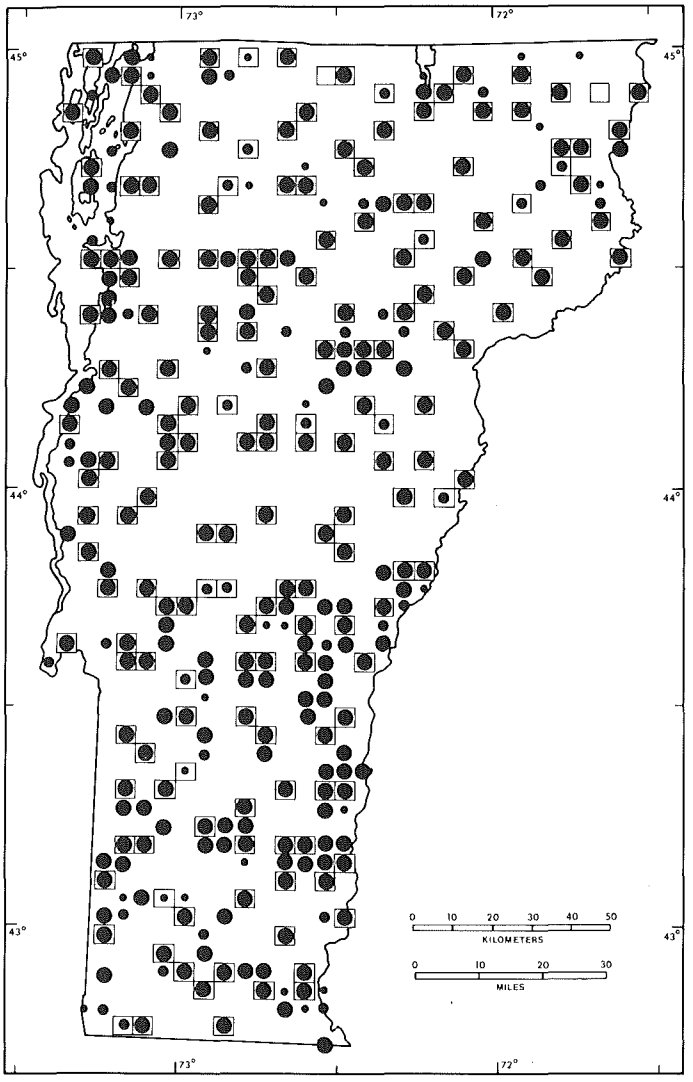
Black-capped Chickadees are many people's favorite birds, providing welcome signs of life during long northern winters. They are found in deciduous, coniferous, and mixed woodlands, and are commonly seen around dwellings with nearby woodlots. Odum (1941a) found that chickadee territories usually contained both mature forest and second growth, including hedgerows and edges.

The Black-capped Chickadees' frequent vocalizations and active foraging methods make them easy to locate. Only during the early stage of the nesting cycle can chickadees be considered inconspicuous. Breeding confirmation is also relatively easy to obtain; 90% of the chickadee records from Atlas Project priority blocks were confirmations. Observation of adults with food for young accounted for 42% of Vermont confirmations. Recently fledged young and active nests contributed an additional 28% and 20% of confirmations, respectively.

Black-capped Chickadees are year-round residents in Vermont, although young birds may migrate during some years. Large southward movements have been observed in years when a good breeding season coincided with poor seed production in northern forests (Lloyd-Evans 1981). Pairs separate from winter flocks from late March to mid April and establish territories through aggressive interactions with other chickadees. Both members of the pair utilize the two- or three-note whistled song during encounters with challengers, although the male defends the territory more vigorously than the female (Odum 1941a). Territories are largest during nest construction and decrease in size as the young develop (Odum 1941a; Stefanski 1967).

Nesting chickadees utilize either an old woodpecker hole or a nest box, or excavate a nesting cavity, usually in a well-rotted stub, with both members of the pair removing bits of wood and scattering them at a distance from the nest tree. Vermont chickadees have been observed building nests between April 3 and July 6. More than half of 23 Vermont nest sites were in birches or aspen; other tree species, rotted stumps, fenceposts, and nest boxes were also used. Nests were placed at heights of 0.6–3 m (2–10 ft); the average was 1.7 m (5.6 ft). The cavity is lined with moss, feathers, hair, and soft plant materials. The female incubates the 5 to 10 white eggs, finely spotted with reddish brown, for 12 to 13 days (Bent 1946). Twenty-two egg dates from Vermont ranged from May 2 to July 15; the average size of 13 clutches was 6.3 eggs. Vermont nestling dates range from May 9 to July 30 (19 records). The young fledge after 16 days in the nest and remain with their parents an additional 3 to 4 weeks (Odum 1941b; Smith 1967; Wiese and Meyer 1979). Fledglings have been observed in Vermont from June 6 to August 10 (27 records).

Banding studies by Smith (1967) and Wiese and Meyer (1979) indicate that juvenile Black-cappeds disperse from their natal area, and that they are replaced by other young in winter flocks of 6 to 10 chickadees. The dominant individuals in such flocks are the pair whose breeding territory corresponds to the flock territory (Glase 1973). Other species often join chickadees to form foraging flocks of mixed species, which may include Downy and Hairy woodpeckers, Red- and White-breasted nuthatches, Brown Creepers, Golden-crowned Kinglets, and, during migration, warblers and vireos.



No. of priority blocks in which recorded

TOTAL 177 (99%)

Possible breeding:	3 (2% of total)
Probable breeding:	14 (8% of total)
Confirmed breeding:	160 (90% of total)

Physiographic regions in which recorded

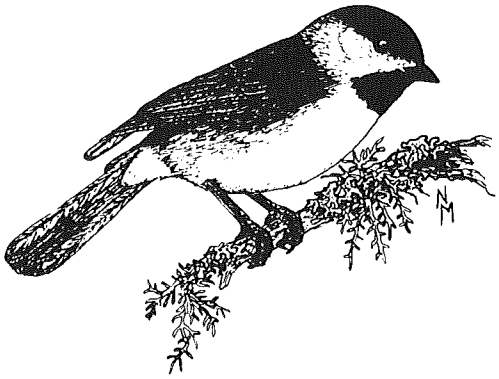
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17.5
Green Mountains	53	98	30.0
North Central	19	100	11.0
Northeast Highlands	15	94	8.0
East Central	19	100	11.0
Taconic Mountains	16	100	9.0
Eastern Foothills	24	100	13.5

All early accounts of Vermont birds list the Black-capped Chickadee as a common resident. This status holds true today: chickadees were located in 99% of the priority blocks during the Atlas Project, and in all the physiographic regions of the state. Although density was not measured during the Atlas Project, personal observations and Christmas Bird Count data indicate that the lowest densities of individuals occur in the Champlain Lowlands, where chickadees are limited to woodlots, swamps, orchards, and hedgerows (N. L. Martin, pers. observ.). The five Audubon Christmas Bird Counts between 1978–79 and 1982–83 illustrate this distribution: counts from Burlington and Ferrisburg in the Champlain Lowlands averaged 4.6 and 6.6 chickadees per party hour; counts in the well-forested Green Mountains and eastern part of the state averaged from 9.5 to 14.7 chickadees per party hour; and the Island Pond Bird Count in the Northeast Highlands averaged 7.1 chickadees per party hour, probably reflecting a greater rate of emigration from the boreal forest (CBC 1978–1983). Black-capped Chickadees are among Vermont's most abundant birds and are likely to remain so, for they have shown adaptability in adjusting to human-influenced environments.

NANCY L. MARTIN

Boreal Chickadee

Parus hudsonicus



The Boreal Chickadee occupies the boreal forest zone of the Nearctic region. It reaches a southern limit of its breeding range in northeastern Vermont, where it is uncommon, locally distributed, and often overlooked. Unlike the Black-capped Chickadee, the Boreal usually sticks close to dense spruce woods and avoids human settlements; it is generally more retiring and less inquisitive than the Black-capped.

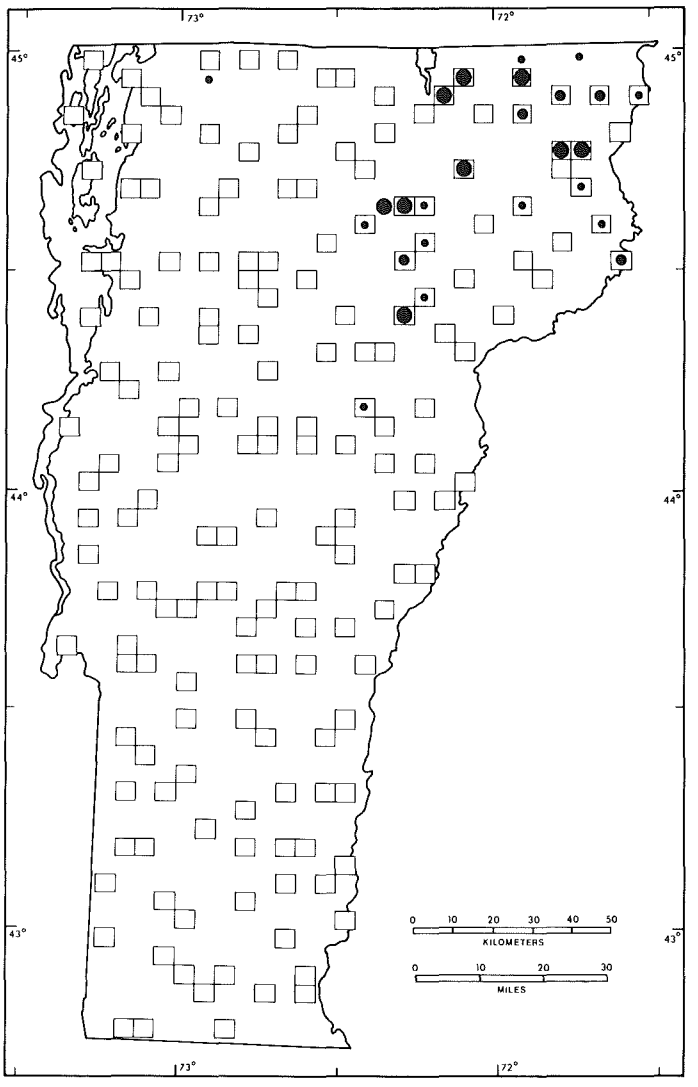
The best technique for locating this species is to listen for it in appropriate habitat. Its version of the *chick-a-dee* call is a hoarse, somewhat nasal, drawling *sick-a-day*. Once learned, the song is easy to remember and to distinguish from that of the Black-capped; the two species often forage together in winter, so the calls may be compared directly. The Boreal also has several chip notes, uttered in a petulant tone, and a short warbled song that is seldom heard (Pough 1949).

This species may be found in somewhat wet coniferous forests, especially those containing black spruce. The Boreal is most numerous in the boreal black spruce-balsam fir forest east of Island Pond. However, even there, in the state's most suitable habitat, a single observer is unlikely to find more than six to eight Borealss in a single day at any season. Borealss are somewhat migratory, moving southward in some years in fairly large irruptive flights that begin in October. During years of chickadee irruptions, Borealss may be found as scarce migrants or winter residents in any section of Vermont, where they utilize red and white spruces, cedars, and other conifers. Irruptive events are unusual, however, and during most winters Borealss stick fairly close to their breeding range. In winter Borealss tend to move about in flocks, which sometimes consist only of themselves and at other times are of intermixed species, and may include Black-capped Chickadees, Golden-crowned Kinglets, Red-breasted Nuthatches, and Downy Woodpeckers.

Boreal Chickadees feed principally on tree-infesting insects and spiders, their pupae and eggs, some fruit, and the seeds of conifers and birches. Though less active and vocal than Black-capped Chickadees, Borealss forage busily over tree twigs and branches, often out of sight among dense conifer needles. In early spring, pairs often come to the ground where melted snow has uncovered edible material dropped from the trees (McLaren 1975). In winter Borealss may visit feeding stations, where they are partial to fatty foods.

During the Atlas Project, the Boreal was confirmed as a breeder as far south as Cabot and as far west as East Craftsbury. Reports of possible breeding came from as far south as East Barre and as far west as the black spruce bogs at Bear Swamp in Wolcott and at Lake Carmi. Borealss were found in a substantial number of priority blocks in the Northeast Highlands and the North Central regions.

McLaren (1975) found territories of breeding Boreal pairs to be larger than 4.9 ha (12 a). As territories do not seem to be advertised vocally or patrolled regularly, boundaries are undoubtedly trespassed (McLaren 1975). Courtship behavior includes begging of food (mostly by females), accompanied by wing fluttering. Males continue feeding females until the eggs hatch, a period of 4 to 5 weeks (McLaren 1975). The



No. of priority blocks in which recorded

TOTAL 22 (12%)

Possible breeding:	9 (41% of total)
Probable breeding:	5 (23% of total)
Confirmed breeding:	8 (36% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	10	53	45
Northeast Highlands	11	69	50
East Central	1	5	5
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

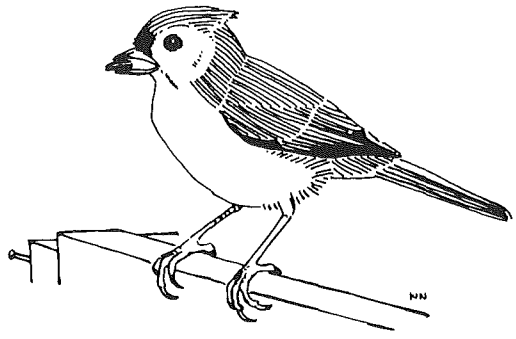
nest hole is most often excavated by Borealsin a dead stump or snag that contains a soft core surrounded by hard outer layers; the cavity is placed 0.3–3 m (1–10 ft) above the ground. Natural cavities and abandoned woodpecker holes are also used. The female alone builds the nest, which nearly fills the cavity, from moss, plant down, lichens, and animal hair; the eggs and young are closely cupped in a denser mass of the same materials. Four to 9 (usually 6 to 7) white eggs dotted with brown are laid and incubated by the female, normally for 15 days. Both parents feed the young, which fledge at about 18 days after hatching (McLaren 1975).

Nest building by Boreal Chickadees has been observed in Vermont as early as May 9, and adults have been seen feeding fledglings as late as July 7. There are no egg dates for Vermont, but dates for New York—June 1 to July 17—may be applicable (Bull 1974).

G. FRANK OATMAN

Tufted Titmouse

Parus bicolor



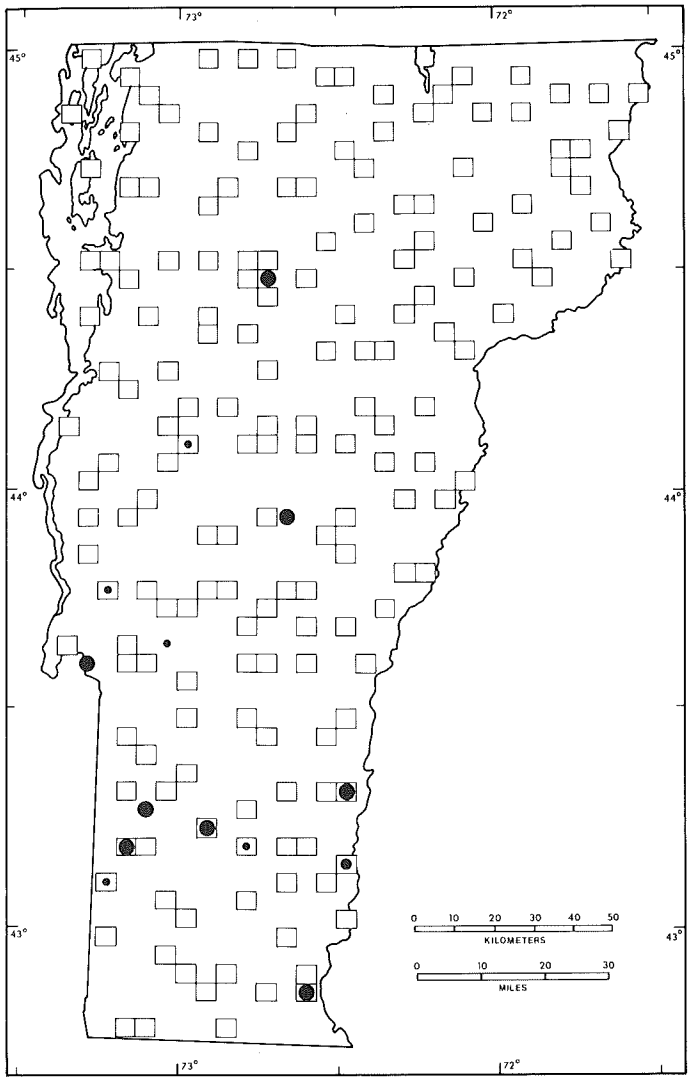
The Tufted Titmouse, like a number of other primarily southern species, has considerably extended its range northward in the last 50 years. Eaton (1914) mentioned only one breeding record for the entire state of New York. Forbush (1929) stated that titmice occurred casually in central New York and Connecticut and that there were no satisfactory records for Vermont. The species' prodigious spread has been well documented in New England since 1963 through the Massachusetts Audubon Society's annual Cardinal-Tufted Titmouse Survey. This February census has shown significant increases in the winter titmouse population in Vermont: from 1972 to 1978, fewer than 50 were reported annually, except for 1975, when the count was 160; between 1979 and 1983 Vermont titmouse reports have averaged 144 annually (Massachusetts Audubon Society 1972–83; RVB, Winter 1972–83). Audubon Christmas Bird Count totals for Vermont reflect a similar pattern, with fewer than 10 titmice per season recorded before the winter of 1978–79, except in 1974–75 when three counts reported a total of 52. From 1978–79 to 1982–83, an average of 70 titmice were reported on the basis of eleven counts (CBC 1974–83).

The expansion of the Tufted Titmouse's range has recently extended northward into southern Maine, central New Hampshire, and Vermont, and westward to southern Ontario, central Michigan, and Wisconsin. Within this range the species is still increasing in numbers; it continues to expand northward. Tufted Titmice are uncommon in Vermont, and breeding is restricted to river valleys in the southern part of the state. Tufted Titmice appear to have entered Vermont through the Connecticut and Hudson river drainages.

Titmice inhabit deciduous forest, riparian woodland, and residential areas. Of 7 Atlas Project Vermont confirmations, 4 were in village locales where yards or gardens bordered on mixed deciduous woodlands; 2 were near houses surrounded by mixed hardwoods and evergreens; and 1 was in open farm country with a nearby woodland. Titmice keep to the woods more than Black-capped Chickadees do, and are heard more often than seen. They are conspicuous when they come to feeders for sunflower seeds, suet, and peanut butter, and have been reported as far north as Burlington, Plainfield, and St. Johnsbury (Ellison 1981).

The first Vermont breeding report for the species was obtained in 1975, when adults feeding young were observed in Dorset (C. Earle, pers. comm.). During the Atlas Project breeding was reported throughout the southern two-thirds of the state. Atlas Project confirmations include nest building in Peru in June 1976 (ASR, L. Williams); adults feeding three young in Stowe in June 1979 (ASR, C. Schultz); recently fledged young in Brattleboro from July 8 to 16, 1980 (ASR, J. Prouty); four young being fed by adults on July 11, 1980 in Randolph (ASR, E. W. Clapp); nest building in Springfield on April 4, 1981 (ASR, E. W. Weeks); a pair nesting in a birdhouse, which was first reported on May 8, 1981, and whose young were heard on May 18 in Fair Haven (ASR, E. P. Allen).

Tufted Titmouse nests are built 0.9–2.7 m (3–9 ft) above the ground in natural cavities such as tree hollows and abandoned woodpecker holes. Artificial cavities such as nest boxes, metal pipes, and tin cylinder-shaped mail boxes are occasionally used (Laskey 1957). The nest is built mainly by the female and takes from 6 to 11 days to complete (Brackbill 1970). It is composed of mosses, dried grasses, rootlets, dead leaves, and strips of bark fiber, and is padded with



No. of priority blocks in which recorded

TOTAL 9 (5%)

Possible breeding:	4 (44.5% of total)
Probable breeding:	1 (11.0% of total)
Confirmed breeding:	4 (44.5% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	3	5	33.3
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	3	19	33.3
Eastern Foothills	3	13	33.3

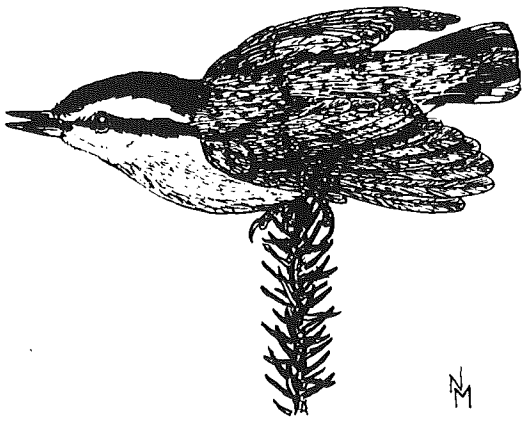
hair, fur, wool, and string; snake skins are also commonly used. Five to 6, occasionally 4 to 7, eggs are laid. Incubation is performed solely by the female and lasts for 13 to 14 days. One brood is produced each year. The young climb out of the nest in 17 to 18 days. Both parents feed the young; Tufted Titmice are most easily detected during feeding periods. Fledglings are often brought to feeders by their parents. The young may remain with their parents throughout the winter in small family groups.

The Tufted Titmouse is primarily a forest bird, although it may wander into more open areas before and after the nesting season (Beddall 1963). In Vermont, titmice separate from winter flocks in March and April and become retiring during the early stages of the nesting season.

WHITNEY NICHOLS

Red-breasted Nuthatch

Sitta canadensis



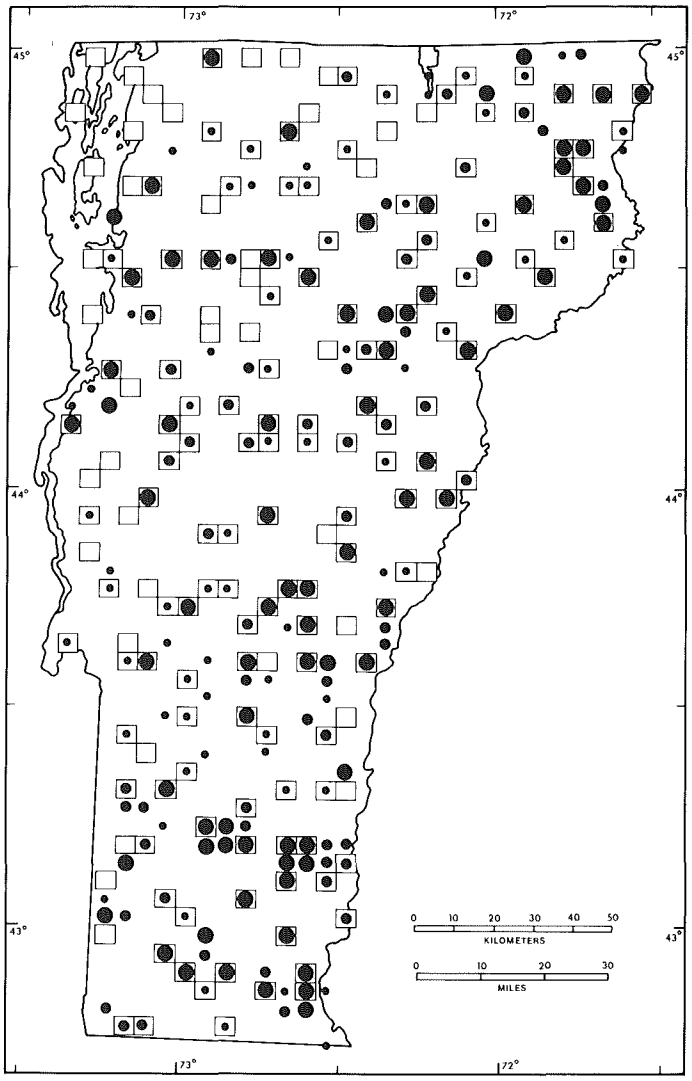
The Red-breasted Nuthatch inhabits the boreal forests in North America. It ranges from Alaska and Canada to the southwestern U.S. and from the northeastern U.S. to the higher mountains of Tennessee and North Carolina. In Vermont, this species is common in coniferous forests and uncommon in mixed woods with cone-bearing trees.

The Red-breasted Nuthatch moves as readily upside down as right side up as it feeds along the trunks of trees; the species also feeds out at the tips of branches, unlike the White-breasted Nuthatch. Its diet consists of the seeds of pine, spruce, fir, and other conifers, as well as insects such as beetles, wasps, and caterpillars and a variety of insect eggs and larvae (Bent 1948). Red-breasted Nuthatches frequently wedge their food into bark crevices and then hammer at it until they succeed in breaking off a bite-sized piece. Especially in years of irruptive flights, they are frequent visitors to winter bird feeding stations where they feed on suet and sunflower seeds.

The male Red-breasted Nuthatch begins singing his courtship song in late March. Kilham (1973) described the song as a "repeated series of plaintive, nasal *waa-aa-ns*. There may be 2–6 notes in a series, and 12–16 series sung per minute." Courtship activities are usually carried out among the branches and tops of conifers and are not readily witnessed by the field observer. The Red-breasted Nuthatch excavates a nest cavity in a rotted stub or dead branch of a coniferous or deciduous tree; occasionally the species uses an old woodpecker hole. Usually several nest sites are investigated; the female chooses the final site. The cavity is placed 2 to 12 m (5–40 ft) above ground; the average height is 5 m (15 ft) (Harrison 1975; Harrison 1978). The cavity entrance is 3.8 cm (1.5 in) wide, beyond which a passageway slants down for 7.6–10.2 cm (3–4 in) before the cavity drops straight down for 10.2 cm (4 in) (Harrison 1975). The bottom of the cavity may be lined with bark shreds, grass, moss, feathers, rootlets, hair, or fur.

Nuthatches modify entrances and/or cavities by a variety of methods. The Red-breasted Nuthatch in particular brings globules of pitch or resin from pines, balsam, and other conifers and smears them around the entrance. The male nuthatch continues to bring fresh pitch to the entrance throughout the incubation and nestling periods (Kilham 1972b). Parent birds avoid the pitch by flying straight into the nest. The pitch may protect against predators, competitors, and weather. Kilham (1972b) noticed in nests of both a wild pair of Red-breasted Nuthatches and a pair raised and bred in captivity that the bottom of the passageway was lined with litter.

The Red-breasted Nuthatch is single-brooded. Both female and male incubate the 4 to 7 (usually 5 to 6) eggs (Terres 1980; VINS banding data). The incubation period is reported to be 12 days (Bent 1948). In New York State, eggs have been found in nests from April 30 to June 17 (Bull 1974). The seven Vermont egg dates range from May 5 to July 10. The young birds leave the nest 18–21 days after hatching (Harrison 1978). Dates for nests with young range from May 28 to July 9 (seven records), and dates for dependent young range from June 25 to August 6 (eleven records). Both periods are similar to those given for New York State (Bull 1974). This species was most frequently confirmed by FY (food for young) and FL (recently fledged young) codes.



No. of priority blocks in which recorded

TOTAL 138 (77%)

Possible breeding:	45 (33% of total)
Probable breeding:	31 (22% of total)
Confirmed breeding:	62 (45% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	14	45	10.0
Green Mountains	42	78	30.5
North Central	19	89	14.0
Northeast Highlands	16	100	12.0
East Central	17	89	12.0
Taconic Mountains	10	63	7.0
Eastern Foothills	20	83	14.5

During the Atlas Project the Red-breasted Nuthatch was found to be most common in the Northeast Highlands, the North Central region, and the East Central region, which contain large tracts of boreal forest; it was least common in the Champlain Lowlands, a region of predominantly open farmlands with hardwood or mixed pine-hardwood woodlots. An interesting contrast to the White-breasted Nuthatch exists with regard to physiographic distribution. The White-breasted Nuthatch is more common in the Champlain Lowlands and less common in the North Central region and the Northeast Highlands.

ANNETTE L. GOSNELL

White-breasted Nuthatch

Sitta carolinensis

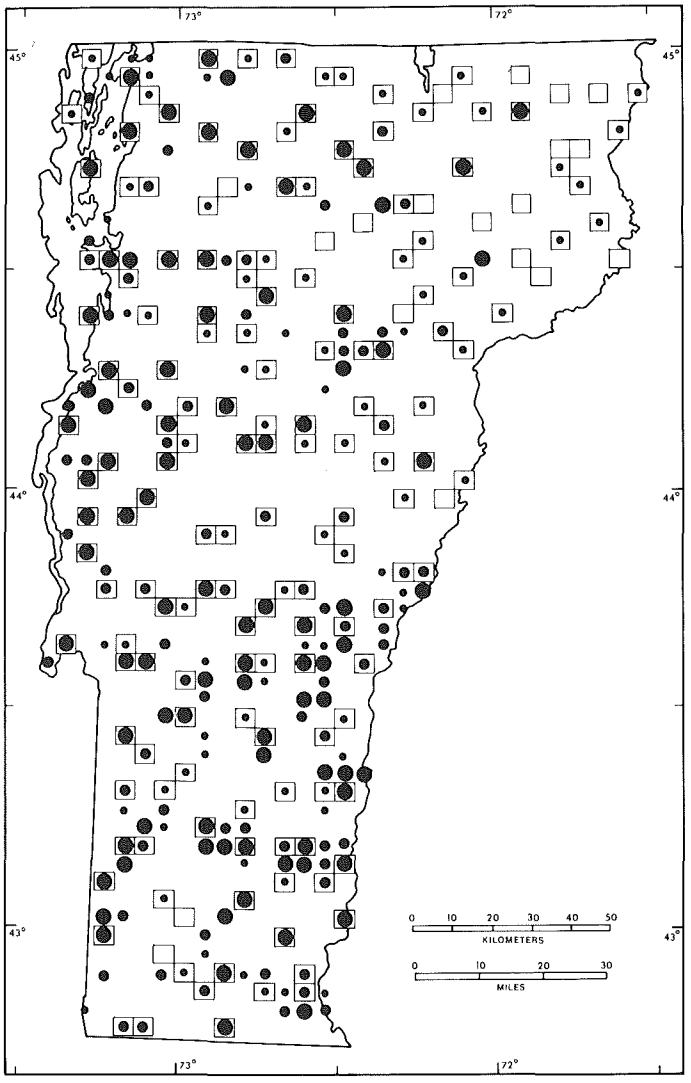
White-breasted Nuthatches inhabit mature deciduous or largely deciduous woodlands. The species nests in the cavities of trees containing hollows, dead limbs, or snags. The presence of trees such as beech or oaks that produce large amounts of mast may be important in determining the abundance of these nuthatches, as the species is scarce where such trees are scarce. White-breasted Nuthatches are readily attracted to bird-feeders, and may often be found in urban and suburban locales when suitable nest sites are available.

White-breasted Nuthatches are present year-round in Vermont. The species is readily discovered by its vocalizations. Its song is first heard during January and continues to be heard until about mid May, with a short intermission in late March (Kilham 1972a). The song is a staccato series of nasal notes, not unlike the song of the Northern Flicker, but more rounded in tone. Most singing occurs in the early morning just after the male has left his roost hole (Kilham 1972a). Nuthatches also have a variety of nasal calls that are easily identified. During the Atlas Project the most frequent confirmations were of adults with food for young (38% of all confirmations) and recently fledged young (37% of all confirmations).

White-breasted Nuthatches maintain a 15 ha (37 a) territory throughout the year (Kilham 1981). Loosely speaking, the adults mate for life; the pair bond is renewed in late winter each year. Nest-building activity is most evident in April. The nest is located in a natural cavity, often a rotted-out knothole or a hole excavated by a woodpecker. Nuthatches seem to prefer holes at least twice as wide as their bodies (Kilham 1971b). A peculiar behavior associated with nest building is bill-sweeping, in which both members of the pair, with various items in their bills, vigorously sweep about the nest hole and on the nest tree. This activity may discourage squirrels from investigating the nest (Kilham 1968). Nests are 1.5–15.2 m (5–50 ft) above the ground (Bull 1974).

The eggs are white, with pale red-brown or purplish spots concentrated about the large end. Clutch size ranges from 4 to 10 eggs; 29 clutches cited in Bent (1948) and Bull (1974) averaged 6.8 eggs. Dates for five Vermont clutches range from April 28 to June 20. The incubation period has been reported as 12 days (Allen 1929). There are only three reports of nestlings for Vermont, one from June 7 to 12, another for June 18, and a third for June 25. Stokes (1983) placed the nestling period at about 14 days. Dependent young have been recorded on 13 dates in Vermont, from June 15 to August 2.

The White-breasted Nuthatch is widely but thinly distributed over most of Vermont, with the smallest numbers in the Northeast Highlands and the North Central regions. Since adults are largely sedentary, Christmas Bird Count data should provide a reasonable index to the population in various parts of Vermont. Numbers recorded per party hour for the years 1974–82 indicate a total figure of 0.58 birds per party hour. The two highest counts were at Saxtons River (1.02 birds per party hour) and Ferrisburg (0.91); the two lowest counts were at Island Pond (0.12) and Craftsbury-Greensboro (0.34). The higher counts were in the southern Connecticut River valley and the Cham-



No. of priority blocks in which recorded

TOTAL 160 (89%)

Possible breeding:	61 (38% of total)
Probable breeding:	36 (23% of total)
Confirmed breeding:	63 (39% of total)

Physiographic regions in which recorded

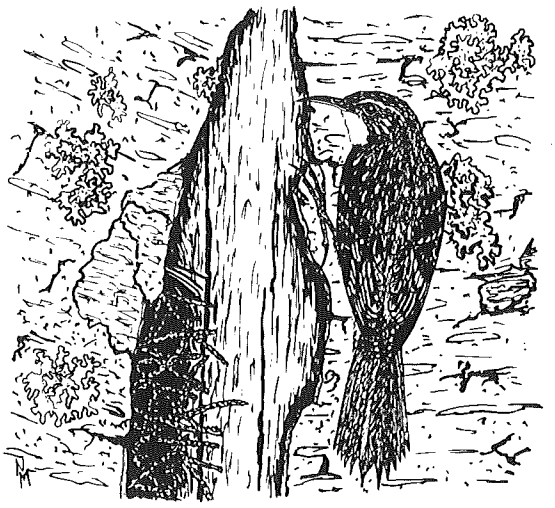
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	30	97	19
Green Mountains	52	96	33
North Central	13	68	8
Northeast Highlands	7	44	4
East Central	18	95	11
Taconic Mountains	16	100	10
Eastern Foothills	24	100	15

plain Lowlands, while the lower counts were in the northeast. These demographic patterns hold true in Atlas Project records for occurrence of the species in priority blocks, as well as for its confirmation in priority blocks. Possibly the greater amount of oak, hickory, and beech in western and southern Vermont is conducive to a larger population.

WALTER G. ELLISON

Brown Creeper

Certhia americana



The diminutive and inconspicuous Brown Creeper is essentially a woodland bird. The availability of suitable nest sites determines its habitat during the breeding season. Nest sites are provided by standing dead trees on which the bark curls up from the trunk in relatively long adherent flakes, under which the nest is wedged. Davis (1978), during her study of the species in Michigan, found all nests to be within at least 60 m (197 ft) of standing or running water. Representative habitats of Brown Creepers include bottomland, swamps, flooded timber, bogs, and mature upland forest (usually coniferous or northern hardwood).

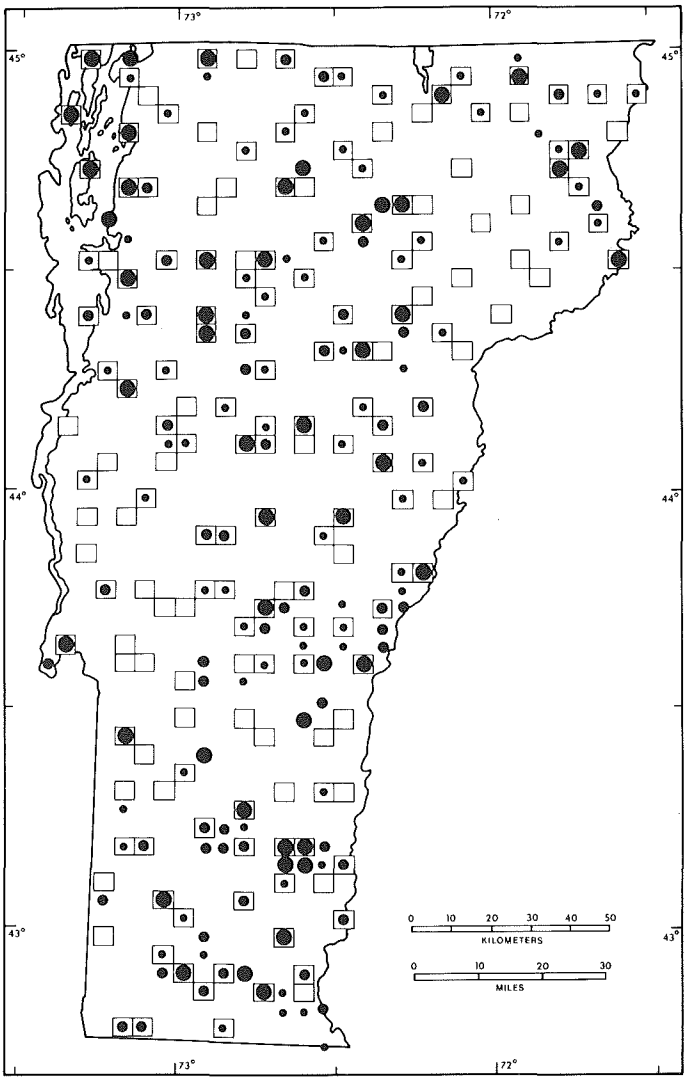
The Brown Creeper's distinctive song and less distinguished call usually draw attention to the species. Both are sibilant and of high frequency. The song is most frequently heard early in the spring; males commence territorial singing in February, and the peak of song activity ranges from March to May. Singing is far less frequent and may cease entirely in June and July. The song is a high-pitched jumble of notes similar in quality to but shorter and less varied than the song of the Winter Wren. Because Brown Creepers spend most of their time on the trunks and branches of trees and are small and cryptically colored, they are often difficult to see.

Once Brown Creepers are located, confirmation of breeding presents further difficulties. The nest's unusual site creates special problems for the observer; suitable habitat usually includes several trees with satisfactory nest sites, and the nest is difficult to find in a tree. Trees utilized for nesting are usually 20 cm (8 in) or more DBH. Seven Vermont nests were at an average height of 3 m (9 ft), out of a range of 1–6 m (4–18 ft). Davis (1978) found mean nest heights of 2.6 and 3.8 m (8.5 and 12.4 ft) for nests on balsam fir and elm trunks, respectively. Most of the confirmations obtained by Atlas Project workers in Vermont derived from parents bearing food to their young (41% of confirmed breeding), or from noisy parties of recently fledged young (22% of confirmed breedings).

While perched in a vertical position, the Brown Creeper sings its territorial song, which may be heard up to 120 m (394 ft) away (Davis 1978). Nest building begins in mid to late May. The nest is attached between the bark flake and the main trunk of the supporting tree by means of cocoons and spider-egg cases. The base of the nest, composed of twigs and wood chips, is lined with moss, fine bark, fibers, plant down, or feathers. Eggs number from 4 to 8, usually 6. In Vermont, eggs have been reported for 4 dates ranging from June 1 to June 28. Two reported dates for nestlings are July 6 and July 18; fledglings have been reported on 12 dates from June 21 to July 23. Davis (1978) found that the species is single-brooded, but renests when an early attempt fails.

The Brown Creeper, while not totally sedentary, is found throughout the year in virtually all parts of the state, with the possible exception of elevations exceeding 915 m (3,000 ft). Some migratory movement is detectable in October and November and during March and April.

Early accounts of Vermont birds listed the Brown Creeper as rare or as a winter visitant; apparently its distribution was formerly limited in large part to the Green Mountains, the only repository of extensive forest in the state in the late 1800s and early



No. of priority blocks in which recorded

TOTAL 123 (69%)

Possible breeding:	54 (44% of total)
Probable breeding:	30 (24% of total)
Confirmed breeding:	39 (32% of total)

Physiographic regions in which recorded

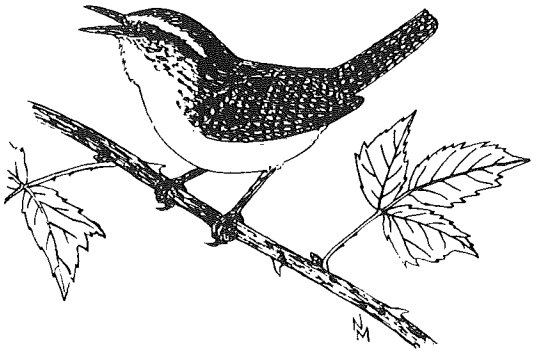
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	20	64	16
Green Mountains	47	87	38
North Central	12	63	10
Northeast Highlands	11	69	9
East Central	13	68	11
Taconic Mountains	4	25	3
Eastern Foothills	16	67	13

1900s. With reforestation, the species has increased greatly in numbers and broadened its distribution. Brown Creepers were reported from 69% of the priority blocks. The highest percentage of occurrence by region was within the species' stronghold, the Green Mountains, where it was located in 87% of the priority blocks. The areas in which the species was most scarce included the southern Champlain Lowlands from Shelburne south and the Taconic Mountains (where it was present in only 25% of the priority blocks).

WALTER G. ELLISON

Carolina Wren

Thryothorus ludovicianus



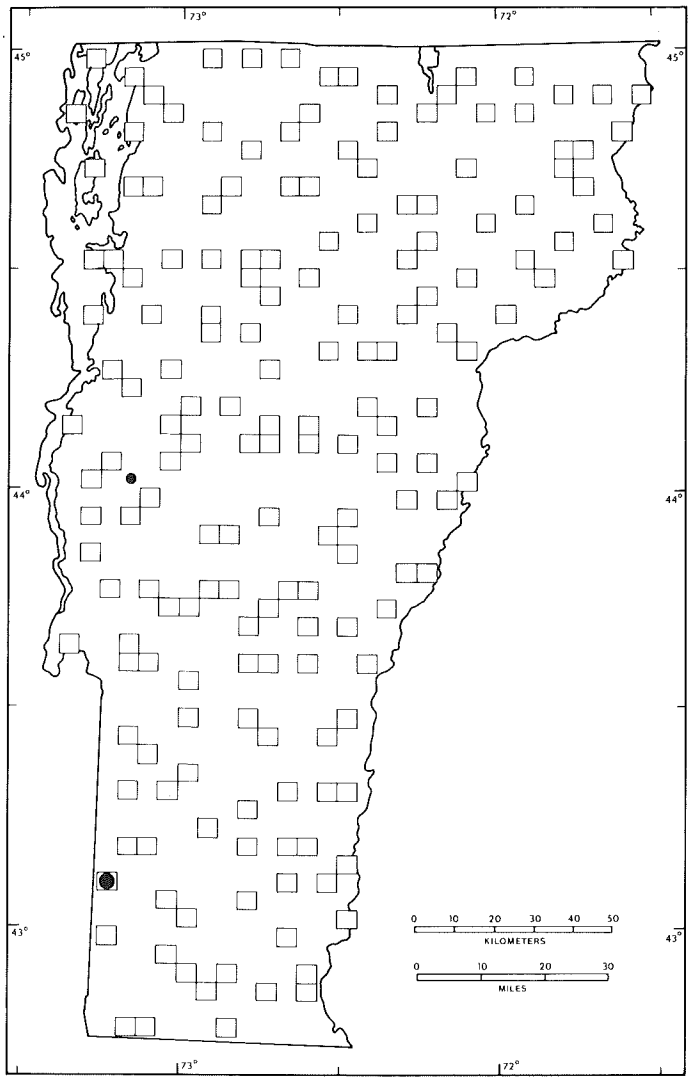
The first Vermont breeding record for the Carolina Wren was established during the Atlas Project. The major habitat requirements of this southern species are thick, often vine-covered, shrubbery and brush, and nesting cavities. In eastern Texas, Conner et al. (1983) found that the species was adversely affected by high densities of pole-sized trees and by the presence of large numbers of pines; they believed that increased canopy shading led to low shrub densities, suggesting that Carolina Wrens select areas with relatively open canopies. Graber and Graber (1979) noted that birds with southern affinities in southern Illinois survive harsh winter conditions better in urban situations. Carolina Wrens are sedentary and highly susceptible to the deleterious effects of severe winters; for these reasons, it is logical that most records for this species in Vermont, where winters are traditionally harsh, are from residential areas having thick ornamental shrubs for cover and fruit, as well as suet feeders.

Breeding Carolina Wrens are most easily detected by song. The song consists of a series of loud, ringing, whistled triplets. The harsh chattering and churring call notes also attract attention to these feisty birds. The species often nests near humans, especially in the North, where it may depend on suet feeders and fruit plantings for its winter survival. These wrens will accept nest boxes, as well as a wide variety of human artifacts, for nest sites.

The nest, built in a cavity, is a bulky, often globular, structure of grass, weed stems, twigs, and plant fibers. Carolina Wrens are early nesters, often laying eggs in early and mid April even in the northern part of their range. One Vermont pair was observed nest building as early as March 31 (ASR, W. Scott and K. Wolff). This pair constructed three nests in one season but showed no signs of incubating in any of them; such behavior suggests that the Carolina Wren, like many wrens, constructs dummy nests. The eggs are white with reddish brown spotting, and number from 4 to 6 per clutch. An average of 4.7 eggs was recorded for 18 New York State clutches (Bull 1974). Egg dates for New York State range from the first week of April to the first week of August (Bull 1974). The incubation period lasts about 14 days, and the young remain in the nest for another 14 days (Nice and Thomas 1948). In the southern U.S., Carolina Wrens are double-brooded and perhaps triple-brooded.

Before the Atlas Project, the Carolina Wren was not known to breed in Vermont and was considered a vagrant from southern New England. Because Carolina Wrens are sedentary and populations decline significantly during severe winters, the species has always occurred in low numbers in New England. Mild periods permit the species' population to build up and allow marginal habitat and geographic regions to be explored; subsequent harsh winters reduce the species to low numbers again (Forbush 1929; Bent 1948). Vague references to the occurrence of the Carolina Wren in Vermont date back to 1884 (Cutting 1884). The first documented record was from Burlington in 1936 (Smith 1938). Subsequent sightings included two from Rutland County, in 1939 and 1943 (Potter 1944), and one from Northfield in 1958 (GMAS records, D. Alan).

A remarkable increase in the number of Carolina Wrens was reported in Vermont during the mid 1970s. This increase may be explained in part by increased observer coverage and knowledge and, in part, by high population densities of this species to the south of Vermont at that time (Able 1974).



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	1 (100% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	1	6	100
Eastern Foothills	0	0	0

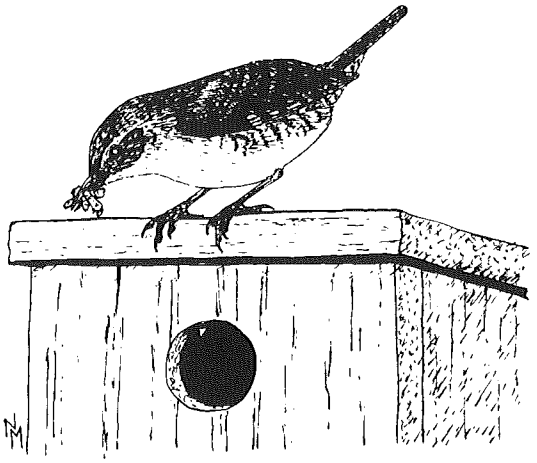
From 1974 to 1982, 29 records reported a total of 31 Carolina Wrens in Vermont; 56% of these records were for 1974–75, after which the species declined dramatically (RVB 1974–83). The severe winter of 1976–77 caused major declines over much of the East (Smith 1977), eliminating most Vermont Carolina Wrens as well as the source population for northern New England colonists.

Both Vermont Atlas Project records were of holdovers from this decline. The records were of a pair that nested in Arlington (Bennington County) in 1978 (ASR, C. S. Chapin and D. Reid), and a pair that was seen building a nest in Middlebury (Addison County) in 1977 (ASR, W. Scott and K. Wolff). A series of mild winters might induce the Carolina Wren to attempt to colonize Vermont again, but the species' presence must currently be considered marginal in the state.

WALTER G. ELLISON

House Wren

Troglodytes aedon



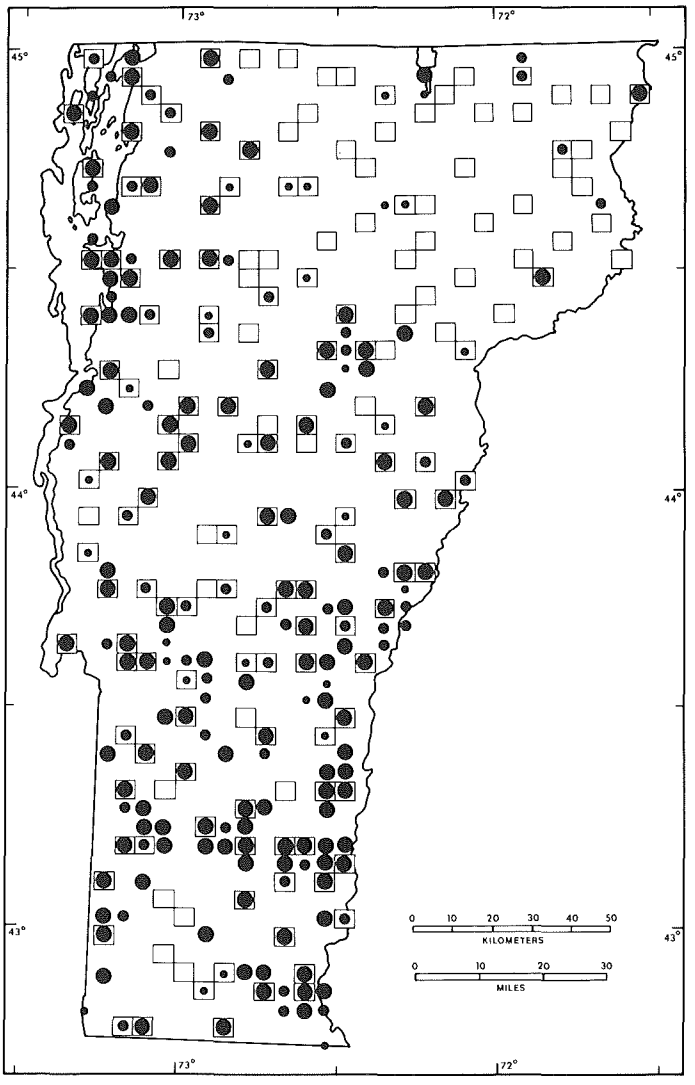
House Wrens are small, plain, brown birds, more distinguished for their exuberant, melodious voices and frenetic behavior than for their outward appearance. Although far from abundant, House Wrens are among the more familiar inhabitants of yards, gardens, and farm hedgerows in the warmer parts of Vermont. They are cavity nesters, taking readily to birdhouses and utilizing a wide variety of natural and artificial cavities. House Wrens forage near the ground and thus prefer the cover provided by thick, brushy vegetation. These birds are not always associated with human habitation; isolated pairs may be found nesting in a variety of locales, including beaver ponds, swamps, hedgerows, and streamside thickets.

Male House Wrens return to Vermont in late April and early May; most are back by the first week of May. They immediately set about establishing territories by sounding their distinctive loud, bubbling warble, and begin claiming all available nest sites within their territories by building stick "nests" in all nearby cavities. Nest sites are generally located below 3 m (10 ft), and may be situated in bird boxes, open ends of metal piping, mailboxes, and preexisting cavities in trees and stumps, as well as in such sites as old wasp nests, felt hats, large skulls, and the abandoned nests of other birds. Upon encountering a hive of wasps or the eggs or young of some earlier arriving bird, the wren attempts to remove them, and usually succeeds. All male wrens share a penchant for constructing an array of "nests," whether mated or not; the NB code therefore is useless for confirming this species.

Females arrive in Vermont about a week after the males. A female will generally select one of the sites utilized by the male, rearrange the pile of sticks, and line this base with grasses or other soft, fibrous materials. She then proceeds to lay 4 to 8 white eggs that are so diffusely spotted with cinnamon brown as to obscure their color. Normal clutches consist of 6 or 7 eggs. Egg dates for Vermont, determined from 10 clutches, range from May 18 to July 16. Records of 17 nests containing young include dates from June 10 to August 2; six dates for recently fledged young range from June 24 to August 8. Late fledgling dates suggest that eggs are sometimes laid as late as the first week of July. Although House Wrens are usually double-brooded, in northern Vermont most pairs probably only manage a single brood. The species' autumn migration is inconspicuous, probably peaking in September. In Vermont late birds have been noted into October in most years.

The first indication that a House Wren is present is the male's advertising song, given incessantly, especially in May and early June. Because the species readily accepts nest boxes, Atlas Project observers most frequently confirmed House Wrens by keeping an eye on nest boxes in yards with wrens. Three-quarters of the confirmed nestings were of active nests; a third of these confirmations were designated by use of the ON code, for cavity-nesting species.

The House Wren is fairly common and, for the most part, generally distributed in the Taconic Mountains, Champlain Lowlands, and Eastern Foothills. It is considerably less common, and more restricted to valleys, in the southern Green Mountains and the East Central region. House Wrens are rare at elevations above 458 m (1,502 ft), and absent above 641 m (2,102 ft). In the Northeast Kingdom (the combined



No. of priority blocks in which recorded

TOTAL 122 (68%)

Possible breeding:	20 (16% of total)
Probable breeding:	25 (21% of total)
Confirmed breeding:	77 (63% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	28	90	23.0
Green Mountains	33	61	27.0
North Central	4	21	3.2
Northeast Highlands	4	25	3.2
East Central	15	79	12.3
Taconic Mountains	15	94	12.3
Eastern Foothills	23	96	19.0

Northeast Highlands and North Central regions) detection was limited to 23% of the priority blocks. Two major factors seem to lead to the exclusion of the species from an area: low average temperatures early in the breeding cycle, and heavy forest cover. Kendeigh (1963) proposed that the onset of egg laying is limited by a temperature threshold of 14.8° C (58.5° F); the growing season in the Northeast Kingdom lasts fewer than 120 days, and late frosts in spring are common. Kendeigh (1963) allowed that some hardy individuals may be able to lay at temperatures ranging as low as 5° C (41° F), which may in part explain the presence of isolated pairs within the region of scarcity.

The House Wren's history in New England has apparently been one of decline and recovery. The introduction of the House Sparrow, followed by its explosive population increase, seemed to contribute to a widely perceived, precipitous decline in the House Wren population in the 1880s. Forbush (1929) and Ross (1953) chronicled the recovery of the species.

WALTER G. ELLISON

Winter Wren

Troglodytes troglodytes

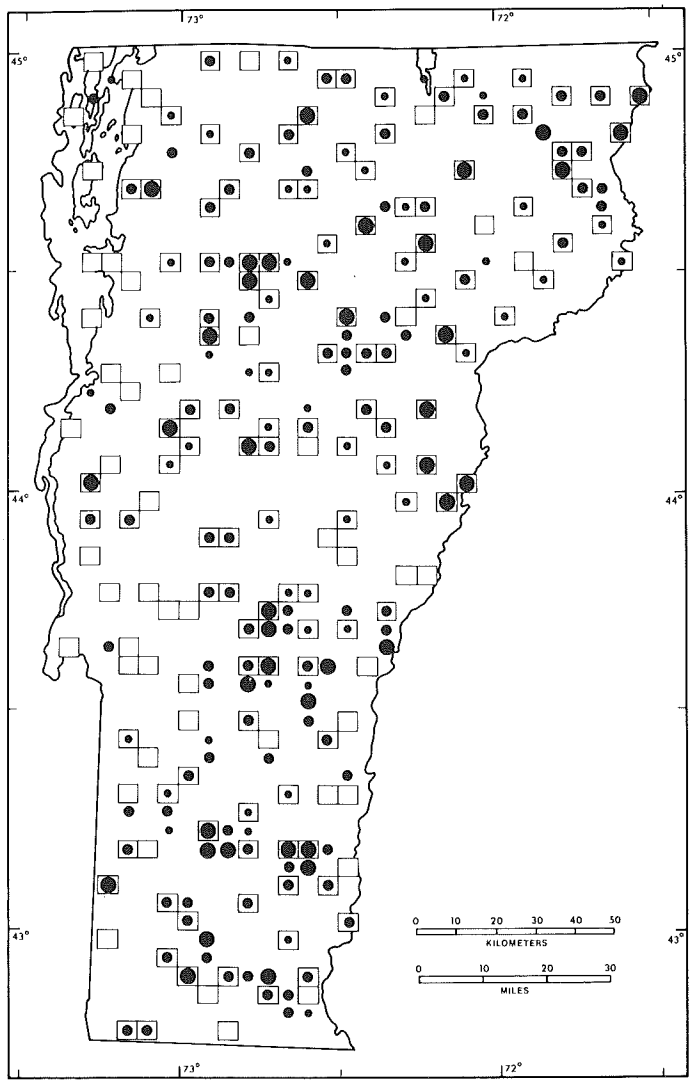
This tiny brown bird inhabits damp coniferous and mixed woodlands over much of Vermont. The Winter Wren is distributed over nearly the full range of elevations in Vermont, from the treeline on Mt. Mansfield at 1,220 m (4,000 ft) to the Alburg Black Spruce Bog at 30 m (98 ft). Habitats include subalpine forests, overgrown rock slides, cool ravines, bogs, white cedar swamps, and the edges of clear cuts at high elevations. Dead wood in the form of slash, downed trees, or standing skeletal trees seems to be a requirement, as it provides nest sites, perches, and foraging sites.

Despite their name, Winter Wrens are usually not hardy enough to weather Vermont winters. Most migrants arrive from early to mid April, although March arrivals are not unusual. Most males have established territories by early May. Because of its diminutive size, cryptic plumage, and habit of skulking, the Winter Wren is often difficult to see; in addition, its chosen haunts are fairly inaccessible. By far the best clue to the bird's presence is its strikingly loud, complex song. The song is a high-pitched torrential outpouring of clear whistled and trilled notes. The singing behavior of males is complex; most possess at least two discrete song types, sometimes three (Kroodsma 1980).

The nest is usually placed in a cavity in the overturned roots of a fallen tree. Nests are also located in cut-banks, standing hollow trees, deteriorated stumps, mossy hummocks, or even among moss covered talus. Considerable care is required to discover the well-hidden structure of moss, twigs, herb stems, and rootlets lined with feathers or hair. Fewer than 10% of Atlas Project confirmations for this species involved the discovery of an active nest. Because the parents themselves are difficult to see and are wary while young are still in the nest, food-carrying provided only 28% of the confirmed breedings. The young, which often number up to six, are noisy when fledged; family groups composed of parents and begging, recently fledged young provided 62% of the confirmations in Vermont.

Adults have been flushed from presumed nest sites as early as May 21 (Ross 1907). For Vermont, there are three documented egg dates reported, ranging from May 24 to June 14. Clutch sizes range from 4 to 7 eggs; the average is 5 or 6 eggs. The one date for a nest with young that has been reported is June 16. Eight dates for recently fledged young range from June 18 to July 11. Autumn migration commences in late September and peaks in October.

As have other forest birds, the Winter Wren has expanded its distribution and probably increased in numbers in Vermont over the last century as the state has regained its forest cover. However, the basic outlines of its range in the state have changed little since 1929, when Forbush stated that it was a "common summer resident in the mountains; rare in swamps in the valleys." Winter Wrens occurred in 91% of the priority blocks in the Green Mountains and 94% of the priority blocks in the Northeast Highlands—both cool, heavily forested regions with high elevations. The species is also well represented in the North and East Central regions. Winter Wrens are least common in the Champlain Lowlands and Taconic Mountains, and were found in fewer than 60% of the priority blocks in the Eastern Foothills, where they were noticeably absent from the southern Connecticut River



No. of priority blocks in which recorded

TOTAL 128 (72%)

Possible breeding:	41 (32% of total)
Probable breeding:	58 (45% of total)
Confirmed breeding:	29 (23% of total)

Physiographic regions in which recorded

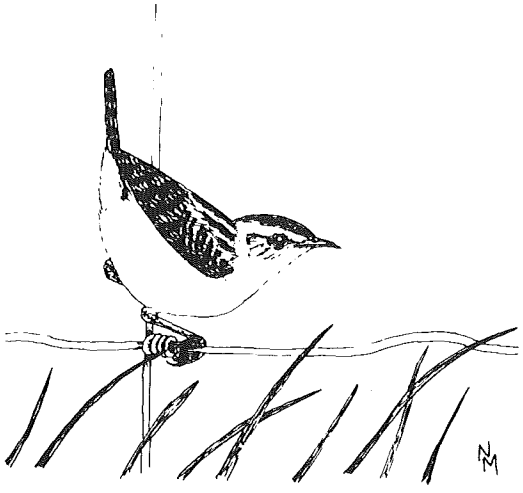
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	13	42	10
Green Mountains	49	91	38
North Central	16	84	13
Northeast Highlands	15	94	12
East Central	17	89	13
Taconic Mountains	4	25	3
Eastern Foothills	14	.58	11

valley. In western Vermont the species is rare in areas above the 20° C (68° F) isotherm—a fact that reflects the general absence of boreal conditions within this warmer area. In eastern Vermont, where a rougher landscape promotes an array of favorable local conditions for the species, Winter Wrens are more generally distributed. The species suffered a noticeable decline in Vermont after the winter of 1976–77, which was particularly harsh in the southeastern U.S. where the birds winter (Howe 1978; BBS 1966–79).

WALTER G. ELLISON

Sedge Wren

Cistothorus platensis

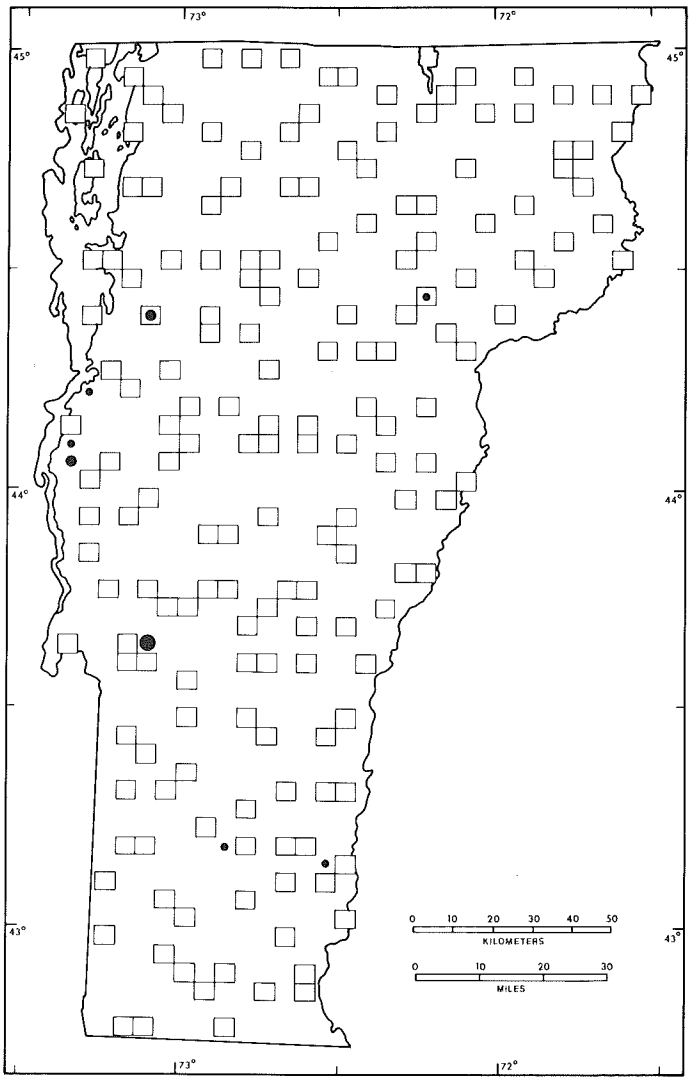


To judge from available reports, the diminutive Sedge Wren (formerly called the Short-billed Marsh Wren) is one of the rarest regularly breeding species in Vermont. It has been proposed for Threatened Species status in the state. Possible breeders were found by Atlas Project workers at only nine locations, and nesting was confirmed at only two of these. The species' apparent scarcity may result from a variety of environmental and behavioral factors. The Sedge Wren is a shy bird with an insectlike song; it nests late in the summer in moist grassy and sedge habitats that are only nominally interesting to many birders. Colonies of Sedge Wrens have little nest-site tenacity from year to year (Burns 1982); areas searched unsuccessfully during one year may have been occupied in other years when efforts were directed elsewhere.

Vermont lies near the northeastern edge of the Sedge Wren's breeding range. Although clear-cutting in the 1800s created vast expanses of grassland in the state, intensive pasturing of sheep and other livestock at that time probably rendered these grasslands inhospitable to the wrens, as they prefer dense lush grasses and sedges in which to conceal their nests. Allen (1909) considered the species a rare breeder in New England and cited no records for Vermont. Forbush (1925) considered it a rare breeder in the state. Acres of seemingly suitable nesting habitat now exist in the Champlain Lowlands and at scattered locations in other regions, although grazing and mowing may make many potential sites unacceptable. Undiscovered colonies of Sedge Wrens could occur along the fringes of the marshes around Lake Champlain. Yet the Sedge Wren remains remarkably scarce in Vermont, and given existing agricultural practices its population is unlikely to increase significantly.

Sedge Wrens display extremely interesting breeding strategies. Although some males may appear in Vermont as early as the third week of May, the majority of the birds probably arrive and commence actual breeding much later, perhaps as late as July. Males establish and vigorously defend relatively large all-purpose territories of 0.2 ha (0.4 a), in which they build a series of 7 to 13 spherical, dummy nests over a period of 2 to 3 months (Burns 1982). The female selects a nest and lines it with grass, sedge, and feathers over a period of 3 days; the 7-egg clutch is then initiated and added to daily. A 14-day incubation period starts before completion of the clutch; hatching therefore extends over a 2- to 3-day period. The nestling period lasts about 2 weeks.

A quarter or more of the males are polygynous, and many of the primary (first-nesting) females raise second clutches, thus continuing the nesting cycle well into August. Because males are busy courting new females, constructing nests, and defending territories, the female gets little assistance during the nesting cycle. She is solely responsible for lining the nest and for incubating the eggs; in addition, she does most of the feeding of the young. Despite the male's inattention, nesting success is relatively high (Crawford 1977; Burns 1982), presumably because the nest is covered and difficult to locate. Nothing is known about postfledgling dependency or dispersal of the young. Because of this wren's apparent scarcity and its habit of skulking, its fall departure dates are largely speculative; no sightings have been made after early September.



No. of priority blocks in which recorded

TOTAL 2 (1%)

Possible breeding:	1 (50% of total)
Probable breeding:	1 (50% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	1	3	50
Green Mountains	0	0	0
North Central	1	5	50
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

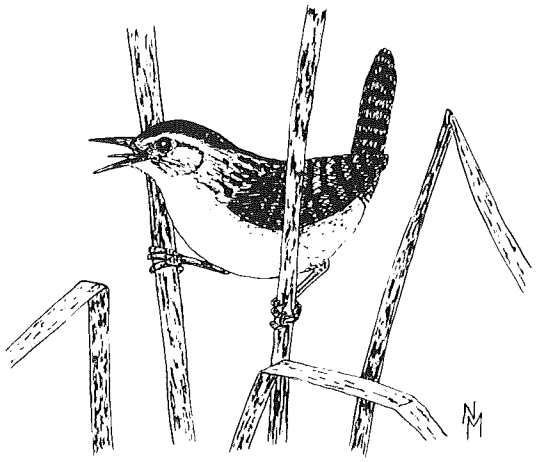
Colonies of nesting Sedge Wrens are highly mobile between seasons. Influx and egress of the birds at the active colony may occur throughout the nesting season (Burns 1982). This flux may reflect intercolonial movement or the colonization of new areas that have become more acceptable as water levels recede or vegetative growth increases. Cues that trigger movement from one acceptable nesting area to another are unknown. Mowing caused one colony in southeastern Vermont to vacate, but the subsequent fate of the colony is unknown.

Those fortunate enough to have flushed a Sedge Wren from its marshy retreat can attest to its feeble flying powers. Rarely can the bird be induced to fly more than once after being flushed; it prefers instead to evade pursuers on the ground. Nonetheless, Sedge Wrens annually migrate to and from their wintering grounds, which range along the Gulf Coast as far north as New Jersey. Southern populations apparently reside year-round at their breeding areas, playing host to an influx of northern birds each winter.

DOUGLAS P. KIBBE

Marsh Wren

Cistothorus palustris

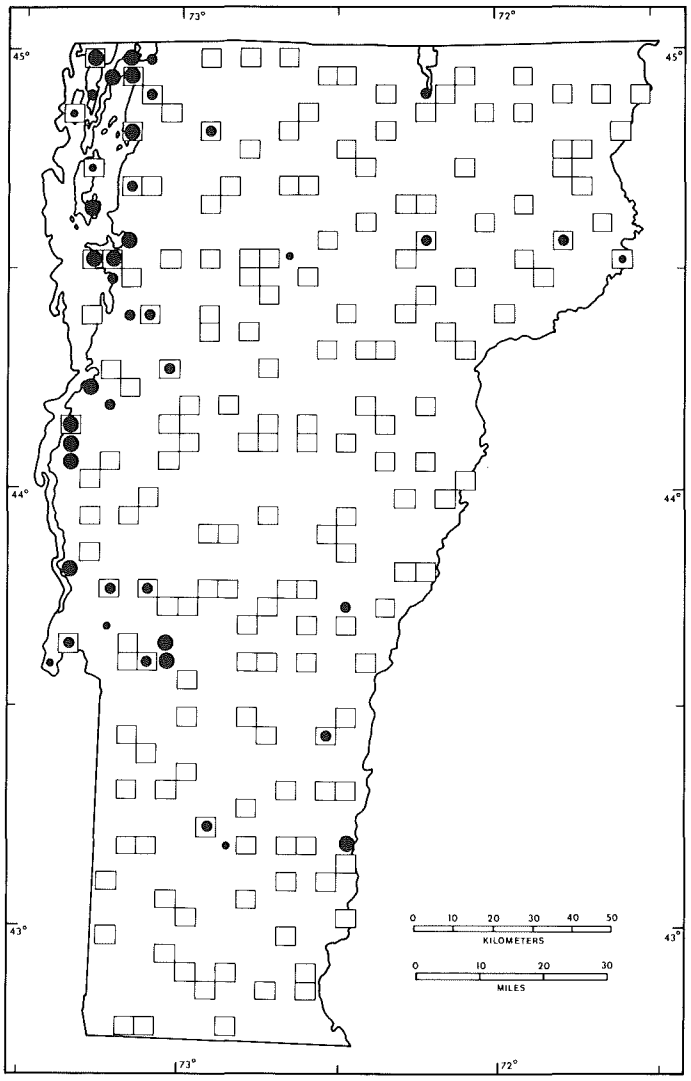


The Marsh Wren (formerly the Long-billed Marsh Wren) is conspicuous in the cattail marsh ecosystem. Breeding from coast to coast throughout North America, wherever suitable habitat is present, the Marsh Wren is an abundant bird in many wetlands. Although highly territorial, the species occurs at high density in preferred habitat. Its incessant song—a scratchy assemblage of rattles followed by a musical trill—and its habit of building dummy nests make this wren seem all the more abundant.

Although because of their habitat requirements they are quite local, Marsh Wrens are abundant in prime wetlands in Vermont. Few cattail marshes larger than 0.8–1.2 ha (2–3 a) lack this species. Small marshes, or those without open water, are usually not used. The Marsh Wren is well distributed in the wetlands of the Champlain Lowlands but elsewhere in the state its appearance is more rare. There are few occurrences recorded from the Connecticut River valley and marshes, although where present it is usually locally common to abundant. Seldom are Marsh Wrens found as isolated breeding pairs.

Marsh Wrens begin to appear in Vermont marshes during the last week of April and are common by mid May. The males are energetic imps, incessantly singing while perched on cattails or while on short fluttering flights above their territories. The male may build from 5 to 40 false nests within the 500 sq m (5,380 sq ft) territory (Welter 1935; Verner and Engelsen 1970). The actual nest, which the female may help to construct, is a spherical mass of interwoven wet cattails and sedges, lined with cattail down, fine plant matter, and feathers; access is by a side entrance. Nests are usually placed over water. False nests, which give every appearance of being real, lack linings and, often, entrances. Nests, dummy and real, may be built throughout the breeding season, since the males are polygynous and are continually seeking to attract new females to their territories. Dummy nests attract females, serving as a courting center from which the male seeks to attract mates (Verner 1965). False nests may also serve to frustrate conspecifics and predators bent on destroying the clutch. Nests are easy to find and accounted for more than three-quarters of the Atlas Project confirmations, but specific dates are available only for a dozen, found on May 29 at Herrick's Cove.

The female typically lays 5 to 6 dull brown eggs evenly dotted with darker brown. Incubation takes 13 to 16 days, and the young may fledge at 11 to 16 days of age (Verner 1965). The male, busy defending his territory and courting new mates, pays scant attention to the incubating female, but may assist in feeding the young (Verner 1965; Verner and Engelsen 1970). Territorial defense is vigorous, however, and is directed at both other Marsh Wrens and larger cohabitants of the marsh. Marsh Wrens, like Sedge Wrens, may seek out and actively destroy their neighbors' eggs, including those of Red-winged Blackbirds and Least Bitterns (Bent 1948; Picman 1977a, 1977b). Fledglings may continue to receive food from the parents for up to 2 weeks. In the portions of their range where they are year-round residents, Marsh Wrens may raise up to three broods, each nesting cycle requiring 45 to 50 days to complete (Verner 1965). Second broods may occasionally be raised in Vermont, but there are no data to support this supposition.



No. of priority blocks in which recorded

TOTAL 22 (12%)

Possible breeding:	3 (14% of total)
Probable breeding:	13 (59% of total)
Confirmed breeding:	6 (27% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	14	45	63.5
Green Mountains	1	2	4.5
North Central	1	5	4.5
Northeast Highlands	2	12	9.0
East Central	0	0	0
Taconic Mountains	3	19	14.0
Eastern Foothills	1	4	4.5

Marsh Wrens become quiet and hard to locate during the postnuptial molt; consequently, their departure from Vermont's marshes is seldom noticed. Most are gone by the end of September, although individuals may linger into winter.

Early authorities (Minot 1895; Perkins and Howe 1901; Allen 1909) considered the Marsh Wren a rare breeder or visitor in Vermont. Whether this was a true reflection of its status in the entire state, or only of its local status around Lakes Champlain and Memphremagog is debatable, since Forbush (1927) considered it a common but exceedingly local summer resident in Vermont—a status it continues to hold today. Since Vermont's wetlands have not changed significantly in the past century, and the Marsh Wren has not exhibited marked range extensions in other northeastern states, earlier assessments were probably based on insufficient knowledge of the Champlain wetlands. Interestingly, however, the only nesting records along the Connecticut River come from the marshes that resulted from the impoundment of the river at Bellows Falls. Perhaps before the establishment of these marsh communities, which now extend for miles along the Vermont shore, the Marsh Wren was indeed a rare visitor to eastern Vermont.

DOUGLAS P. KIBBE

Golden-crowned Kinglet

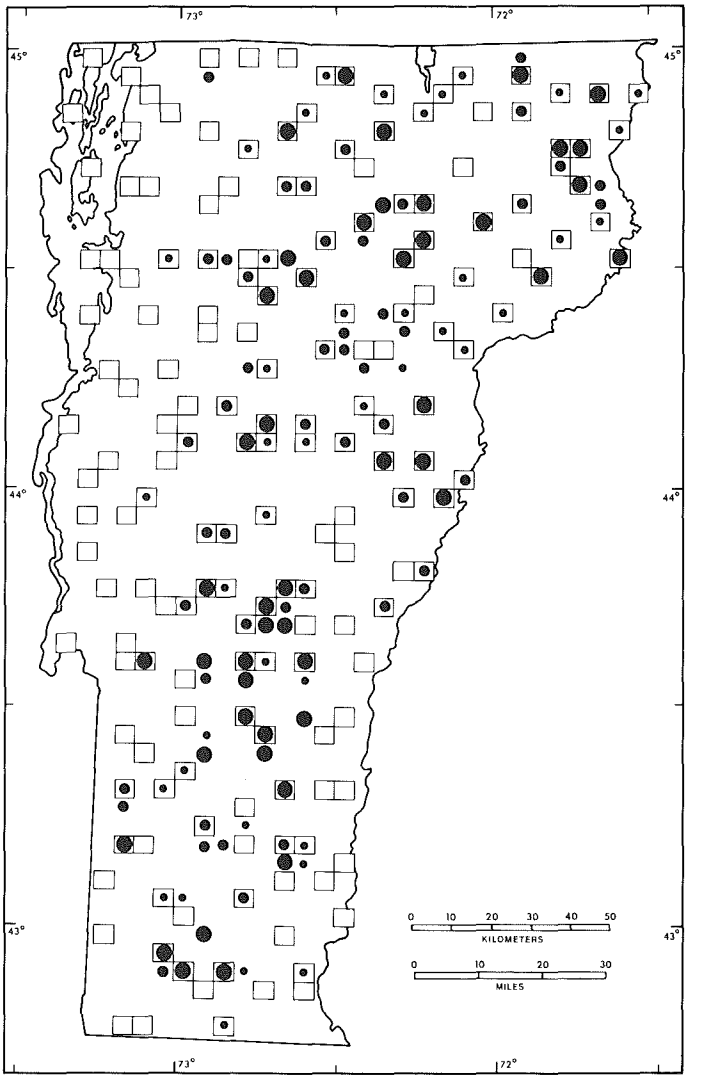
Regulus satrapa

Golden-crowned Kinglets invariably inhabit woodlands dominated by conifers. This species particularly prefers mature stands of spruce, both native and exotic. The species' preference for spruce appears to be related to a combination of factors involving nest sites and foraging behavior. Morse (1976) found that Golden-crowned Kinglets forage mostly in the thick branch-tip foliage of spruces, an area that excludes heavier birds such as most wood warblers. Kinglet nests are usually placed in thick coniferous foliage. Sabo (1980) found that in the White Mountain subalpine habitats of New Hampshire the species was most abundant in virgin stands of spruce. In upstate New York, Andrle (1971) found that 35- to 40-year-old stands of Norway spruce with thick canopies and a DBH of more than 15 cm (6 in) had been colonized by Golden-crowned Kinglets between 1950 and 1970. He suggested that these isolated plantations provide the proper structural and microclimatic habitats for the species.

Golden-crowned Kinglets can be difficult to locate because of their diminutive size, the concealing characteristics of their habitat, and their high-pitched calls, which are outside the range of many people's hearing. The song consists of 4 to 5 high introductory notes that go up the scale, followed by descending, complex, and harsh chickadee-like chatter. The species' habit of branch-tip foraging and its conspicuous hovering often allow sightings by alert observers. Squeaking and swishing sounds will often lure these curious birds into view. The nest itself is extremely well hidden. The principal method of confirming the Golden-crowned Kinglet during the Atlas Project was observation of parents carrying food to young (65% of all confirmations; sightings of dependent young provided 24% of all confirmations).

The Golden-crowned Kinglet winters in Vermont in small numbers. Migration peaks noticeably from late March to early May and from late September to early November. Three egg dates for Vermont, ranging from May 30 to June 8, probably reflect the peak of egg laying. The nest is a pouchlike structure of moss, lichens, and spider web, lined with fine bark, black rootlets, and feathers, often those of grouse. Nests are normally placed well away from the tree trunk in a fork at a branch-tip in thick foliage. Nests are 1.8–18.3 m (6–60 ft) above the ground; the normal range is 9.1–15.2 m (30–50 ft) (Bent 1949). The eggs are white with gray or brown speckling, and number from 5 to 10; 8 or 9 is the usual number. The nest is so small that the eggs are deposited in two layers. There are no data for Vermont on nestlings; five Vermont dates for recently fledged young range from June 28 to July 20.

The Golden-crowned Kinglet is probably more widespread today than it was 100 years ago because of the extensive reforestation that has occurred in Vermont since that time. The kinglets' wintering in a northern range occasionally results in large population fluctuations. L. H. Ross (Field notes) noted very low numbers of kinglets in the late 1930s, and the harsh winter of 1976–77 caused declines throughout the species' eastern range (Robertson 1977). Sabo (1980) recorded a 56% decline in Golden-crowned Kinglets in the White Mountains of New Hampshire between the summers of 1976 and 1977. Much of the Atlas Project work was carried out after this decline, so the species map probably shows a restricted dis-



No. of priority blocks in which recorded

TOTAL 99 (55%)

Possible breeding:	34 (34.3% of total)
Probable breeding:	29 (29.3% of total)
Confirmed breeding:	36 (36.4% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	2	6	2.0
Green Mountains	39	72	39.4
North Central	14	74	14.1
Northeast Highlands	15	94	15.2
East Central	17	89	17.2
Taconic Mountains	4	25	4.0
Eastern Foothills	8	33	8.1

tribution rather than the potential extent of the species' Vermont range.

During the Atlas Project this species was almost unknown in the Champlain Lowlands, where it was absent from 94% of the priority blocks. Golden-crowned Kinglets were very local in the Taconic Mountains and Eastern Foothills, where they were absent from 75% and 67% of the priority blocks, respectively. The highest incidences of occurrence were in northeastern Vermont and the Green Mountains—particularly the Northeast Highlands, where the kinglet was present in 94% of the priority blocks.

WALTER G. ELLISON

Ruby-crowned Kinglet

Regulus calendula

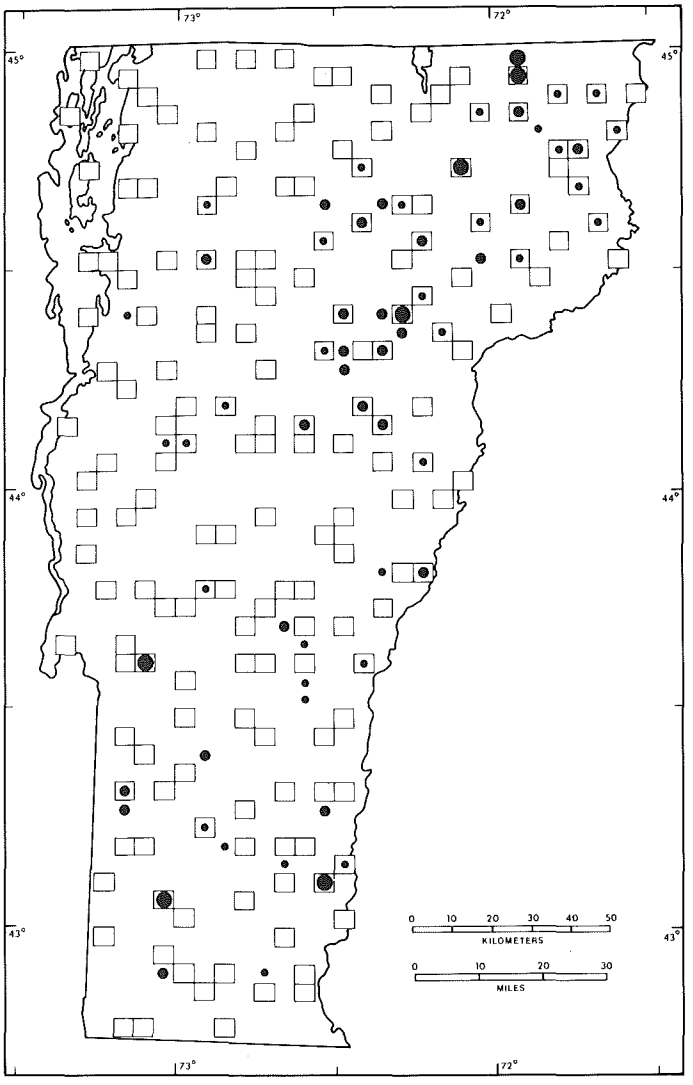
The Ruby-crowned Kinglet is a bird of coniferous forests; it appears to be more closely associated with native spruce and fir than the Golden-crowned Kinglet. In Vermont, the Ruby-crowned Kinglet is most frequently encountered in stands of spruce and fir at the edges of bogs, small ponds, and lakes. Sabo (1980) found that in subalpine habitat in New Hampshire the species tended to select sites near standing water. The Ruby-crowned Kinglet appears to prefer open woodlands and edge over the dense mature stands inhabited by the Golden-crowned Kinglet (Lepthien and Bock 1976). Rabenold (1978) recorded more generalized feeding habits by the Ruby-crown than by the Golden-crown—an indication of possible subordination of the former to its congener, which might in part explain the Ruby-crown's absence from the subalpine ridge habitats that support the Golden-crown.

The best indication of the presence of breeding Ruby-crowned Kinglets is a male singing over an extended period of time. The song has two segments: the first is composed of 2 to 4 high, sibilant notes that are difficult to hear even quite near the bird; the second consists of 3 to 5 startlingly loud, mellow-toned, whistled triplets delivered jerkily and in quick succession. The nest is difficult to discover because it blends extremely well into the evergreen foliage in which it is placed. Henderson (1949) located nests by watching kinglets return to them and by rapping on the trunks of nest trees to induce distraction behavior from the female.

The Ruby-crowned Kinglet is a short-distance migrant. Most eastern Ruby-crowns winter from the Carolinas through the Gulf Coast states (Lepthien and Bock 1976). The species returns to Vermont during mid April; most are on nesting territory by mid May. Migrants may be seen in nonbreeding areas as late as the third week of May. The nest is a pendant structure of moss and lichens placed in thick foliage on a side branch of a spruce or fir. Nest heights are at 0.6–30.5 m (2–100 ft); most are 4.6–9.2 m (15–30 ft) off the ground (Bent 1949). The 5 to 11 eggs are white with red-brown spotting (Bent 1949). There are no dates for eggs in Vermont. The incubation and nestling periods of the Ruby-crowned Kinglet are unreported, but probably compare to those of related species. There is a single reported nestling date for Vermont—June 25. The autumn migration begins in early September and peaks in October. A few kinglets remain to mid November, or rarely, December.

There were no definite breeding records for the Ruby-crowned Kinglet in Vermont before the Atlas Project. Cutting (1884) and Spear (1976) made general, but not specific, references to breeding by the species in Vermont. Peterson and Peterson (1980) also included Vermont in the Ruby-crowned Kinglet's breeding distribution. The Atlas Project resolved any doubt in the matter by recording a total of seven confirmations of breeding from 1977 to 1981.

Atlas Project records of the Ruby-crowned Kinglet were most numerous in the North Central region and the Northeast Highlands, where it was recorded in 63% and 69% of the priority blocks, respectively. There was a scattering of records from all other regions. The species was reported from a surprisingly low proportion of the priority blocks in the Green Mountains. A



No. of priority blocks in which recorded

TOTAL 42 (23%)

Possible breeding:	23 (55% of total)
Probable breeding:	13 (31% of total)
Confirmed breeding:	6 (14% of total)

Physiographic regions in which recorded

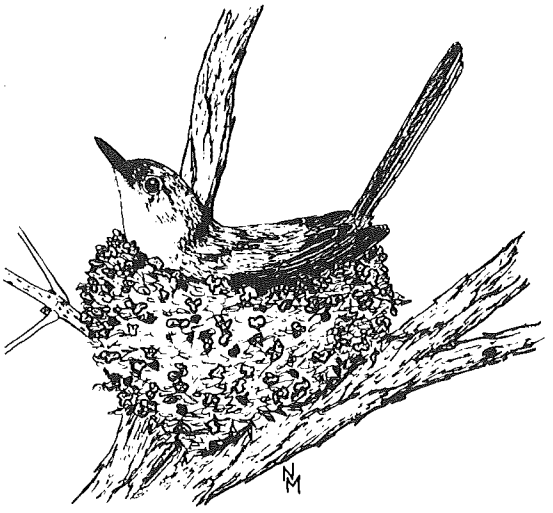
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	2	6	5.0
Green Mountains	6	11	14.0
North Central	12	63	28.5
Northeast Highlands	11	69	26.0
East Central	5	26	12.0
Taconic Mountains	2	13	5.0
Eastern Foothills	4	17	9.5

significant number of records of possible breeding outside of northeastern Vermont may have been of late-migrating, nonbreeding birds, present only for short periods in early June. Probable and confirmed records outside of northeastern Vermont are from areas of uniform high elevation with standing water and pockets of suitable habitat, such as Conant Swamp in Thetford.

WALTER G. ELLISON

Blue-gray Gnatcatcher

Polioptila caerulea

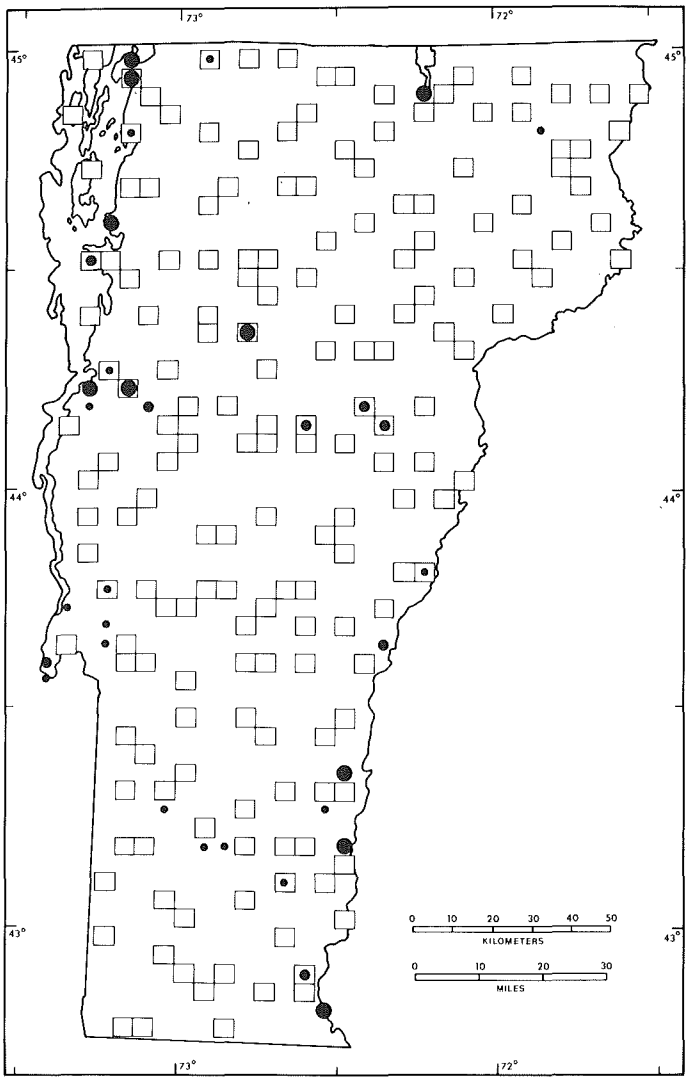


The Blue-gray Gnatcatcher begins the journey north from its wintering grounds (the southern U.S. to Central America) in early March, usually arriving in Vermont during the last week in April. Its preference for wet bottomland forest and swamp, in the North at least (Grube 1957), has confined it in Vermont almost entirely to the waterways, particularly the Connecticut River drainage system and the Champlain Lowlands. The gnatcatcher is much less particular about its habitat in the far South, where it nests anywhere there are trees suitable for nest sites, from wooded residential sections of cities and towns to well-forested areas (Bent 1949). Although still considered rare in Vermont, its numbers have been steadily increasing as it expands its range northward (RVB 1973–83). The Blue-gray Gnatcatcher now breeds nearly to the Vermont-Quebec border; in July 1978 a pair was observed feeding newly fledged young (FY) on the Barton River in the North Central region (ASR, G. F. Oatman), and in July 1980 a nest with young (NY) was found in the Missisquoi National Wildlife Refuge (ASR, E. Ellis and D. Clark).

Upon arriving on the breeding grounds the male sets up a 2 ha (4.5 a) territory which it defends (occasionally with the aid of the female) before nest building. Bent (1949) described the nest as "a beautiful, cup-shaped nest, compactly built of plant down and similar materials bound together with insect silk and spider web and covered externally with bits of lichen." Well camouflaged, the nest is saddled on a horizontal limb 1–24 m (4–80 ft) above the ground. Species of nesting trees vary in Vermont: oak, eastern cottonwood, willow, American elm, red and silver maple, butternut, and shagbark hickory are used. The average nest takes 12 to 15 days to complete. If the nest site is abandoned, the gnatcatcher frequently tears the old nest apart and reuses the building materials in a new nest. Root (1969) noted that both members of the pair give a few calls when approaching and leaving the nest, thus making it easy for observers to find nests during the construction period. Observations in Vermont (where nests are built in May) bear this out.

Three to 6 (commonly 4) eggs are laid on consecutive days, 10 to 14 days after the nest is completed. Incubation, which is shared by the adults, takes about 13 days; young fledge 10 to 12 days later. Brooding and feeding of the young is shared by both parents, although the females apparently assume the most active role with early broods, and the males with fledglings of late broods (Root 1969). Vermont nesting data are scant. Dates for eggs range from May 25 through June 8 (six dates); nestling dates range from May 21 through July 19 (three dates); and fledgling dates are from June 27 to July 1 (three dates). Dates for New York State in Bull (1974) include: egg dates, May 14 through June 17; nestlings, June 1 through July 11; and fledglings, June 28 through July 25. Forbush (1929) wrote that in the greater part of their range gnatcatchers rear only a single brood in a season; two broods are normal in the far South. Bent (1949) noted that both sexes of young gnatcatchers in juvenile plumage resemble the adult female, as they lack the adult male's black forehead.

Before 1864, the Blue-gray Gnatcatcher was believed to occur in New England only when it strayed from breeding grounds in



No. of priority blocks in which recorded

TOTAL 14 (8%)

Possible breeding:	6 (43% of total)
Probable breeding:	5 (36% of total)
Confirmed breeding:	3 (21% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	6	19	43.0
Green Mountains	1	2	7.0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	3	16	21.5
Taconic Mountains	1	6	7.0
Eastern Foothills	3	13	21.5

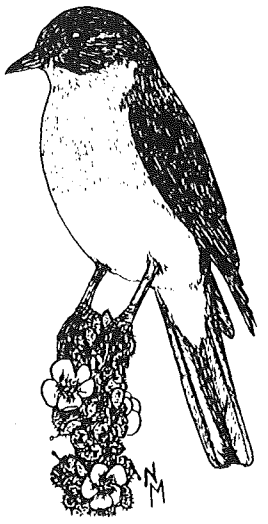
southern New Jersey and southern Ontario (Bagg and Eliot 1937). The first mention of the species in Vermont was in 1884, when Cutting (1884) listed it as "rarely seen in the southern part of the state." The first nesting record for Connecticut dates from 1947 (Saunders 1950); the first Vermont nesting record is of a pair nesting in a swampy area of Burlington in May 1954 (GMAS records, N. St. Jacques); sometime between 1965 and 1970 a fallen nest was found in the Sandbar Wildlife Management Area in Milton. Spear (1976) described the species as rare in the Champlain Valley.

Today the Blue-gray Gnatcatcher, though still considered rare in the state, is steadily increasing in numbers. It can be found with some regularity at certain localities, including Sandbar Wildlife Management Area (Chittenden County), Herrick's Cove and Vernon (Windham County), and the Springweather Nature Area in North Springfield (Windsor County), as well as at numerous spots along Lake Champlain (especially in the East Bay area of West Haven, Rutland County). If the present trend continues, the Blue-gray Gnatcatcher should be a permanent part of Vermont's avifauna in the years to come.

DONALD B. CLARK

Eastern Bluebird

Sialia sialis

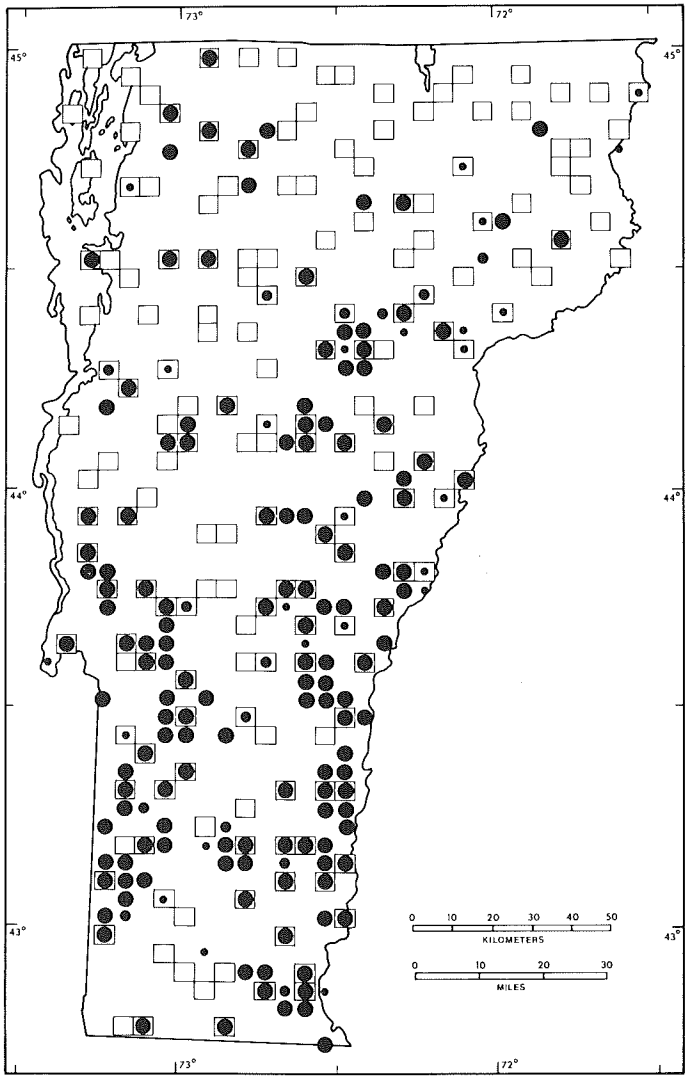


Eastern Bluebirds generally inhabit rural areas and farmlands, but they will also take advantage of open glades, beaver meadows, and forest openings created by fire or logging (Conner and Adkisson 1974; DeGraaf et al. 1980; Kiviat 1982). Their primary habitat requirements are the presence of elevated foraging perches and suitable nesting cavities, either natural or man-made (Pinkowski 1977b). Studies by Pinkowski (1977b, 1979) and Goldman (1975) showed that Eastern Bluebirds usually hunt by dropping to the ground after locating prey from a perch; therefore low vegetation facilitates foraging.

Bluebirds are not as easily located as many other open-country species, but careful scanning of fencerows and yards with nest boxes often leads to their detection. Their soft, warbling song does not carry long distances. Confirmation is not difficult, primarily because the species tends to use nest boxes. In Atlas Project priority blocks, 78% of the records were confirmations. The location of nests accounted for 69% of all Vermont Atlas Project confirmations; 39% of these nests contained young. Recently fledged young contributed an additional 18% of the confirmations.

Eastern Bluebirds winter in the central and southern U.S., returning to Vermont in late March. The female gathers dry grass or pine needles for the nest and begins egg laying within a few days of nest completion, continuing until a full clutch of 3 to 8 blue eggs (usually 4 to 5) is laid (Bull 1974). The average of 19 Vermont clutches is 4.4 eggs. Up to 3 clutches are laid in a season (Hamilton 1943; Thomas 1946; Hartshorne 1962). Dates for 24 nests containing eggs in Vermont range from April 20 to July 29. The young hatch after an incubation period of 13 to 15 days (Thomas 1946; Hartshorne 1962). Nests with young have been reported on 24 dates between May 15 and August 15 in Vermont. Nestlings fledge after 17 to 18 days, at which time the male takes over their care and the female prepares for subsequent broods (Thomas 1946; Hartshorne 1962). Fledgling dates for Vermont range from May 21 to August 23. Pinkowski (1977b) found that predation and inclement weather were common causes of nesting failure among bluebirds in Michigan, and that many pairs succeeded in raising only one brood. Family groups often stay together during migration. The peak of fall movement is during late September to early October. A few individuals may successfully winter in southwestern Bennington County during mild winters.

Early accounts of the birds of Vermont indicate that the Eastern Bluebird was common throughout the state in the mid to late 1800s (Thompson 1853; Cutting 1884). Early in the twentieth century writers described the bluebird as a common summer resident in some areas (Perkins and Howe 1901; Fortner et al. 1933). However, in the early 1900s, as bluebirds lost habitat to reforestation, they also began to experience competition for nest sites from introduced House Sparrows and European Starlings. Both of these species, being more or less sedentary, are able to claim nesting cavities before bluebirds arrive in the spring, and the larger starling can easily evict bluebirds from cavities with large enough entrances (Bent 1949; Zeleny 1976). Pruning and cutting in orchards and woodlot edges have



No. of priority blocks in which recorded

TOTAL 92 (51%)

Possible breeding:	14 (15% of total)
Probable breeding:	7 (7% of total)
Confirmed breeding:	71 (78% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	14	45	15
Green Mountains	18	33	20
North Central	8	42	9
Northeast Highlands	2	13	2
East Central	14	74	15
Taconic Mountains	14	88	15
Eastern Foothills	22	92	24

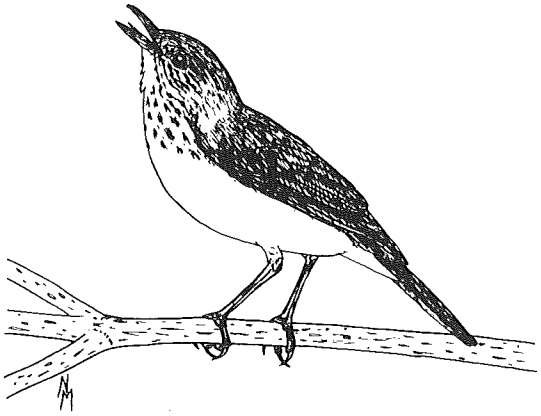
also contributed to bluebird decline by decreasing the number of natural cavities (Bent 1949; Zeleny 1976). During the winter and when they first arrive in the spring, many bluebirds die if ice or snow covers the fruit they depend on for winter food. It may take bluebird populations several years to recover after particularly harsh winters (Forbush 1929; Bent 1949).

In Vermont, two Audubon chapters—Rutland County and Ascutney Mountain—have had active nest box placement and monitoring programs. Perhaps as a result of these efforts, the Eastern Foothills and Taconic Mountains had the highest concentration of bluebird records in Atlas Project priority blocks, followed closely by the East Central region. In the Champlain Lowlands, where competition with introduced species is most severe, bluebirds were located in only 45% of the priority blocks. The areas of lowest bluebird density in Vermont are the heavily forested high elevations of the Green Mountains and the Northeast Highlands. The Eastern Bluebird has been on the National Audubon Society's Blue List since 1978. In Vermont, numbers of bluebirds could probably be increased by the placement and monitoring of additional nest boxes in suitable habitat.

NANCY L. MARTIN

Veery

Catharus fuscescens

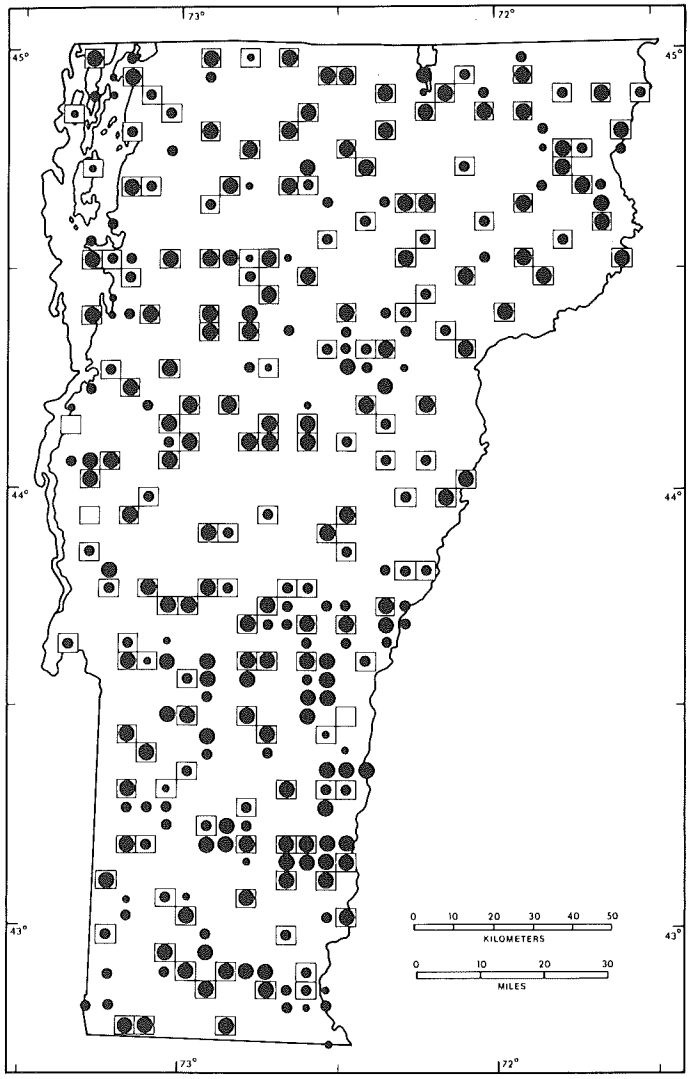


The Veery, like most woodland thrushes, is more frequently heard than seen. Most birders are familiar with its *veer* alarm call. Its melodious song, a series of downward-spiraling notes, rivals that of the Hermit Thrush. Veeries breed throughout Vermont; their range of accepted habitats overlaps that of all other thrushes except the Gray-cheeked. Although accepting a nearly ubiquitous array of breeding areas, in Connecticut Veeries preferred moist sites (Berlin 1977) and, indeed, few swamps or moist woodlands in the Northeast are unoccupied by Veeries. However, Vermont's greatest recorded breeding densities for the Veery—64 to 91 pairs per 100 ha (26 to 37 pairs per 100 a)—have been found in habitat composed of mixed forest and old fields in central Vermont (Nicholson 1973, 1975, 1978). Dilger (1956a) found that Veeries preferred disturbed (cutover) forests, presumably because of dense undergrowth there. The Veery's acceptance of varied habitat is not surprising in light of its geographic distribution: it breeds nearly coast to coast across the northern U.S. and southern Canada.

The male Veery, like the Wood Thrush, usually arrives in Vermont's woodlands during the first week of May. Advertising songs attract the female, but full pair bonding is only achieved following several days of pursuit by the male. Song bouts are particularly concentrated at dawn and dusk, with singing during the latter period most intense. As might be expected of a rather drab dweller of dimly lit forest thickets, plumage characteristics account for little in species recognition, and vocalizations are important (Dilger 1956a). Interspecific competition occurs between similarly plumaged members of the genus. Various aggressive displays (gaping, spreading of the breast plumage, crest raising) are shown by all members of the genus that occur in Vermont, and presumably result in some spatial separation in nesting areas; still, it is not uncommon to find the Veery and Wood, Hermit, or Swainson's thrushes in overlapping territories (D. P. Kibbe, pers. observ.).

The Veery's bulky nest is built on a thick foundation of dead leaves, usually among saplings or in shrubbery on or near the ground. Three to 5 pale blue eggs are laid; they are incubated for 11 to 12 days. Twenty-three Vermont egg dates range from May 26 to July 23, with a peak in early June. Nestlings grow rapidly, and they may leave the nest in as few as 10 days. Nestlings have been found as early as June 10 and as late as July 6. The fledglings' period of dependence is unknown, although it is likely to be equally as long as the nestling period. Fledglings sport buff-tipped wing coverts until the postjuvenile molt in September, and can be readily recognized. Fledglings have been recorded from July 7 to August 8, which would seem to indicate that two broods may be raised per year. Late nestings may, however, be a consequence of earlier nest failures. Postbreeding birds molt and become rather secretive until their flight feathers are fully regrown.

Confirmations of breeding by Veeries were relatively easy to achieve during the Atlas Project because adults with food for young are conspicuous as they defend their nestlings. Sixty-four percent of all priority block sightings were confirmations. The species was missing from only three priority blocks statewide; two of these blocks were in the Champlain Lowlands, where extensive agriculture has eliminated much of this species' breeding habitat.



No. of priority blocks in which recorded

TOTAL 176 (98%)

Possible breeding:	8 (4% of total)
Probable breeding:	56 (32% of total)
Confirmed breeding:	112 (64% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	29	94	16
Green Mountains	54	100	31
North Central	19	100	11
Northeast Highlands	16	100	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	23	96	13

During the breeding season, the Veery's diet is principally insect material. Veeries forage extensively on or near the ground, searching under leaves and on low vegetation for invertebrates. Migrant and molting birds can be usually found in dense berry patches since Veeries, like all thrushes, are fond of fruits.

Veeries depart from Vermont by the third week in September for their wintering grounds, which extend from Central America to Brazil. There is, however, an exceptional Vermont record for December (RVB, Winter 1981–82).

Although the Veery has always been considered common in the state (Allen 1909; Forbush 1925), recent reforestation has probably benefited the species. Vermont data from the U.S. Fish and Wildlife Service Breeding Bird survey since 1966 indicate an average annual increase in the Veery population of more than 3% (BBS 1966–79).

DOUGLAS P. KIBBE

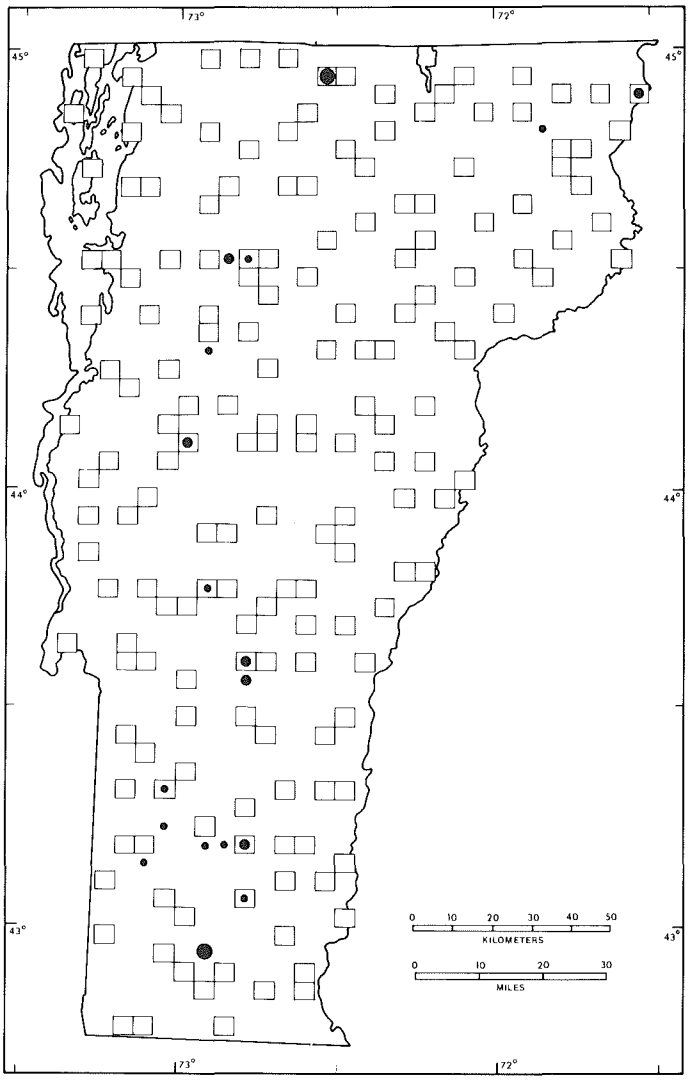
Gray-cheeked Thrush

Catharus minimus

The Gray-cheeked Thrush is the rarest member of the Turdinae subfamily breeding in Vermont. Although the species ranges from northeastern Siberia east to Newfoundland and south to Massachusetts, it is seldom encountered except during migration. Those familiar with its call note may frequently hear migrants passing overhead in late May, but the birds are shy on the ground and seldom sing except on their breeding territories. Banders using mist nets to capture migrants are more likely to be familiar with this species than is the field observer. Gray-cheeked Thrushes may easily be mistaken for their more common, look-alike cousins, the Swainson's and Hermit thrushes, unless cheek and tail color are carefully noted.

Although the Gray-cheeked Thrush occupies a variety of moist boreal forest types throughout northern Canada, the race (*C. m. bicknelli*) breeding in the mountains of the Maritime provinces, northern New England, and eastern New York is extremely selective about its habitat. In Vermont, so near the southern limit of its range, the species is restricted to the dense, often stunted, coniferous stands atop the Green Mountain peaks, generally above 914 m (3,000 ft). Populations in eastern New York and western Massachusetts show similar habitat preferences (Forbush 1927; Able and Noon 1976). Whether the species was as restricted in this part of its range before colonial settlement and agricultural clearing occurred will probably never be known. Since recorded ornithological observations began, the Gray-cheeked Thrush has never been widely distributed in Vermont. Perkins and Howe (1901) and Allen (1909) considered it a rare or uncommon summer resident. Because of its penchant for high altitudes, the species is unrecorded on the U.S. Fish and Wildlife Service's Breeding Bird Survey routes or in any Breeding Bird censuses for Vermont published in *American Birds*. Consequently, actual population densities for Vermont are unknown, and even relative estimates are difficult to obtain. Sabo (1980) found a population density of 9 per sq km and an average territory size of 2.1 per ha (2.4 a) in the White Mountains of New Hampshire. In its preferred habitat the Gray-cheeked is the most frequently encountered thrush, but nothing is known about the amount of habitat necessary to sustain a population of Gray-cheeked Thrushes, or about the size of this species' home range or various other population parameters.

Gray-cheeked Thrushes are the last of Vermont's thrushes to return in the spring. Migrants can often be found at lower elevations into early June. Denizens of dense cover, the males are shy, and their reedlike song, which slurs upward, provides the best clue to their presence on breeding territories during June and early July. Prone to singing in the evening, the species is unique among Vermont's thrushes in having an evening flight song (Dilger 1956b). The nest site is variable; nests may be placed on the ground or in a coniferous or deciduous tree up to 6 m (20 ft) above the ground. Like most of its congeners, the Gray-cheeked usually constructs its nest from grass, mud, moss, and leaves, with little lining. The 3 to 6, usually 4, light green-blue to pale blue eggs are faintly marked with brown. June 22 is the only Vermont egg date available (Allen 1909). Incubation takes 12 to 14 days (Jehl and Hussell 1966; Terres 1980), and the



No. of priority blocks in which recorded

TOTAL 9 (5%)

Possible breeding:	4 (44.5% of total)
Probable breeding:	4 (44.5% of total)
Confirmed breeding:	1 (11.0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	7	13	78
North Central	0	0	0
Northeast Highlands	1	6	11
East Central	0	0	0
Taconic Mountains	1	6	11
Eastern Foothills	0	0	0

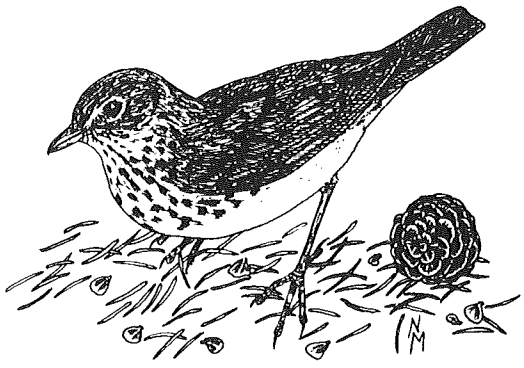
young may be able to fly at 11 to 13 days of age (Bent 1949). Fledglings sport buff-tipped wing coverts until the fall postjuvenile molt. The timing of fall migration in Vermont breeding populations is poorly known. Not only are the remote mountaintops rarely visited by birders, but the influx of migrant Gray-cheekeds from the extensive Canadian breeding range obscures the departure of local birds. All, however, are gone by the end of September.

Vermont protects some of its higher elevations under its state land-use law (Act 250), thus helping to insure continued nesting habitat for the Gray-cheeked Thrush and other cohabitants (such as the Blackpoll Warbler) of high-altitude boreal forests. Farther north these species are widely distributed and may be less discriminating in their habitat choice. At the southern limit of their range, however, they are highly selective, and their continued existence in the state depends on the health of these limited, environmentally sensitive areas.

DOUGLAS P. KIBBE

Swainson's Thrush

Cartharus ustulatus



The Swainson's Thrush is a common but relatively inconspicuous breeder in the mixed coniferous-deciduous forests of Vermont's higher elevations. It typically occurs in habitats just below those occupied by the Gray-cheeked Thrush. Holmes and Sawyer (1975) concluded that the Swainson's Thrush was physiologically less well adapted to cool mountaintop climates than the Gray-cheeked Thrush. This explanation only partly accounts for the habitat segregation observed, since Swainson's Thrushes at northern latitudes may occupy more rigorous environments than those occupied by Gray-cheeked Thrushes at the southern edge of their breeding range. Able and Noon (1976), on the basis of their studies in Vermont and New York, hypothesized that interspecific aggression reinforced spatial competitive exclusion in Gray-cheeked and Swainson's thrushes. Noon (1981), after conducting song playback experiments, concluded that the thrushes responded more strongly to songs of conspecifics. He further concluded that interspecific interactions contributed little to habitat selection of these species.

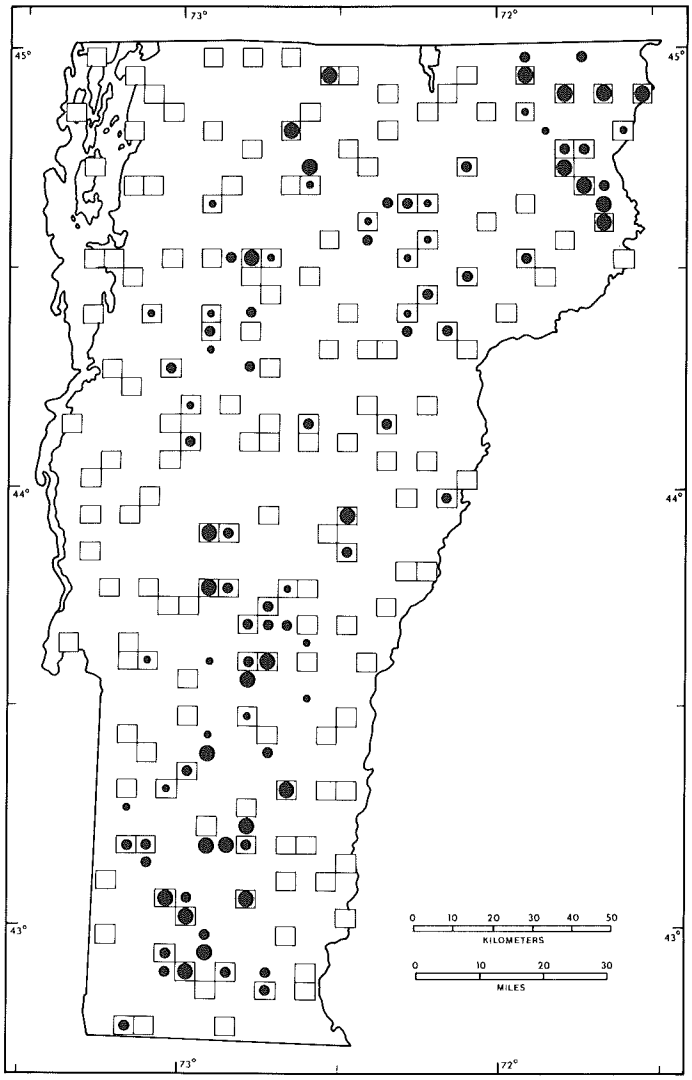
The Swainson's overlaps the Veery and Hermit Thrush in its habitat selection at the lower elevations. Morse (1972) concluded from studies in Maine that the Hermit Thrush was dominant over the Swainson's. The elevation at which the Swainson's breeds has proven remarkably consistent; on Camels Hump, for example, it was found at 700–1,100 m (2,296–3,608 ft), while on Mt. Mansfield it was present at 750–1,100 m (2,460–3,608 ft) (Able and Noon 1976). In Canada the species is more widespread and apparently occupies niches that are filled by the Veery and the Hermit Thrush at more southern latitudes.

The breeding range of the Swainson's Thrush extends from northern Alaska and Canada southward through mountains to California, Colorado, and West Virginia. At the southern limit of its range it is extremely local. The species winters in South America, returning to Vermont in mid May. Migration may still be ongoing in early June, however. The species is most widely distributed in Vermont in the North Central, Green Mountain, and Northeast Highland regions, reaching its greatest frequency of occurrence in the latter region. There were records from all of the Atlas Project physiographic regions in the state, but possible breeding records from the Champlain Lowlands as well as from other lower elevation blocks may well represent late migrants.

The Swainson's Thrush may be found in both undisturbed and selectively logged woodlands. The species prefers areas with openings in the canopy that facilitate its habit of hawking for passing insects (Noon 1981). Prime territories are dense thickets near streams. Although they share woodlands in Vermont with several ground-foraging thrushes, Swainson's Thrushes flycatch frequently, thus reducing, presumably, interspecific competition (Dilger 1956b, Noon 1981).

Since it breeds in mountainous areas in Vermont, the Swainson's Thrush is less well known to most observers than more common members of its family. The Swainson's song, an ascending spiral, is nonetheless an integral part of the dawn symphony in the Green Mountains.

The nest, a compact structure of moss, leaves, twigs, and mud lined with finer material, is well hidden next to the tree trunk, 0.6–2.1 m (2–7 ft) above ground. Nest building has been observed as early as May 21. Three to 5 bluish eggs, speckled with reddish brown, are laid; they are incu-



No. of priority blocks in which recorded

TOTAL 64 (36%)

Possible breeding:	17 (26% of total)
Probable breeding:	28 (44% of total)
Confirmed breeding:	19 (30% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	5	16	7.2
Green Mountains	26	48	40.2
North Central	10	53	15.2
Northeast Highlands	12	75	18.2
East Central	6	32	9.0
Taconic Mountains	4	25	6.0
Eastern Foothills	3	12	4.2

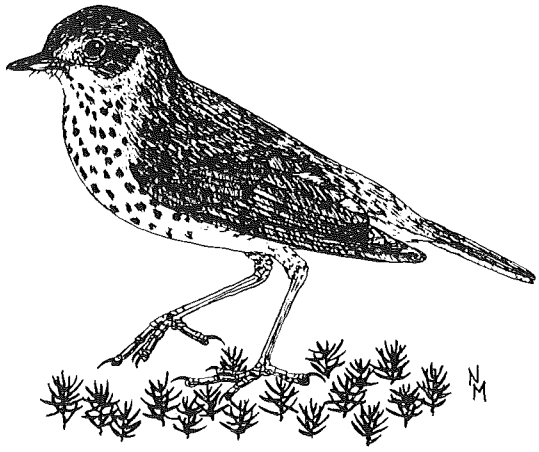
bated by the female for 10 to 13 days. Nests with eggs have been found in Vermont between June 8 and 26. Both parents tend the young, which leave the nest in 10 to 12 days. Fledglings have been observed as late as August 10. Swainson's Thrushes frequent lower elevations during migration, and may be found in some numbers in berry-laden forest thickets in the fall. Most have departed Vermont by October 20.

The Swainson's Thrush has apparently always been a relatively uncommon inhabitant of Vermont forests. Although agricultural clearing in the 1800s may have caused the species' distribution to contract, actual data are wanting. Today the Swainson's is widely distributed, and is probably most abundant at the higher elevations of the Green Mountains.

DOUGLAS P. KIBBE

Hermit Thrush

Catharus guttatus



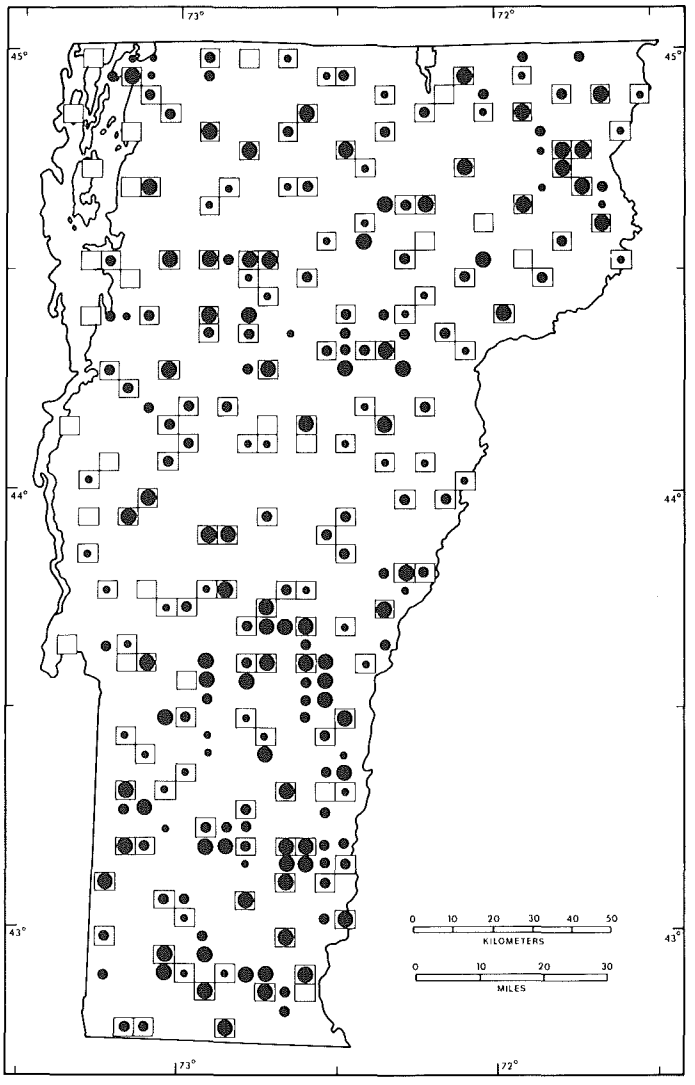
The Hermit Thrush, considered by many to be the finest songster in North America, is Vermont's state bird. Although its flutelike song can be heard throughout much of the state during spring and summer, probably only a small fraction of the state's populace has actually seen the species. The Hermit Thrush is, however, easily recognized by its rufous rump and its habit of raising and lowering its tail after alighting or when alarmed. Early proponents of the Hermit Thrush as a state symbol may have been inspired by its ethereal song, a series of ascending and descending bell-like notes, which may also have inspired one of this bird's colloquial names—American nightingale.

The Hermit Thrush, one of the first woodland species to return to Vermont each spring, usually arrives between April 7 and April 21, nearly a month before many of its congeners. Unseasonably warm weather during the early spring of 1976 brought a first arrival on March 18 (RVB, Spring 1976). Autumn migrants consistently peak between October 10 and 18. Occasionally, Hermit Thrushes attempt to overwinter in Vermont; they are known to visit feeding stations (Bull 1974).

Although often thought of as a species of mixed hardwood and boreal forests of the mountainous regions, Hermit Thrushes may be found in a variety of woodland types. They are more often associated with dense coniferous or mixed deciduous-coniferous woodlands than with pure deciduous forest (Dilger 1956b). Noon et al. (1979) reported that the species may be more frequently encountered in disturbed and successional habitats than in mature habitats; the former may include margins of old burns, margins of lakes and bogs, or pioneer stands of aspen, white birch, and cherry that have become established as part of old field succession. Because they share habitats with several closely related thrushes, Hermit Thrushes provide excellent examples of niche partitioning (Dilger 1956a, 1956b). Interspecific competition reportedly determines many of the observed habitat relationships among birds in the Northeast (Noon 1981); nonetheless, many habitats support two or three species, indicating that coexistence is possible and that breeding habitat requirements are satisfied by a broad range of communities.

The Hermit Thrush is sparsely but widely distributed throughout Vermont, and is probably only excluded from portions of the Champlain Lowlands by lack of suitable habitat. Vermont breeding-bird mapping studies of suitable edge and second-growth communities (Williamson 1972, 1975; Nicholson 1973, 1974, 1975; Carpenter 1973) yielded Hermit Thrush densities of 5 to 18 pairs per 40.5 ha (100 a). Wood Thrush and Veery densities in these communities were generally twice those of Hermit Thrushes. Perkins and Howe (1901) and Fortner et al. (1933) alluded to the species' abundance and widespread distribution throughout Vermont. Davenport (1907) wrote that the Hermit Thrush was probably the most common thrush in Bennington and Windham counties.

Normally a ground nester, the Hermit Thrush may occasionally build its nest low in a small tree. The nest is a compact cup of mud and coarse fibers with a fine lining. From 3 to 6, usually 3 to 4, pale blue eggs are laid (Harrison 1978). Of 9 Vermont clutches, 4 had 3 eggs and 5 had 4 eggs.



No. of priority blocks in which recorded

TOTAL 155 (86%)

Possible breeding:	45 (29% of total)
Probable breeding:	54 (35% of total)
Confirmed breeding:	56 (36% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	18	58	12
Green Mountains	53	98	34
North Central	16	84	10
Northeast Highlands	15	95	10
East Central	18	95	12
Taconic Mountains	13	81	8
Eastern Foothills	22	92	14

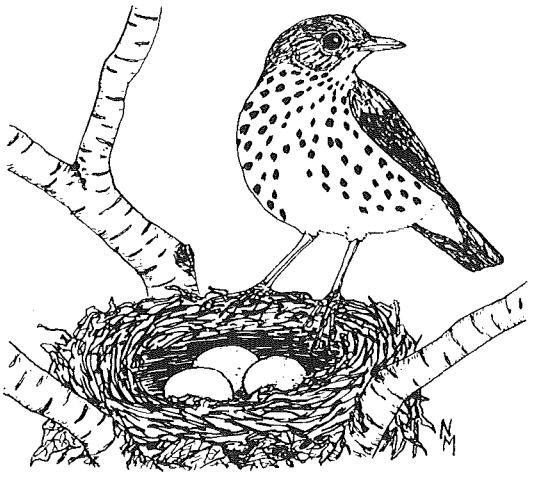
Hermit Thrushes are infrequent hosts to Brown-headed Cowbird eggs (Friedmann 1963). The nesting season is prolonged, with Vermont dates for 14 nests with eggs ranging from May 13 to August 17; 7 of these nests were found between May 23 and June 6. The extended breeding period would probably allow Hermit Thrushes to raise a second brood, but this has not been documented. Four nestling dates for Vermont range from June 10 through August 10, and five fledgling dates fall between June 10 and July 17. Incubation, performed by the female, lasts 12 days; the young fledge after a similar length of time. Hermit Thrushes are relatively difficult to confirm because of their retiring nature. Most Atlas Project confirmations in Vermont were based on adults feeding young or on fledglings.

Severe winter weather in the southern U.S. may cause significant losses of birds. A decline in Hermit Thrush numbers on 1977 U.S. Fish and Wildlife Service Breeding Bird surveys was probably related to the severity of the previous winter (BBS 1966–79; Robertson 1977). The species' numbers have increased gradually since that time. With much of Vermont reverting to forest, this species will probably continue to inhabit the state.

DOUGLAS P. KIBBE

Wood Thrush

Hylocichla mustelina

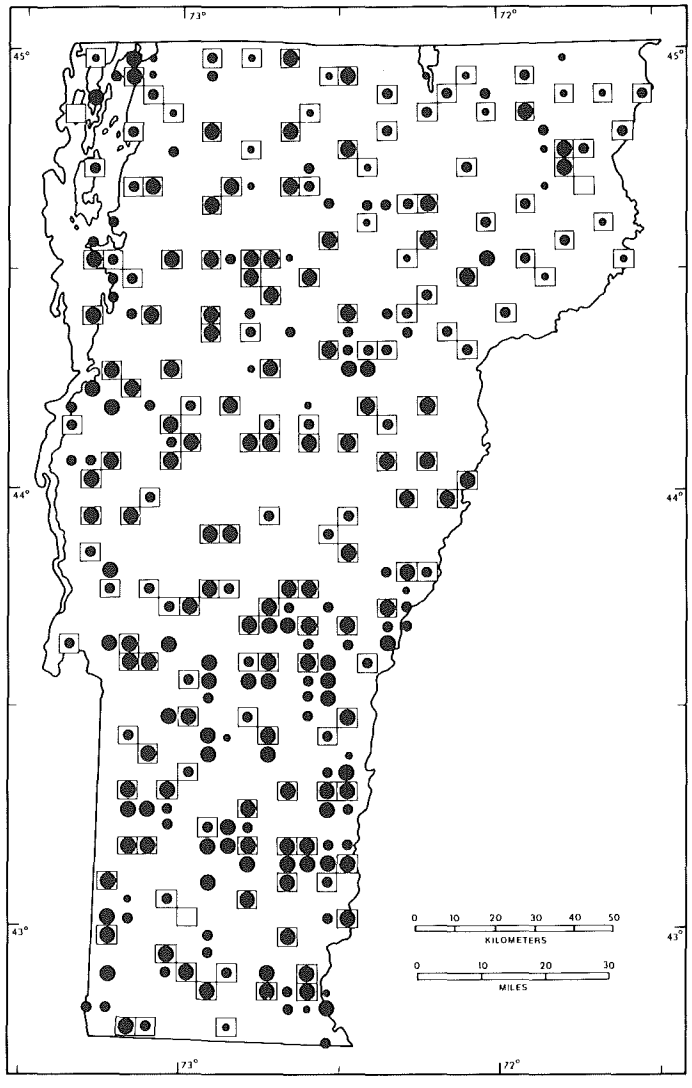


The Wood Thrush is the largest of Vermont's woodland thrushes. Its loud, liquid, bell-like notes resound through Vermont's woodlands, beginning early in May. Although its preferred habitats greatly overlap those of the Veery and Hermit Thrush, the Wood Thrush appears to favor mature woods (Bertin 1977). It particularly favors moist, bottomland deciduous forests for breeding. Coniferous stands support few if any Wood Thrushes. Relatively tolerant of man's presence, like the American Robin, Wood Thrushes are frequently found on forest edges and occasionally in suburban areas. Greatest Vermont densities, 30 to 37 pairs per 40.5 ha (100 a), have been recorded at a mixed forest-homestead site (Nicholson 1975, 1978), but densities of 5 to 26 pairs per 40.5 ha (100 a) appear to be more typical of occupied habitats; lowest densities are recorded for mixed coniferous-deciduous sites and at higher altitudes. Although now distributed throughout Vermont, Wood Thrushes were probably once less common in the state's forests. The extensive clearing that accompanied the eighteenth-century sheep-raising boom must have reduced suitable breeding habitat, but whether the species was common or even present in the state before the 1800s is unclear.

The Wood Thrush's breeding behavior has been intensively studied (Dilger 1956a; Brackbill 1958). Males return to the breeding ground ahead of the females and occupy and defend territories against all conspecifics, male or female. The earliest date of return for Vermont is April 24. Advertising songs are given throughout the breeding period; there are pronounced peaks at dawn and dusk. Conspecifics entering a territory are assailed by high-intensity singing and a spread display (in which the breast feathers are fluffed to maximize the bird's frontal profile) with concurrent crest raising. Invading males usually retreat from the territory, while females are reluctant to leave and are subsequently pursued. Although it may take three to four days, the courtship pursuit eventually approaches a sedate level, at which point the pair bond is established and nesting may proceed.

Placement of the nest closely resembles that of the American Robin; nest composition is also similar, though typically the Wood Thrush uses more dead leaves and moss instead of mud, and lines the nest with rootlets rather than grass. The Vermont Institute of Natural Science's nest collection contains three Wood Thrush nests decorated with strips of plastic that have been worked in with the dead leaves. Nests are saddled on branches or in crotches of saplings or trees, 2–4 m (6–12 ft) above ground level, rarely at 15 m (50 ft).

Eastern hemlock appears to be a preferred nest tree in Vermont, although other conifers and deciduous trees are also frequently used. Nest building in Vermont has been observed as late as June 8. Nest construction may take 5 to 7 days (Brackbill 1958). Usually 3 to 4 (rarely 2 or 5) blue-green eggs are laid; they are incubated by the female for 13 to 14 days. Since incubation normally starts with the laying of the second egg (Brackbill 1958), hatching may occur over a 2-day period. Vermont egg dates range from May 20 to July 5, but show a marked peak in late May and the first 3 weeks of June. Atlas Project observers had little difficulty locating and confirming this species; most confirmations (57%) were



No. of priority blocks in which recorded

TOTAL 176 (98%)

Possible breeding:	17 (10% of total)
Probable breeding:	58 (33% of total)
Confirmed breeding:	101 (57% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	30	97	17
Green Mountains	53	98	30
North Central	19	100	11
Northeast Highlands	15	94	8
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	14

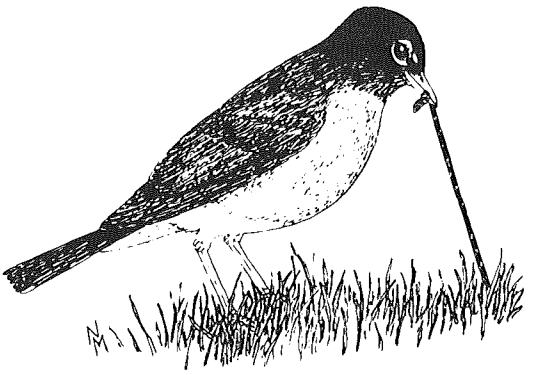
of adults carrying food for young. Nests with young were recorded from June 12 through July 16 (13 records). Fledgling Wood Thrushes are readily identifiable in the field by their gangly actions and light-tipped wing coverts. Fledglings were noted as early as June 22 and as late as July 16, and a sizeable proportion (32%) of all confirmations were of fledglings. Brackbill (1958) observed that fledglings began to forage for themselves at 17 to 18 days of age (about 4 days after fledging), but remained on the male's territory and were fed until 24 to 27 days of age. Although Wood Thrushes farther south frequently raise second broods, the cluster of Vermont egg dates in early June seems to indicate that pairs infrequently attempt second clutches in this state. Early July egg dates could easily indicate renesting efforts following the failure of the first attempt.

Although the largest of Vermont's woodland thrushes, the Wood Thrush is by no means the hardiest. Most birds depart from Vermont in mid September for their wintering grounds from Mexico south to Panama, and all are normally gone by mid October.

DOUGLAS P. KIBBE

American Robin

Turdus migratorius

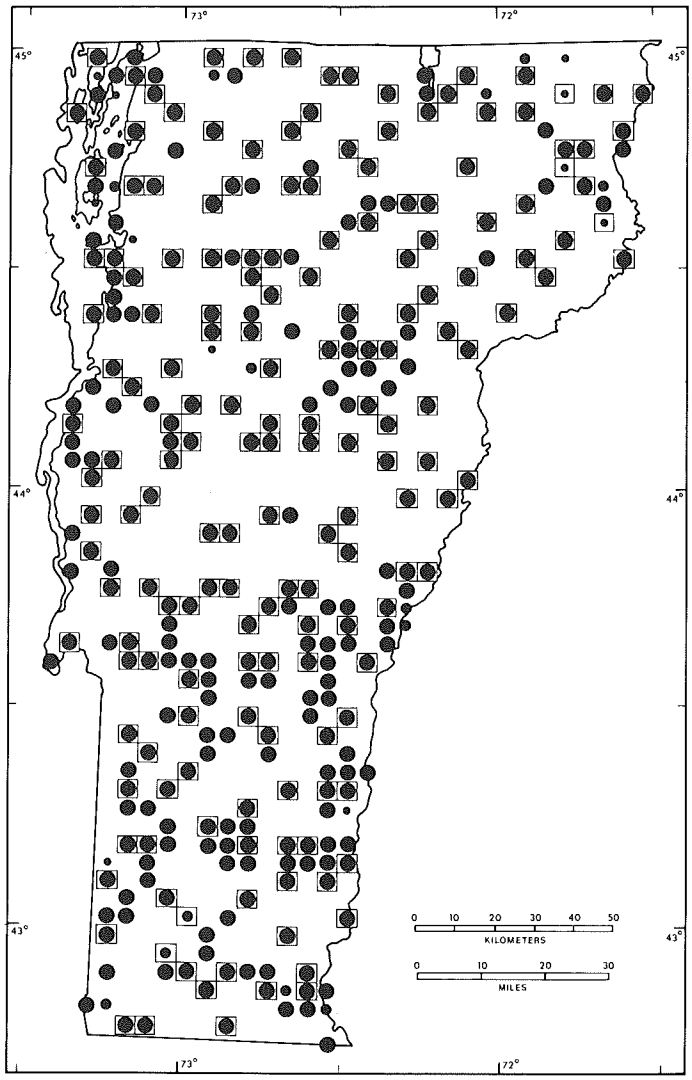


Long popularized in verses (many of which refer to the unrelated European Robin [*Erithacus rubecula*]), the American Robin rivals apple pie as an American institution. Certainly it is the most familiar bird to millions of casual observers across the country. The American Robin owes its success, if not its popularity, to its ability to adapt to man-altered environments and to a prodigious reproductive ability. A single pair has been known to raise up to three broods in a breeding season; normally two are raised (Terres 1980).

Although American Robins bred in every Atlas Project priority block within Vermont, the species is noticeably scarce, even rare, in forested areas unbroken by roads or human habitation. In the vicinity of such openings, however, the robin thrives, and consequently ranks as one of the most abundant species in the U.S. Fish and Wildlife Service's Breeding Bird surveys in Vermont. Around towns and villages their conspicuousness is heightened by their habit of foraging on mowed lawns (Eiserer 1980) and in other open areas for worms and insects, as well as by their prolonged breeding season, which keeps pairs busy about their nest sites from April through July. Cohabitation with man has exposed robins to a variety of toxic chemicals, and reproductive failures noted in robin populations were among the first signs alerting environmentalists to the dangers of DDT (Hickey and Hunt 1960). Though still exposed to a myriad of pesticides and herbicides, robin populations appear to be thriving in areas where they were once depleted (Beaver 1980).

A few hardy individuals may occasionally overwinter in mild years if fruits and berries are abundant, but most of Vermont's American Robins winter in the southern U.S. and Mexico in flocks numbering in the thousands. One of the harbingers of spring, male robins may return to set up their territories in early March, and females may return to initiate nest construction and incubation in April. Courtship displays are poorly documented for the American Robin despite its abundance around man's residences. Overt displays that lead to pair formation are unknown. Various "tail-flick," "tail-lift," and "wing-droop" displays described by Stokes (1979) are attributed to aggressive behavior rather than courtship. Although males sing vigorously throughout the nesting period, territorial defense is sporadic and the defended territory small (less than 0.1 ha [0.25 a]). Much of the pair's activity takes place away from the area actively defended. Densities of up to 100 pairs per sq km (41 per 100 a) have been recorded in central Vermont woodlands around dwellings and old fields (Nicholson 1978).

Robins prefer evergreens for nest sites early in the year, but nesting success has been found (Knupp et al. 1977) to be higher in deciduous trees once they leaf out. Fences, window ledges, or the ground may be used later in the year. Nest building may be initiated up to 2 weeks before egg laying, but the nest may be reused for subsequent broods (Stokes 1979). The nest, usually a deep cup of mud and grass with a fine lining of grass, may be placed as high as 23 m (75 ft) above the ground, although the normal range is 3–5 m (10–15 ft). Three to 4 pastel blue eggs constitute a normal clutch, but as many as 7 have been noted (Harrison 1978). Seventy-four Vermont egg dates range from April 25 to July 17. Incubation, almost exclusively the female's domain, takes 11 to 14 days, rarely less. The male is inattentive at night and may even roost communally with other males during incuba-



No. of priority blocks in which recorded

TOTAL 179 (100%)

Possible breeding:	3 (2% of total)
Probable breeding:	2 (1% of total)
Confirmed breeding:	174 (97% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17
Green Mountains	54	100	30
North Central	19	100	11
Northeast Highlands	16	100	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	13

tion; however, both parents tend the nestlings until fledging, 9 to 16 (average 13) days later (Stokes 1979). Sixty-seven Vermont nestling dates range from May 5 through September 1. Fledglings may remain within the male's territory for 2 to 3 weeks, while the female incubates the next brood. Fledglings have been recorded from May 21 through September 1.

Robins are among the easiest species to confirm as breeders. Nests are relatively large and conspicuous, and may persist until long after leaves fall. Occasionally they may even serve as a base for next year's nest. Adults carrying nesting material, food, or fecal matter are easily sighted, particularly since nest defense and mobbing behavior are common in this species when young are present (Shedd 1982). The newly fledged, boldly spotted young (their spots confirm their phylogenetic ties with other thrushes) are also readily identified. Consequently, American Robins had a higher confirmation rate (97%) in Atlas Project priority blocks than any other species.

DOUGLAS P. KIBBE

Gray Catbird

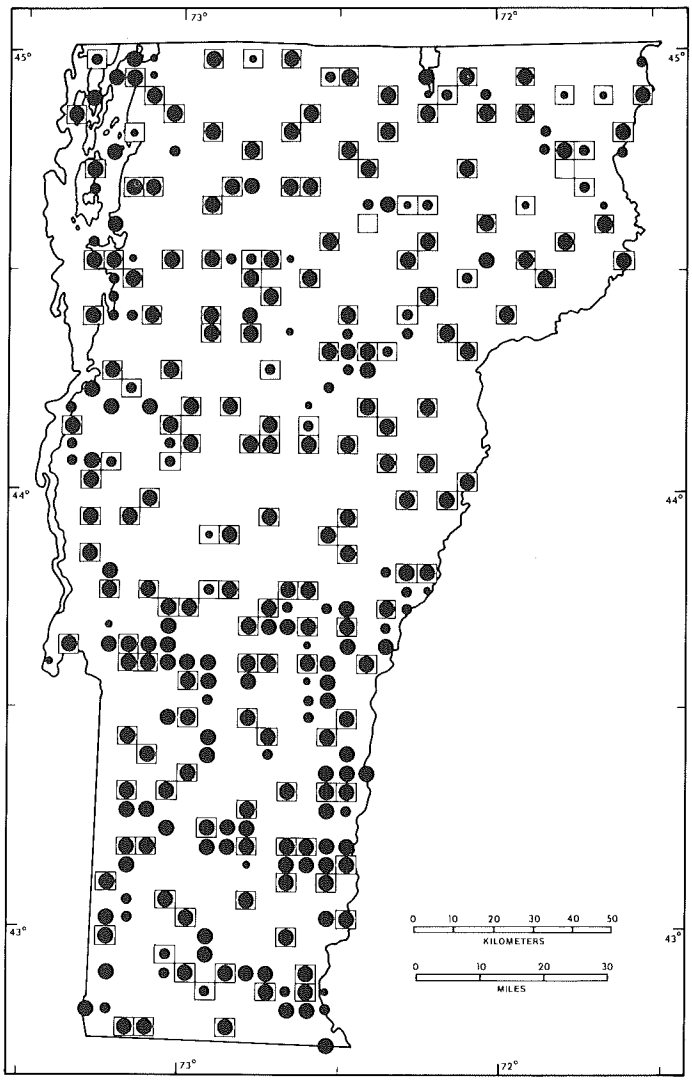
Dumetella carolinensis

The distinctive mewing of the aptly named Gray Catbird is a familiar sound around most rural Vermont residences during the spring and summer. A common denizen of moist shrub and edge habitats throughout the state, the catbird generally returns in the first week of May from its wintering grounds along the Gulf of Mexico. Although common in the seral brushlands and thickets that pervade Vermont's abandoned farmlands, the catbird shuns unbroken woodlands and is rarely found in coniferous habitats. It will, however, frequently place its nest in a conifer. Equally at home in streamside alder swales or brushy fencerows, the species has probably always been common in the state, although it undoubtedly benefited from the arrival of settlers, who converted mature forests to seral stages more to the catbird's liking. Highest breeding densities in Vermont, 49 pairs per 100 ha (20 per 100 a), have been recorded from streamside habitats (Farrar 1973). During late summer and the fall migration, which extends from September through the third week of October, it may be one of the most abundant species in areas of berry bushes.

The song, given from atop a shrub as the male sits hunched over with tail depressed, is deliberate. The catbird's repertoire is more limited than that of the Brown Thrasher or Northern Mockingbird. Like the latter, Gray Catbirds may occasionally sing at night (Graber et al. 1970). A very soft song is also given in autumn (Schafer 1916; Terres 1980). Territorial songs diminish sharply toward the end of the breeding season, only to be replaced by cat calls and *cluck* alarm notes.

Males return a week or more before the females to establish territories by loud singing. Courtship behaviors include chasing, high squeaky singing, and visual displays of fluffed body feathers. Nesting commences in mid May and extends through June into July. Vermont dates for nests with eggs extend from May 14 through July 28 (26 records); 17 of these nest dates fall between May 20 and June 8. Renesting may account for some of the later nests; however the species is known to produce double (Nickell 1965) and, rarely, triple broods (Harrison 1978). There are three early July records of nest-building activity in Vermont, indicating that at least second broods are attempted in the state. Although the male assists in nest site selection, most, if not all, of the building of the final nest is done by the female (Stokes 1979). The bulky nest, which takes 5 to 8 days to construct, is hidden in a viney tangle, thorny shrub, or dense conifer 1–3 m (3–10 ft) above ground. It frequently contains a large amount of grapevine both in the nest wall and lining, and is virtually indistinguishable from the nest of the Northern Mockingbird. The female incubates the clutch of 2 to 6 (usually 4) dark, greenish blue glossy eggs for 12 to 15 days. Of 19 Vermont clutches, 13 had 4 eggs and 4 had 3 eggs.

Although the male does little of the nest construction and does not assist in incubating, he guards the nest area against predators and cowbird parasitism in the female's absence (Slack 1976). Cowbird eggs are frequently ejected from parasitized nests (Rothstein 1974; Scott 1977) if the male's guard has been circumvented. The male also undertakes a majority of the feeding activities during the 11-day nestling period, while the female divides her efforts between feeding, brooding, and shading the young (Johnson



No. of priority blocks in which recorded

TOTAL 177 (99%)

Possible breeding:	7 (4% of total)
Probable breeding:	18 (10% of total)
Confirmed breeding:	152 (86% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	18
Green Mountains	54	100	30
North Central	18	95	10
Northeast Highlands	15	94	8
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	14

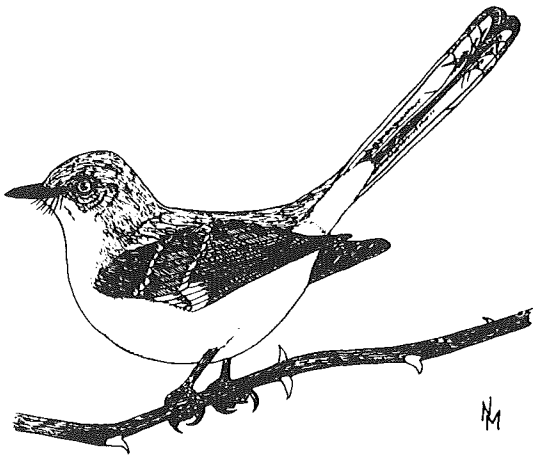
and Best 1982). Nests with young in Vermont have been observed between June 11 and July 27. If disturbed, the young may fledge as many as 3 days prematurely (i.e., at 9 days of age). Fledgling Gray Catbirds may be found in Vermont from June 19 through August 3 (16 records). Nesting success is relatively high (61%-70%) (Slack 1976), a fact that may account for the species' frequently phenomenal fall abundance in Vermont's bottomland thickets.

Although nests are relatively easy to find by watching the adults, most (63%) Atlas Project confirmations in Vermont were attributed to parents carrying food for young. Since both parents are relatively aggressive near the nest, they may be readily observed especially when young are present. Few species' records in the Atlas Project rivaled the 86% confirmation rate of the catbird in the priority blocks in which it was recorded.

DOUGLAS P. KIBBE

Northern Mockingbird

Mimus polyglottos

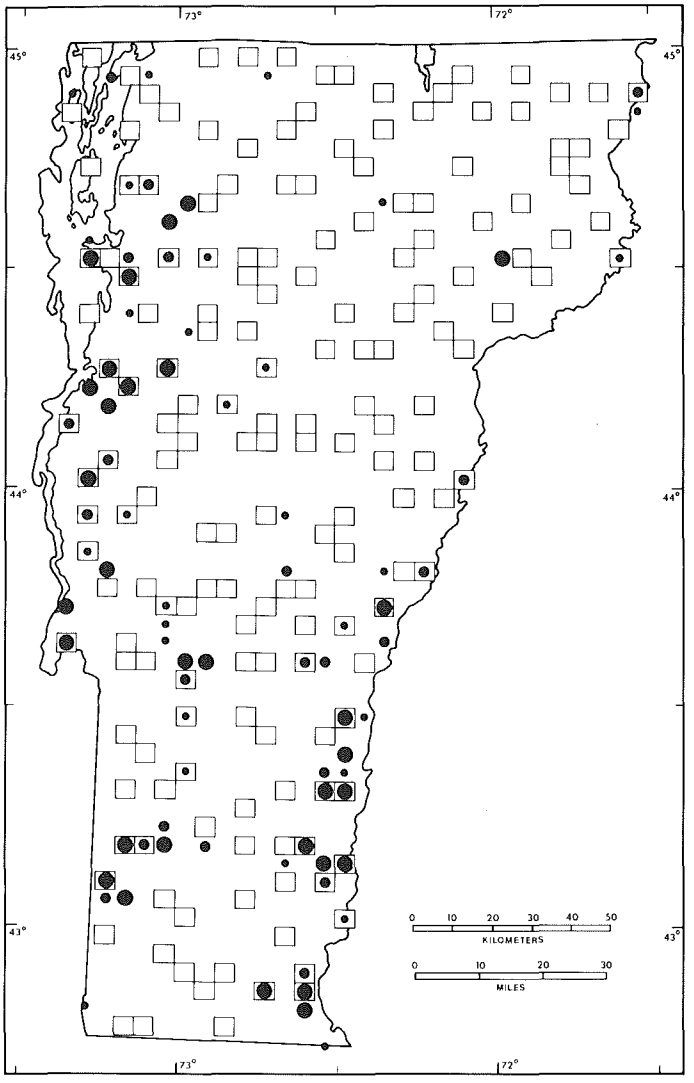


The Northern Mockingbird, a relative newcomer to much of Vermont, has increased markedly both in numbers and distribution in the state during recent decades. Currently the mockingbird appears to be spreading northward through the Lake Champlain and Connecticut River valleys and laterally along the major drainage systems into the center of the state. Reasons for this recent population growth are obscure. Beddall (1963) identified a warming trend that began about 1900, and decreased hunting as demand from the caged bird trade dropped, as significant factors in the mockingbird's increase in New England. This advance is still occurring, and it will be particularly interesting to compare this species' distribution in 10 or 20 years with that found during the Atlas Project effort. The mockingbird has gained a substantial hold in the Eastern Foothills and Champlain Lowlands, where it was found in 62% and 52% of the Atlas Project priority blocks, respectively. The Taconic Mountains, where mockingbirds were recorded in 38% of the priority blocks, is the only other region that currently supports a significant population.

Northern Mockingbirds are well known throughout their range for their vocal abilities. As their name implies, they can mimic almost anything within their hearing. Although they channel most territorial behavior into song, which is given from elevated perches or, occasionally, in flight, clashes on the borders of territories may also result in defiant males sparring for advantage with sideways hops along their disputed boundaries.

Although reputedly permanent residents throughout their range (from southern Oregon east to northern Utah, Wyoming, Newfoundland and Nova Scotia, and south to southern Baja California and the West Indies), wintering mockingbirds in Vermont retreat to the densest cover in the vicinity with the onset of cold weather. Multiflora rose thickets are particularly favored. By April, males are vigorously announcing their territorial intentions. As unmated males carry nesting material to likely nest sites within their territories (Laskey 1962), nest-building activity may not be absolute proof of breeding. Only three Vermont Atlas Project records were of nest building. In more southerly climates, mockingbirds have been known to raise up to four broods per season.

Early nests are generally placed in conifers (Laskey 1962), whereas later nests may be situated in any available dense shrubbery, such as rose hedges. The compact nest of twigs and leaves lined with rootlets, built by both members of the pair, may be 0.6–3 m (2–10 ft) above the ground—rarely, 15 m (50 ft). Earlier nests tend to be placed lower than later ones. Nests are relatively easy to locate and account for more than half of all confirmations in Vermont. From 4 to 6 blue or green eggs, heavily marked with brown, are laid and incubated by the female. Both incubation and nestling periods normally last 12 to 13 days. Adults are highly defensive during this period. The two Vermont egg dates reported are June 9 and July 1; all Vermont nestling dates, July 7 through August 5, could be of second broods, as could the recorded fledgling dates of July 13 through August 6 (three records). Horwich (1965) indicated that young begin feeding themselves at 17 days of age (4–5 days past fledging), and fledglings may beg until 44 days of age. Early nests in Illinois (Graber et



No. of priority blocks in which recorded

TOTAL 42 (23%)

Possible breeding:	12 (28.5% of total)
Probable breeding:	13 (31.0% of total)
Confirmed breeding:	17 (40.5% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	16	52	38
Green Mountains	2	4	5
North Central	0	0	0
Northeast Highlands	2	12	5
East Central	1	5	2
Taconic Mountains	6	38	14
Eastern Foothills	15	62	36

al. 1970) had very low (9%) fledgling success; the dearth of early breeding season nesting records in Vermont may result from a similar high failure rate among early nesting attempts.

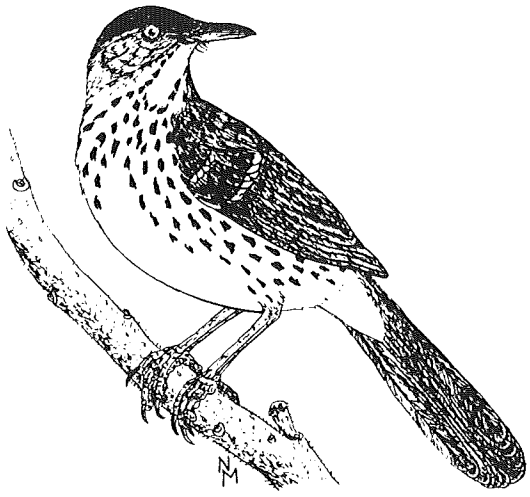
Although mockingbirds forage extensively on the ground and feed primarily on insects, they are extremely fond of fruits and berries. Wintering birds seem particularly attracted to multiflora rose hips, probably because thickets of this introduced plant provide both food and cover in abundance. The mockingbird's expansion may be related to the success of this planting.

During the fall adults establish wintering territories, either as pairs or as individuals, and force the young to disperse to unoccupied areas. Banding studies in Tennessee (Laskey 1962) indicated that young may disperse up to 320 km (200 mi) away. Fall dispersal of fledglings may colonize new areas in Vermont. Extralimital sightings of Northern Mockingbirds are more common in the spring, however, in Vermont. Both fall dispersal and short-range spring migration may prove to be factors in this species' northward expansion.

DOUGLAS P. KIBBE

Brown Thrasher

Toxostoma rufum

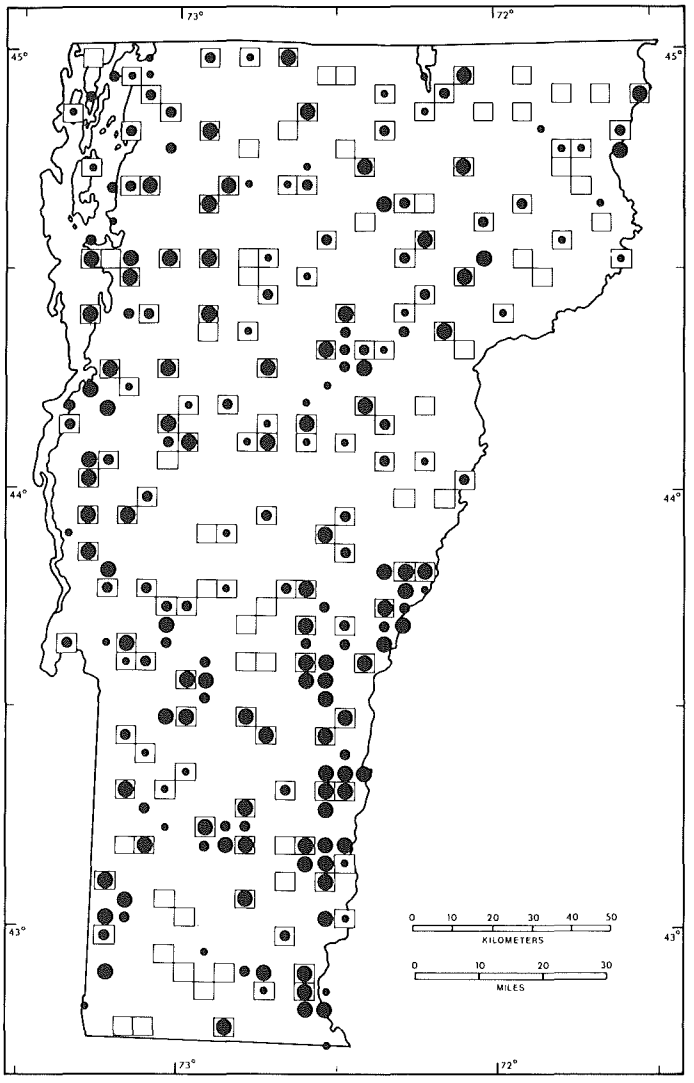


The Brown Thrasher is the shiest member of the mimic thrush family (Mimidae) to breed in Vermont. Less well known for its vocal abilities than the boisterous Northern Mockingbird, the Brown Thrasher is nonetheless an accomplished songster and mimic of other birds (including the Northern Flicker, Tufted Titmouse, Wood Thrush, and Northern Cardinal). The thrasher's loud territorial song, generally distinguishable from that of the mockingbird because it has fewer repetitious notes, is given from the top of a shrub or low tree. A soft, more complex whisper song given while the bird is hidden may also be heard, particularly early in the breeding season (Schafer 1916; Graber et al. 1970).

Although a few hardy Brown Thrashers linger in the Northeast each year past the usual mid October departure date, few successfully overwinter. Thrashers are among Vermont's earliest migrant songbirds to return, arriving during the third week of April from their wintering grounds in the southeastern U.S. They probably commence breeding in Vermont early in May, as they do in New York (Bull 1974), before many other migrant passerines have returned. They prefer shrubby, overgrown fields for breeding habitat, but forest edges and hedgerows may also be used.

The bulky, basketlike nest lined with rootlets is usually placed in a thorny and/or very dense shrub 0.6–2 m (2–7 ft) above the ground, occasionally as high as 4.6 m (15 ft). Although ground nests are uncommon, early nests tend to be built lower than those started later in the breeding season (Graber et al. 1970). Viburnum and hawthorn are commonly used nest supports in New York (Bull 1974). From 4 days to 2 weeks may separate nest initiation and egg laying. From 3 to 6 (usually 4 to 5) brown-speckled, bluish white eggs are laid early in the morning on consecutive days (Graber et al. 1970). Clutches completed early in the breeding period tend to be larger. Vermont egg dates range from May 24 to June 16 (eight records). Both parents incubate the clutch for 12 to 14 days, and the nestlings fledge in 9 to 14 days. Data from Illinois (Graber et al. 1970) indicate that most Brown Thrashers are not double-brooded; late nests probably represent renesting attempts. Fledgling success has been found to be low, averaging 41% (Mayfield 1961). Although thrashers aggressively defend their nests, predation is probably the leading cause of reproductive failure. The Brown Thrasher is the largest passerine regularly victimized by the Brown-headed Cowbird (Terres 1980), but the incidence and success rate of parasitism is apparently low (Graber et al. 1970).

The Brown Thrasher is generally distributed throughout Vermont, but reaches its greatest abundance in the lower elevations of the Champlain Lowlands and Connecticut River valley. It was found in 75% of all Atlas Project priority blocks. Atlas Project workers in the Green Mountains and Northeast Highlands encountered thrashers infrequently. Although Brown Thrashers in the Northeast have been decreasing by nearly 3% per year according to U.S. Fish and Wildlife Service Breeding Bird surveys, no significant population change has occurred



No. of priority blocks in which recorded

TOTAL 135 (75%)

Possible breeding:	33 (24% of total)
Probable breeding:	40 (30% of total)
Confirmed breeding:	62 (46% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	29	94	22
Green Mountains	31	57	23
North Central	16	84	12
Northeast Highlands	7	44	5
East Central	15	79	11
Taconic Mountains	15	94	11
Eastern Foothills	22	92	16

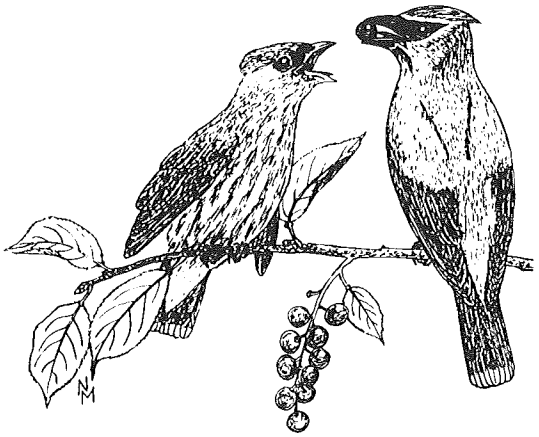
in Vermont (Robbins 1982b). Territory mapping studies in farm and second-growth edge habitat in Vermont have recorded up to 12 pairs per 40.5 ha (100 a) (Williamson 1972).

The Brown Thrasher was probably rare in Vermont before land was cleared for agriculture; clearance greatly increased the acreage of disturbed edge community available. The thrasher's status appears to have changed little in the past century, although in the early 1900s, when pasture was abandoned, the species probably flourished. The maturation of existing shrub and forest areas in Vermont may reduce Brown Thrasher populations slightly in the future, but the species adapts well to man's proximity and will probably continue to thrive in suburban and agricultural districts.

DOUGLAS P. KIBBE

Cedar Waxwing

Bombycilla cedrorum

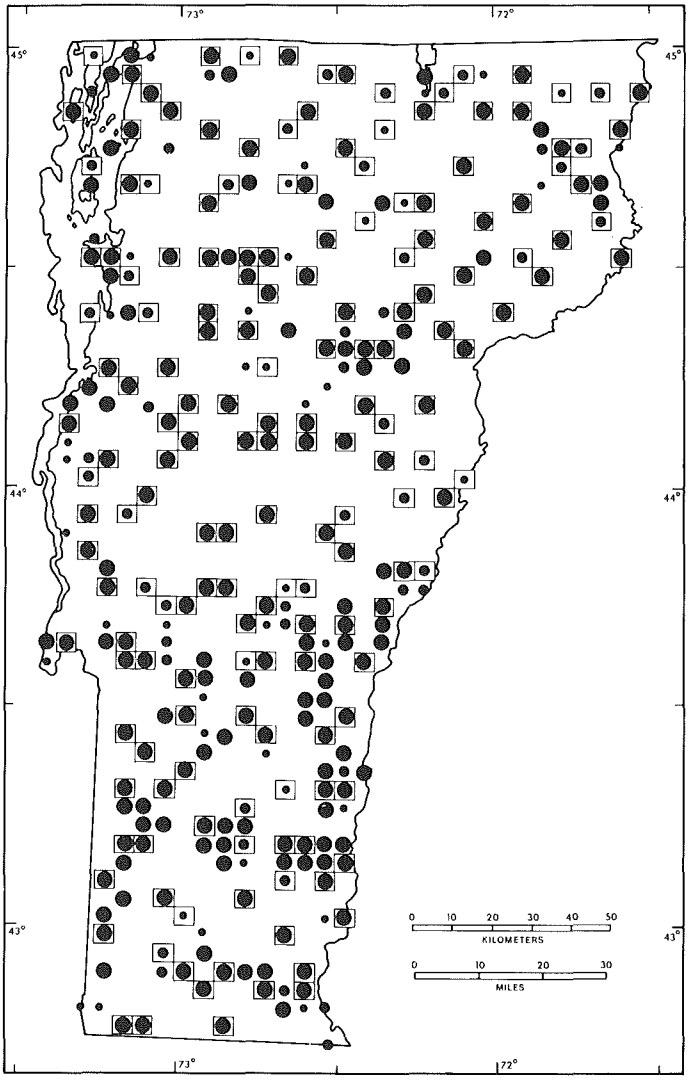


The major factor influencing the selection of nesting habitat by the Cedar Waxwing is food availability. Waxwings are highly frugivorous, supplementing their fruit diet with insects during the summer; for this reason, waxwings always nest near a steady supply of fruit. The species prefers edge habitats, probably because fruit-bearing plants grow most often in areas that are exposed to sunlight. As long as their food requirements are met waxwings will nest anywhere, from urban and suburban parks and plantings to forest clearings and roadsides, beaver ponds and meadows, and stream banks. This ability to adapt to any kind of edge habitat assures the waxwing of one of the widest distributions among Vermont birds. It was located in all 179 Atlas Project priority blocks, and was considered a confirmed or probable breeder in 92% of them.

The Cedar Waxwing is generally easy to locate because of its gregarious nature, its constant movement between the nest site and food sources, and its habit of selecting conspicuous sentinel perches near the nest. The waxwing's voice is distinctive, but may be missed because it is sibilant and high pitched. Both members of the pair are active nest builders; as nests are placed fairly low, it is often easy to watch pairs coming from and going to them. When fledglings are present, their insistent begging calls often give them away. During the Atlas Project breeding was most frequently confirmed by nest building (26.5%), nests containing eggs (25.5%), and recently fledged young (20.1%).

Waxwings may be encountered year-round in Vermont, although the species is very local during the winter. In winter Cedar Waxwings are seen in the Champlain Lowlands and the Connecticut River valley, sometimes accompanied by a few of the rare Bohemian Waxwings (*Bombycilla garrulus*). Most Cedar Waxwings arrive in breeding areas in late May and begin nest building by early to mid June. Nests are placed in shrubs and small- to medium-sized trees, at heights of 1.8–6.1 m (6–20 ft) (Harrison 1978). Nests are constructed from plant fiber, artificial materials such as yarn, stems and leaves of herbaceous plants, and twigs. The nest is bulky and tends to be somewhat untidy. Egg dates from 28 Vermont nests range from June 17 to August 26. Nestlings have been reported from July 1 to September 10 (seven records). The four Vermont fledgling dates range from mid July to late September. Clutch size for 20 Vermont nests averaged 4.3 eggs, with a range of 3 to 5; this agrees with the average of 4.2 eggs per clutch cited by Leck and Cantor (1979). Some waxwings lay a second clutch in late July or August, but the majority are not double-brooded. Cedar Waxwings gather into their winter flocks and disperse from their nesting areas in late September and early October.

The Cedar Waxwing is common to very common in Vermont. As the species tends to concentrate at abundant food sources, the population may vary considerably from year to year. "Cedar birds," as they are also known, were considered common during the early part of the present century. The species has been increasing in numbers at a rate of 4% a year in the Northeast and 6.1% a year in Vermont since sometime in the 1960s (BBS 1966–79). This increase may be related to decreased pesticide treatment of shade trees and fruit orchards since the 1940s and 1950s, when the use of DDT and other persistent poisons was unrestricted.



No. of priority blocks in which recorded

TOTAL 179 (100%)

Possible breeding:	14 (8% of total)
Probable breeding:	31 (17% of total)
Confirmed breeding:	134 (75% of total)

Physiographic regions in which recorded

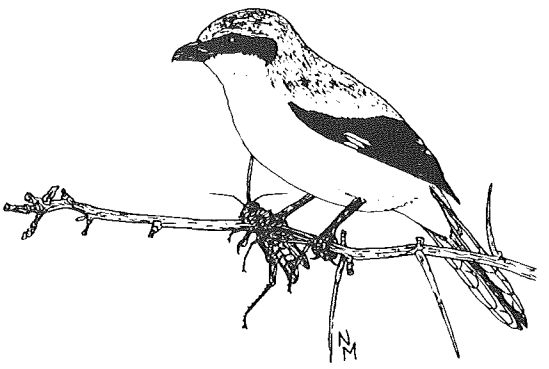
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17
Green Mountains	54	100	30
North Central	19	100	11
Northeast Highlands	16	100	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	13

The Cedar Waxwing's name is derived from its fondness for cedar berries and the presence in many birds of red, waxy droplets on the tips of the bird's secondary feathers. These droplets serve no known function, but they are often present in both Cedar Waxwing and Bohemian Waxwing adults.

WALTER G. ELLISON

Loggerhead Shrike

Lanius ludovicianus



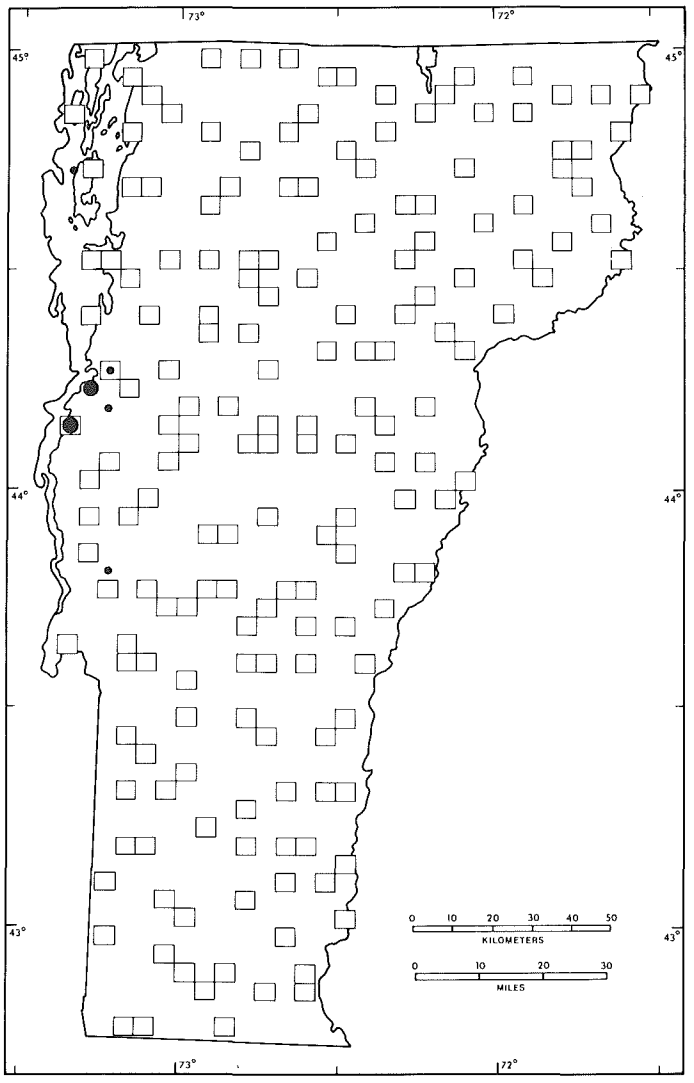
The Loggerhead Shrike's notched, hooked bill and barbarous habits belie its status as a songbird. Much maligned as a "butcher bird" for its habit of caching prey on thorns or barbed wire fences, the Loggerhead Shrike helps fill an ecological niche left vacant by larger raptorial species. Although small birds may form a portion of the shrike's diet, particularly in winter, insects and mice are its primary prey.

Certainly one of the rarest breeding birds in Vermont, the Loggerhead is proposed for Endangered Species status in the state. As a result of growing concern for the species throughout the Northeast, it is being considered for Threatened or Endangered species status by the U.S. Fish and Wildlife Service (Milburn 1981). The Loggerhead Shrike has always been a rare breeder in Vermont. Milburn (1981) recorded only 23 verified nests and 25 potential nesting records in the state since 1870. The majority of these records come from Addison (11), Rutland (10), Chittenden (9), and Grand Isle (5) counties, with lesser numbers in Franklin, Orange, Orleans, Lamoille, and Windsor counties. Nesting activity appears to have peaked in the late 1800s, 1950s, and 1970s (Milburn 1981; RVB 1973–83).

During the Atlas Project, the Loggerhead Shrike was recorded as breeding only in the Champlain Lowlands. Confirmation was obtained twice: at the Dead Creek Wildlife Management Area, when adults were observed feeding young on June 21, 1977 (the family group was observed together throughout July [ASR, A. Pistorius]); and in hayfields bordered by hedgerows near South Slang in Ferrisburg, where two adults and three young were observed on August 7, 1978 (ASR, J. and M. Dye). Three possible breeding reports were also obtained in 1977 and 1978: in Ferrisburg one adult seen on June 13, 1977, and another on June 22, 1978 (ASR, J. and M. Dye); an adult was seen on South Hero July 6, 1978 (ASR, A. L. Gosnell). Since 1978 there has been no evidence of nesting in Vermont; single nesting season sightings have been recorded for 1979, 1980, and 1982, but no nesting season reports at all were made in 1981 or 1983, even though a special three-day survey of former nesting sites was carried out in 1983 (RVB 1978–83).

The Loggerhead is a rare migrant; indeed the species reaches the northeastern limit of its distribution in the Northeast. The current breeding populations in the Northeast appear to occupy an area encompassing the Great Lakes and the St. Lawrence River valley. In the Northeast, Loggerhead Shrikes begin to reappear from their wintering areas in the southern U.S. in late March; they depart by the end of October. Their presence in spring and fall overlaps somewhat that of the Northern Shrike, *Lanius excubitor*, a species that frequently winters at Vermont's latitude and is sometimes misidentified as the Loggerhead. In Vermont, Loggerheads usually return in the first week in April, although March dates exist; the latest fall date reported is "early September" (RVB, 1973–83).

Loggerhead Shrikes prefer to nest in dense, thorny shrubs in relatively open habitats. Hedgerows bordering grasslands and abandoned orchards are typical nesting areas. The bulky twig nest, which may take more than a week to construct (Graber et al. 1973), may be located 1.2–6.1 m (4–20 ft) above the ground, frequently in a hawthorn or apple tree (Bull 1974). Shrikes commence nesting as early as the latter half of April in New York, where second broods have been recorded (Bull 1975). Six egg dates for Vermont range from May 4 through



No. of priority blocks in which recorded

TOTAL 2 (1%)

Possible breeding:	1 (50% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	1 (50% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	2	6	100
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

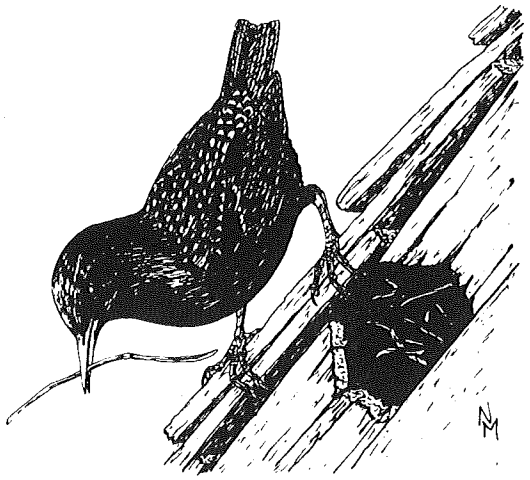
May 29. Clutches are relatively large, averaging 5 to 6 dull white eggs. Incubation may last 10 to 12 days when both sexes share the chore (Bent 1950), but may otherwise require as many as 17 days (Graber et al. 1973). Incubation is apparently initiated before completion of the clutch (D. P. Kibbe, pers. observ.), as is the case with many raptorial species. The young may fledge at 3 weeks of age but remain dependent upon the parents for an additional 2 weeks (Terres 1980). Dependent fledglings have been noted in Vermont from June 21 through August 7.

Shrikes are highly territorial: both members of the pair defend the nesting territory (Miller 1931; Bent 1950). Because shrikes carry food year-round to caches, locating nests or young is the most reliable method of obtaining breeding confirmation. The species is thought to be declining throughout the Northeast (Milburn 1981); every effort should be made to protect and preserve current nesting locations.

DOUGLAS P. KIBBE

European Starling

Sturnus vulgaris



The European Starling was introduced to North America in New York City's Central Park when 60 birds were released in 1890 and 40 in 1891; from this small number have descended the hordes now extant (Bent 1950). The European Starling inhabits most of the U.S. and southern Canada to southeast Alaska. The species was first recorded in Vermont in December 1913, in Bennington (Ross 1927).

During the Atlas Project starlings were recorded as breeding widely in Vermont, being absent from only 12 of the priority blocks. They were least widespread in the Northeast Highlands and East Central regions. They are widespread in Vermont year-round. Although the European Starling winters throughout its North American breeding range (Kessel 1953), many individuals apparently migrate to the middle states for the winter. Starlings frequently gather in large flocks after the breeding season, and are common around lowland farms and villages during the winter.

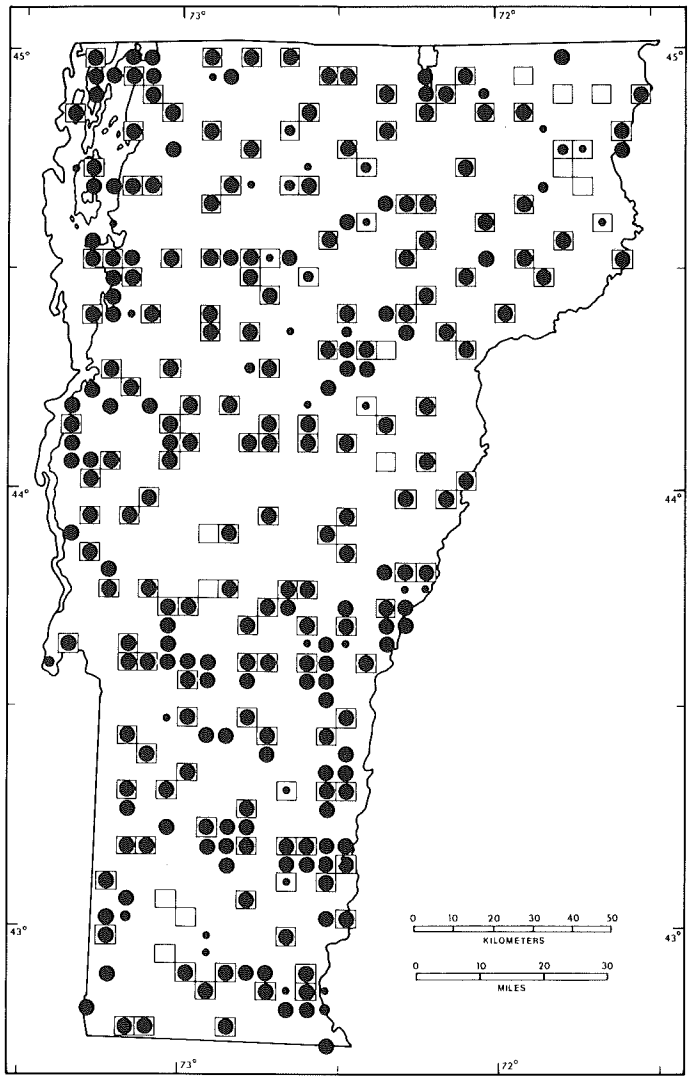
The starling inhabits rural farming districts, towns, and cities, but not heavily forested regions. It is a cavity nester, and individuals may frequently be seen in their favorite holes in dead American elms in open fields and fencerows. They frequently will occupy flicker-excavated holes. They will also nest in any convenient cavity on a building or other man-made structure. The nest may be 0.6–18.3 m (2–60 ft) above the ground, but is usually 3–7.6 m (10–25 ft) up (Bent 1950). As cavity nesters, starlings compete with Eastern Bluebirds, Tree Swallows, House Sparrows, and Purple Martins for nest sites; they may compete with Great Crested Flycatchers as well (Bent 1950). In Burlington and West Haven, Vermont, Atlas Project workers observed starlings competing with Red-headed Woodpeckers.

Males claim nest sites in the autumn or winter and advertise to potential mates with a vigorous crowing display (Kessel 1957).

The first stage of the nest, built by the male, includes dead leaves, coarse and fine grasses, and straws; sometimes rootlets, small twigs, and bits of cloth, paper, string, and other trash are added. The final touches are added by the female, who lines the nest with finer pieces of grass or feathers. The size of the nest conforms to the size of the cavity, with the inner cup usually about 7.6 cm (3 in) in diameter. The nests are slovenly, unkempt, and filthy, containing the excrement of the young, whose stay in the nest is usually long (Bent 1950).

The starling usually lays 4 or 5 eggs. They are ovate to elliptical. The color is very pale bluish or greenish white with a slight gloss. Nests with eggs have been observed in Vermont from April 26 through June 30 (14 records). The period of incubation is 11 to 14 days, usually the latter (Bent 1950). In Vermont, 30 nests with young were seen from May 23 to July 18. The incubation duties are shared by both sexes. The young remain in the nest for a period of 2 to 3 weeks, until they can fly well. The total nesting cycle lasts about 40 days.

The nestlings are fed by the parents largely on insects. Two broods are usually raised each year, sometimes three. After fledging, the young join others to form huge flocks of gray-plumaged juveniles. In Vermont recently fledged young have been recorded from June 8 to July 25.



No. of priority blocks in which recorded

TOTAL 167 (93%)

Possible breeding:	7 (4% of total)
Probable breeding:	5 (3% of total)
Confirmed breeding:	155 (93% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	18.5
Green Mountains	49	91	29.3
North Central	18	95	10.8
Northeast Highlands	11	69	6.6
East Central	18	95	10.8
Taconic Mountains	16	100	9.6
Eastern Foothills	24	100	14.4

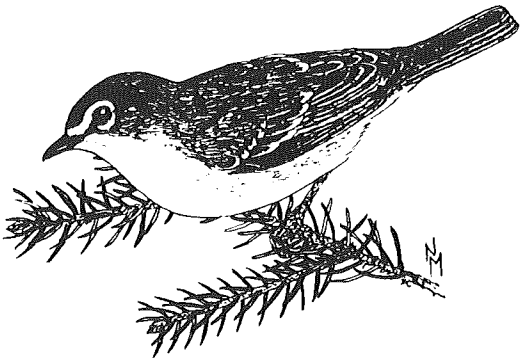
About 57% of the starling's food is animal matter and 43% vegetable. Most animal food is consumed in April (91% of the diet) and May (95%). Insects constitute about 42% of the total diet. Vegetable food consists of cultivated and wild fruits (cherries being favored), berries, grain, and seeds. Most of the starling's feeding habits benefit human agriculture: it is an effective enemy of the clover weevil, and also destroys cutworms and Japanese beetle larvae (Terres 1980). Starlings frequently search the ground for their insect food (Bent 1950).

Although the European Starling remains an abundant breeding species in Vermont, populations in the northeastern U.S. have declined slightly in recent years (Robbins 1982b). As reforestation of Vermont continues, the starling may have to adapt to a woodland life-style. The current distribution indicates that European Starlings are already adjusting well.

GEORGE F. ELLISON

Solitary Vireo

Vireo solitarius



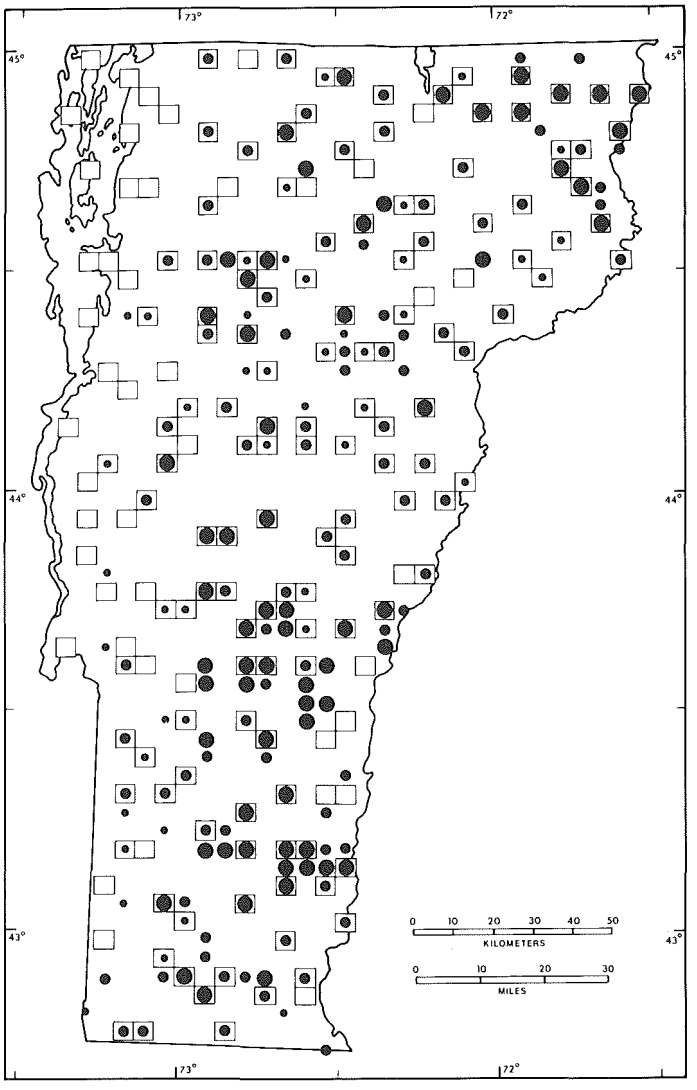
The Solitary Vireo is by far the hardiest member of its family to occur in Vermont, regularly arriving during the third week of April and frequently lingering until the third week of October—exceptionally, until November 11. The species winters from the southeastern U.S. south to El Salvador. It breeds across most of Canada and the northern U.S., in the West south to northern Mexico, and in the East to northern Georgia. Although widely distributed in the North, the species is much more localized in the southern portions of its breeding range.

Throughout its breeding range the Solitary Vireo displays a marked preference for coniferous and mixed coniferous-deciduous woods, a habitat preference indicated by the species' Atlas Project priority block distribution in the mountainous and highland portions of the state. Clearing for agriculture and urban development in the lowlands has removed much suitable breeding habitat. Throughout most of the remainder of the state, however, Solitary Vireos may be readily found, albeit (true to their name) usually in low densities. The four pairs per 40.5 ha (100 a) found in deciduous-coniferous second-growth northwoods (Carpenter 1977) are probably representative of densities in the majority of the state.

Sabo (1980) found that Solitary Vireos occupied 300 m (984 ft) long linear territories along streams in his subalpine study area in the White Mountains of New Hampshire. He also found that territory size was a relatively large 5 ha (12.5 a). Bent (1950) also found territory size to be large, particularly relative to that of the Red-eyed Vireo, with which the Solitary may share territories. Solitary Vireos are territorial even in the wintering grounds, and are seldom seen in conspecific aggregation even during migration. They are, however, common migrants in Vermont—among the vireos, second only to the Red-eyed.

Nesting by the Solitary probably commences in May, although all four available Vermont records of nest building are from June 1 to June 19. The pair shares in nest building, although the female does most of the actual construction. The nest, a cup suspended (like most vireo nests) in a fork of a horizontal branch, is generally located midway up a conifer, 1.2–3.7 m (4–12 ft) high—rarely, as high as 12.2 m (40 ft). Deciduous trees are occasionally also used. The 3 to 5 (usually 4) brown-speckled, creamy white eggs may be laid from mid May through June. Vermont egg dates (six records) range from May 22 to July 2. The eggs are incubated by both parents for 11 to 12 days (Bull 1974). Both parents may call or sing while on the nest. The song is slower and sweeter than the Red-eyed Vireo's. Incubating birds are exceptionally tame and may even be fed by hand or touched while on the nest (Bent 1950). The nestling period may be 12 to 14 days, according to data analyzed at the North American Nest Record Program at the Cornell Laboratory of Ornithology. Confirmation of breeding is most easily achieved during the nestling period; 60% of all Atlas Project confirmations were of adults feeding young. Age to independence is unknown. Bent (1950) cited observations of young accompanying the adults as they built the nest for a second clutch. Fledglings have been recorded in Vermont as late as July 30.

Although second broods are apparently common at the southern limits of the species' range, the frequency with which they occur in the northern area of the range is



No. of priority blocks in which recorded

TOTAL 134 (75%)

Possible breeding:	31 (23% of total)
Probable breeding:	59 (44% of total)
Confirmed breeding:	44 (33% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	7	22	5
Green Mountains	52	96	39
North Central	16	84	12
Northeast Highlands	16	100	12
East Central	18	94	13
Taconic Mountains	8	50	6
Eastern Foothills	17	70	13

unknown. Late egg and departure dates from Vermont imply that second broods are likely, although this is as yet unproven.

Around the turn of the century, when agriculture was still in its heyday, the Solitary Vireo was considered a rare to uncommon summer resident in Vermont (Perkins and Howe 1901; Allen 1909). Since that time, reforestation of abandoned farmland has proceeded at an accelerated rate, and the Solitary Vireo can be found breeding wherever stands of relatively mature white pines or other conifers are prevalent. The species still appears to be most common in boreal habitats, however, and was found in low numbers in the Champlain Lowlands, which has little suitable coniferous habitat. The Atlas Project established the species' nesting status in Vermont, which had previously been considered "uncertain" (Spear 1976).

DOUGLAS P. KIBBE

Yellow-throated Vireo

Vireo flavifrons

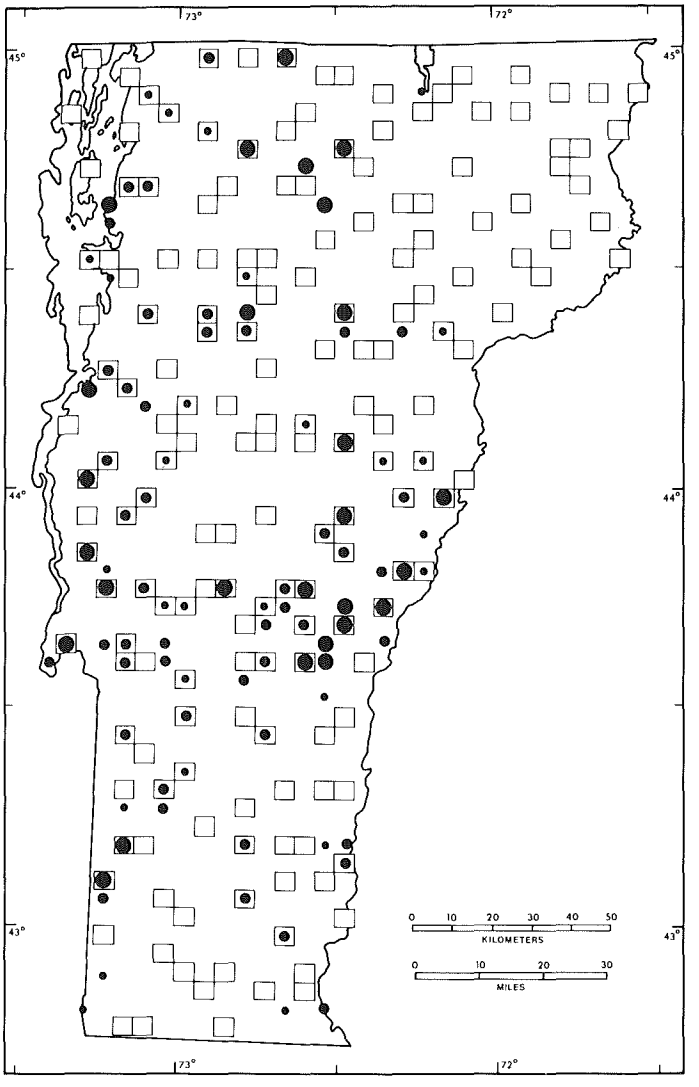
The Yellow-throated Vireo is one of the most brightly colored species within its otherwise somberly plumaged family. Its conspicuous yellow spectacles and brilliant yellow throat and breast contrast with its olive-yellow back, white underparts, and gray rump. It has two well-defined, white wing bars. The female is only slightly duller than the male.

The Yellow-throated Vireo's distribution in Vermont was not clearly defined before the Atlas Project; Spear (1976) listed its nesting status as "Irregular: questionable regularity but nesting records exist," and in the first year of the Atlas Project it was listed as an asterisked species upon which detailed reports were required. However, the species is well distributed in Vermont, occurring in more than one-third of the priority blocks in the state and in all of the physiographic regions except the Northeast Highlands. Vermont data (RVB 1973–83; Atlas Project field workers, pers. comms.) indicate that Yellow-throated Vireos are especially attracted to the rich, open woods on floodplains by rivers and streams, and are locally common within this habitat. They are also found near lakes and other bodies of water, and inhabit large shade trees along streets and in yards of towns. They occasionally live in deciduous woods away from water, but seem to require more open habitat than either the Solitary or Red-eyed vireos. Yellow-throated Vireos are found principally at low elevations.

Yellow-throated Vireos move about slowly in the upper levels of trees, where they might go unnoticed but for their slow, hoarse singing. The song is phrased similarly to the Red-eyed Vireo's, but may be distinguished by its richer tonal quality. Occasional Yellow-throateds mimic the song of the Solitary Vireo (Bagg and Eliot 1937).

Yellow-throated Vireos arrive in Vermont during the first week of May. Soon after their arrival, these vireos establish territories and begin nesting. A handsome, cuplike nest is suspended in a fork of a horizontal limb, 0.9–18.3 m (3–60 ft) above the ground—usually more than 6 m (20 ft) above—and well within the canopy. The nest, a thick-walled basket with an incurved rim, is composed of plant fibers and narrow strips of bark and similar material; it is lined with fine grasses bound together with spider silks and insect cocoons, and is well decorated on the outside with lichens, plant down, and shreds of paper. Nest building is performed mainly by the female, and takes about 1 week (Harrison 1975). The species is single-brooded. A pair observed building a nest in Washington, Vermont, on the late date of June 26 may have been attempting a second nesting after the first was destroyed. A nest in Clarendon on June 3 contained 3 eggs. A female was observed on a nest 9 m (30 ft) high in a deciduous tree on June 15, at West Rutland. Bent (1950) said that like other vireos the Yellow-throated is strongly attached to its nest. Sometimes a pair is quite aggressive when the nest is approached, and will attempt to drive away the intruder by scolding and threatening to attack.

Three to 5, usually 4, eggs are laid. They are white, smooth, slightly glossy, and spotted with brownish blotches on the larger ends. Incubation takes about 2 weeks, and is performed by both sexes. The male often sings while on the nest (Forbush 1929). The young remain in the nest for 15 days (Terres 1980); they are fed by both adults. Nests with young were found in Royalton on June 22; in Rutland County on June 25; and on



No. of priority blocks in which recorded

TOTAL 65 (36%)

Possible breeding:	17 (26% of total)
Probable breeding:	29 (45% of total)
Confirmed breeding:	19 (29% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	15	48	23.1
Green Mountains	19	35	29.2
North Central	2	10	3.1
Northeast Highlands	0	0	0
East Central	9	47	13.8
Taconic Mountains	11	69	16.9
Eastern Foothills	9	37	13.9

a backwater of the Waits River, about 9 m (30 ft) high in a young deciduous tree on July 15.

To the north, Yellow-throated Vireo breeding distribution is limited to southern Quebec and western New Brunswick. The species is widely distributed over eastern North America from southern Canada through the Great Lakes region, and south to southern Texas and northern Florida. Yellow-throated Vireos winter from southern Mexico through Central America to Colombia. They have usually left Vermont by the third week of September.

WHITNEY NICHOLS

Warbling Vireo

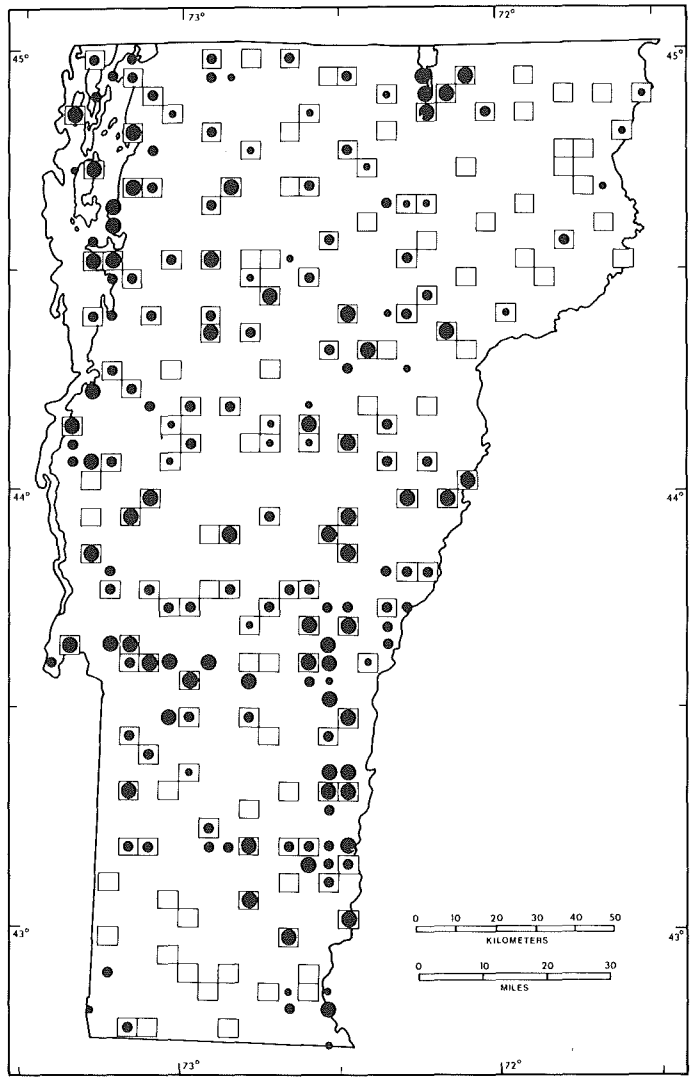
Vireo gilvus

The Warbling Vireo is a bird of unprepossessing habits and appearance whose song is pleasant, if incessant. Warbling Vireos inhabit the middle level and canopy of medium to tall deciduous trees. The species is not partial to extensive woodlands; it prefers mature trees in edge or open locations. James (1976) found that canopy cover in Warbling Vireo territories in southern Ontario averaged 34%—an indication of the species' preference for openings. Warbling Vireos may be excluded from more heavily wooded areas by competition with the Red-eyed Vireo, which has similar foraging habits and food preferences. The Warbling Vireo's territories are often located near water; pairs are seldom found far from a small pond, lake, or stream. By its habitat preference, the Warbling Vireo was preadapted for the rows of tall shade trees found in the villages of New England; the species is common in residential areas.

Were it not for their voices, these unobtrusive gray birds would pass unnoticed. Their song is a mellow, leisurely warble, which weaves up and down the scale, ending abruptly with a sharp, upward-inflected note. Warbling Vireos are usually seen high in the foliage of a shade tree, moving deliberately in search of prey among the leaves. With care and patience, an observer may see them visit the nest, a basketlike structure of bark strips, fine grass, plant down, and webbing placed in a branch fork, usually well out from the trunk. The male, who shares the chore of incubation, often bursts into song while on the nest. Nearly 43% of the Atlas Project confirmations for this species were of active nests containing either eggs or nestlings; an additional 41% were of parents bearing food to their young.

Warbling Vireos winter in Central America and reappear in Vermont during May, either late in the first week or within the second week. The species is single-brooded, and commences nesting during late May. Early literature implies that elms were preferred nest trees (Bent 1950); however, with the advent of Dutch elm disease this vireo has adapted to other tree species. Of 10 Ontario nests located by James (1976), 4 were in maples and 5 in poplar. The nest is built fairly high; James's (1976) nests averaged 8.2 m (27 ft) above ground, and 6 Vermont nests averaged 8.9 m (29 ft). There are only four egg dates on record for Vermont, covering a range of dates from May 24 to June 23. The eggs are white with sparse, dark speckling at the large end; the clutch usually numbers 4 eggs, in a range of 3 to 5. Of the four known nestling dates for Vermont, three fall on June 25, and the fourth is for June 29. Nestling dates for New York State range from late May to late June (Bull 1974). Dependent young have been reported on five dates in Vermont, ranging from June 26 to July 26. The autumn migration of the Warbling Vireo peaks in August.

The Warbling Vireo is widely but thinly distributed in Vermont. Most Atlas Project blocks having some open land with groves of tall trees had at least two to four pairs of these birds, often more. The Northeast Highlands was the only region in which they were recorded in low numbers in priority blocks. That region's extensive closed-canopy forests, often dominated by conifers, are ill-suited to the Warbling Vireo's requirements. Warbling Vireos are largely limited to river valleys in the Green Mountains, and are



No. of priority blocks in which recorded

TOTAL 123 (69%)

Possible breeding:	19 (15% of total)
Probable breeding:	60 (49% of total)
Confirmed breeding:	44 (36% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	27	87	22
Green Mountains	34	63	28
North Central	14	74	11
Northeast Highlands	3	19	2
East Central	14	74	11
Taconic Mountains	13	81	11
Eastern Foothills	18	75	15

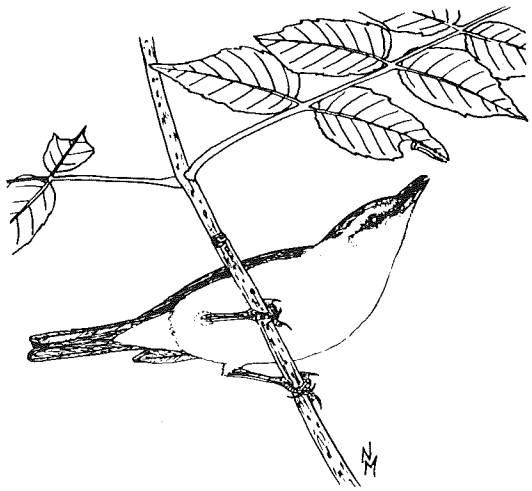
rare in the broad southernmost portion of the Vermont range.

The Warbling Vireo is widely perceived to have declined in the Northeast during the 1950s and 1960s, apparently as a result of the spraying of shade trees with persistent pesticides (Bull 1974). The species is recovering from this decline; it has been increasing in numbers at an annual rate of 3.4% in the northeastern U.S. since 1966, according to U.S. Fish and Wildlife Service Breeding Bird Survey data (Robbins 1982b).

WALTER G. ELLISON

Philadelphia Vireo

Vireo philadelphicus

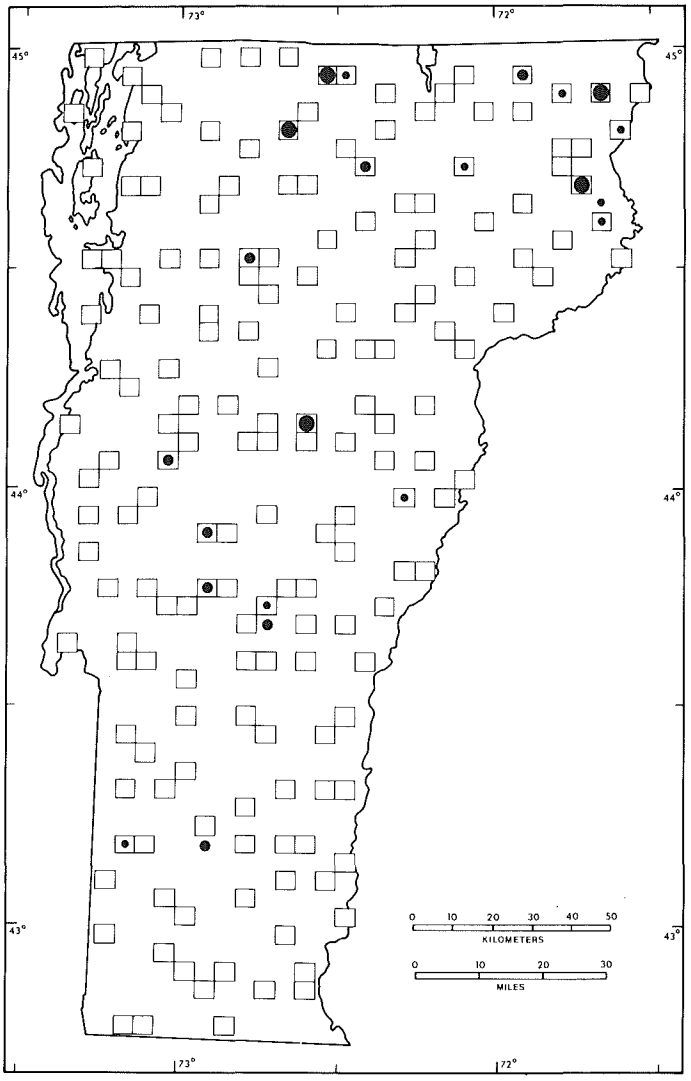


The Philadelphia Vireo breeds across much of southern Canada from British Columbia to Newfoundland, but its distribution in the U.S. is restricted. The species is known to breed in Maine and in the White and Adirondack mountains, but was only known to nest in Vermont from old reports (Davenport 1907). Atlas Project confirmation was first achieved in 1979. Observations made during that and subsequent years revealed that the Philadelphia Vireo could be locally common in preferred habitat in northern Vermont. For example, 14 birds were seen in the Cold Hollow Mountains, south of Montgomery Center, along less than a mile of logging road in an area that had been selectively cut 5 to 10 years before. Subsequent observations revealed that, though rare in the state, the Philadelphia was far more widely distributed and frequently encountered than observers had previously suspected.

The Philadelphia Vireo is particularly interesting to ecologists because of its similarity to the Red-eyed Vireo. The two species overlap at the southern and northern limits of their respective ranges. In the area of sympatry they compete interspecifically for similar habitats (Rice 1978). In Vermont, Philadelphia and Red-eyed vireos have been found to respond strongly to tapes of each others' songs. Ethologists interpret various differences in their behavior and reproductive strategies as reproductive-isolating mechanisms (Barlow and Power 1970).

Although in Canada the Philadelphia Vireo inhabits aspen-birch forests, most Vermont records are from cutover hardwood forest; occasionally they are from open mixed woodlands. Rice (1978) found that Philadelphia Vireos in Canada occupied territories of 0.3 ha (0.8 a), nearly identical in size to territories used in the same habitat by Red-eyed Vireos. However, territories were for the most part mutually exclusive. Interspecific aggressive response to song (Barlow and Power 1970; Rice 1978) helps to maintain territorial boundaries, but how females distinguish correct mates—a selective process often assumed to be a function of song—is not clear; mismatches are unknown. Philadelphia Vireos nest higher in the canopy than Red-eyeds, but Rice (1978) determined that no significant differences in foraging heights of the two species existed.

The Philadelphia Vireo arrives in Vermont in mid May. Like most other members of the genus, the Philadelphia Vireo builds its nest in the fork of a horizontal branch; the nest is 3–12 m (10–40 ft) above the ground. June 16 is the only date for nest construction in Vermont. From 3 to 5 (usually 4) brown-spotted, white eggs constitute a complete clutch. In marked contrast to the Red-eyed Vireo, the male Philadelphia assists in incubating the clutch. He may even sing while on the nest (Lewis 1921). Incubation lasts 13 to 14 days, and the nestling period is approximately equivalent. Young are fed a variety of insects captured by gleaning, hovering, and occasional hawking. Age to complete independence is unknown, but is probably similar to that of Red-eyed Vireos. Both Vermont fledgling dates are from late June. Rice (1978) found that Philadelphia Vireos experienced much less nest parasitism by Brown-headed Cowbirds than did Red-eyeds, but failed to identify behavioral traits that might account for the observed differences. In Vermont, Philadelphia Vireos oc-



No. of priority blocks in which recorded

TOTAL 19 (11%)

Possible breeding:	8 (42% of total)
Probable breeding:	6 (32% of total)
Confirmed breeding:	5 (26% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	9	17	47
North Central	1	5	5
Northeast Highlands	6	38	32
East Central	2	10	11
Taconic Mountains	1	6	5
Eastern Foothills	0	0	0

cur in areas where cowbirds are relatively uncommon (D. P. Kibbe, pers. observ.); parasitism rates within the state are unknown.

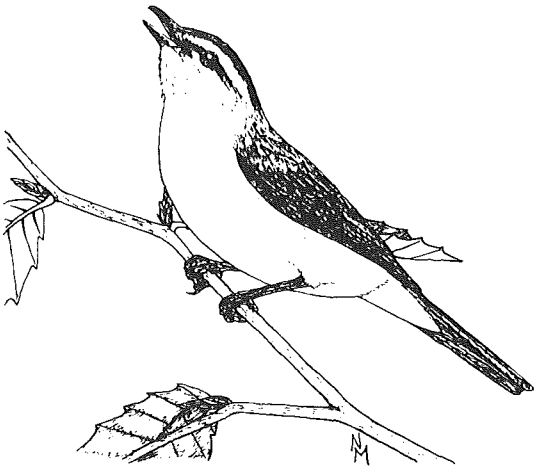
Philadelphia Vireos are common but unobtrusive fall migrants. Most pass through Vermont in late August and early September, but stragglers may be found through September 28. The species winters from central Guatemala to Panama and Colombia.

The historic status of the Philadelphia Vireo in Vermont and current trends in the population are open to speculation. Perkins and Howe (1901) and Spear (1976) considered the Philadelphia Vireo an uncommon summer resident. Selective logging activity appears to create habitat suitable for Philadelphias. Most of the state's forests have been selectively cut in the past, but increasing tracts, particularly in the Northeast Highlands, are now being clear-cut. While clear-cutting is not as beneficial to Philadelphia Vireos as selective logging, the edge habitats created are probably better habitat for the species than unbroken forest. Additional studies of the dynamics of colonization by Philadelphia Vireo populations in cutover areas, and analyses of distribution records in subsequent years, are needed to enlighten our view of the status of these unobtrusive residents.

DOUGLAS P. KIBBE

Red-eyed Vireo

Vireo olivaceus

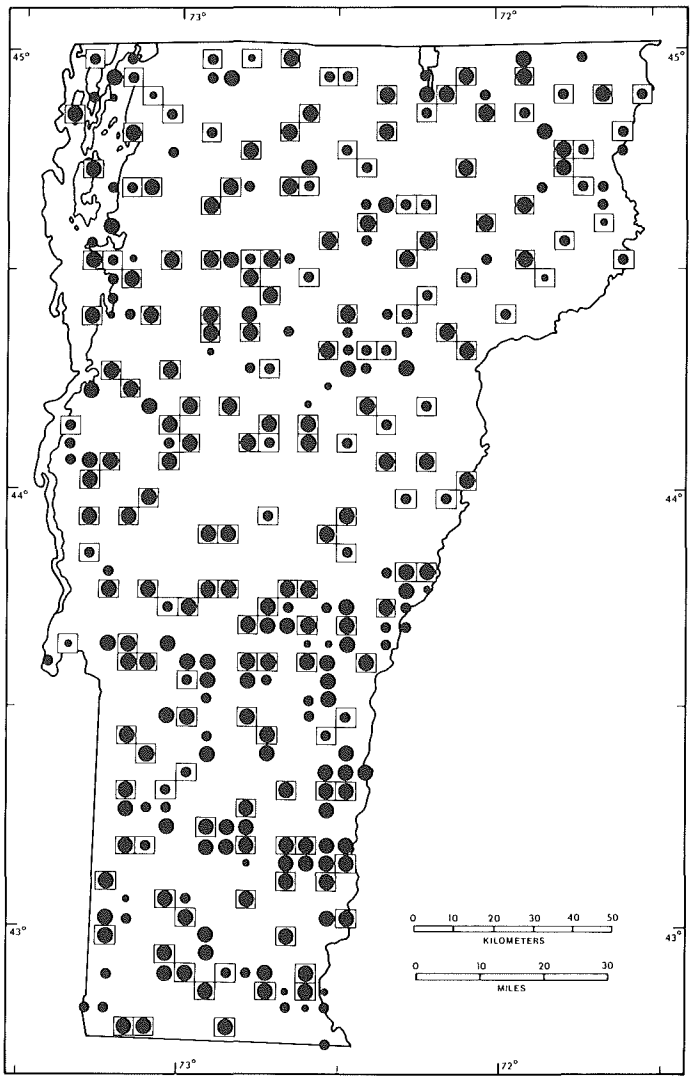


The Red-eyed Vireo is generally conceded to be the most abundant woodland bird in eastern deciduous forests. Since more than 75% of Vermont is forested and 68% of that area is under deciduous cover (Johnson 1980), it is scarcely surprising that Red-eyed Vireos were found in all Atlas Project priority blocks. U.S. Fish and Wildlife Service Breeding Bird Survey data indicate that Red-eyed Vireos are increasing at a rate of 4.6% per year in Vermont (Robbins 1982b), a fact that undoubtedly reflects the ongoing reforestation of the state. Similar trends exist among populations of this species throughout the Northeast. Although the Red-eyed Vireo shares various habitats with Philadelphia, Yellow-throated, Warbling, and Solitary vireos, only the Solitary exhibited a greater percentage of increase in U.S. Fish and Wildlife Service Breeding Bird surveys between 1966 and 1979 (Robbins 1982b). Red-eyed Vireos, however, remain by far the more abundant and widespread of the two species.

The Red-eyed Vireo breeds throughout the deciduous forests of eastern North America. Although recorded in Vermont as early as April 22, males usually arrive on territory during the second week of May. Females appear shortly thereafter. Territories are 0.3–0.7 ha (0.8–1.7 a) in area (Williamson 1971; Rice 1978). The highest density recorded for the species in mixed forest was 44 pairs per 40.5 ha (100 a), at Woodstock (Nicholson 1975). Territories are patrolled by the male, who sings incessantly and with incredible monotony throughout the breeding season until the young fledge and postnuptial molt starts.

Vireos have few obvious courtship displays. The swaying display given by the male Red-eyed and many of its congeners apparently functions as a form of courtship (Barlow and Rice 1977), but in some contexts may, like tail fanning, have an aggressive function as well. Since pair bonding is accompanied by aerial chases high in the canopy, much probably remains to be learned about the more intimate aspects of courtship.

The female Red-eyed, accompanied but unaided by the male, builds a nest that is suspended in the fork of a low horizontal branch, usually 1–3 m (3–10 ft) above the ground. Nest building has been observed from May 23 to July 1 in Vermont. American beech and sugar maple are preferred nest trees in Vermont, though a variety of trees and shrubs, deciduous and coniferous, are used throughout the species' range. Several days of mating activity follow nest completion and precede initiation of the 3- to 5-egg clutch. The eggs are white with reddish-brown or black markings on the larger end. Twenty-eight nests with eggs have been found in the state between May 28 and July 9. The male's constant song appears to reassure the incubating female that all is well; cessation puts her instantly on the alert (Stokes 1979). The male may feed her occasionally during the 12- to 14-day incubation period. Once the young hatch the male attends the nest more closely, bringing food to the young and the female as she broods. Nestlings have been recorded between June 16 and August 14 (17 records); adults with food for young accounted for more than 40% of the 124 confirmations. Red-eyed Vireos forage on insects by gleaning and hovering. The male usually feeds higher in the canopy than his mate (Williamson 1971). Both defend the nest site. Fecal sacs are eaten or carried off and



No. of priority blocks in which recorded

TOTAL 179 (100%)

Possible breeding:	5 (3% of total)
Probable breeding:	50 (28% of total)
Confirmed breeding:	124 (69% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17
Green Mountains	54	100	30
North Central	19	100	11
Northeast Highlands	16	100	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	13

left on twigs or tree branches. The nestlings may fledge at 10 to 11 days of age. They have been observed being fed as many as 20 days after fledging, but are ignored at 30 days, although they still may beg (Lawrence 1953). Fledglings, which have been reported as early as July 7 and as late as August 25, accounted for nearly 15% of the confirmations.

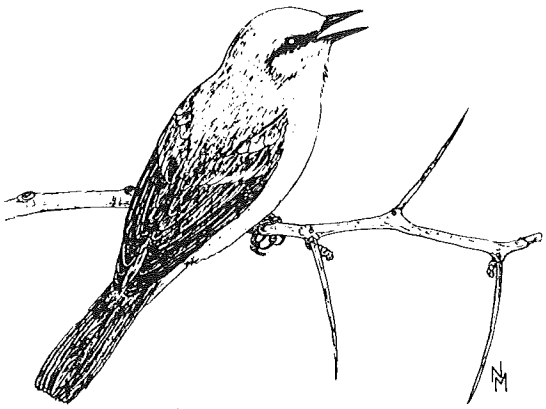
Second clutches are rare in this species (Lawrence 1953), and renesting probably accounts for most late nesting dates. Red-eyed Vireos are common hosts to Brown-headed Cowbird eggs. Frequently one of the easiest ways to confirm breeding in the cowbird is to locate a vireo nest. Nests are relatively easy to find; they accounted for more than 37% of all confirmations for the species. Red-eyed Vireos are abundant fall migrants, normally completing their departure from Vermont by the end of September, occasionally lingering until October 20.

Although the Red-eyed Vireo was apparently always a common summer resident in Vermont, its population must have been considerably less than its current size during the late 1800s, when agricultural clearing reached its zenith.

DOUGLAS P. KIBBE

Blue-winged Warbler

Vermivora pinus



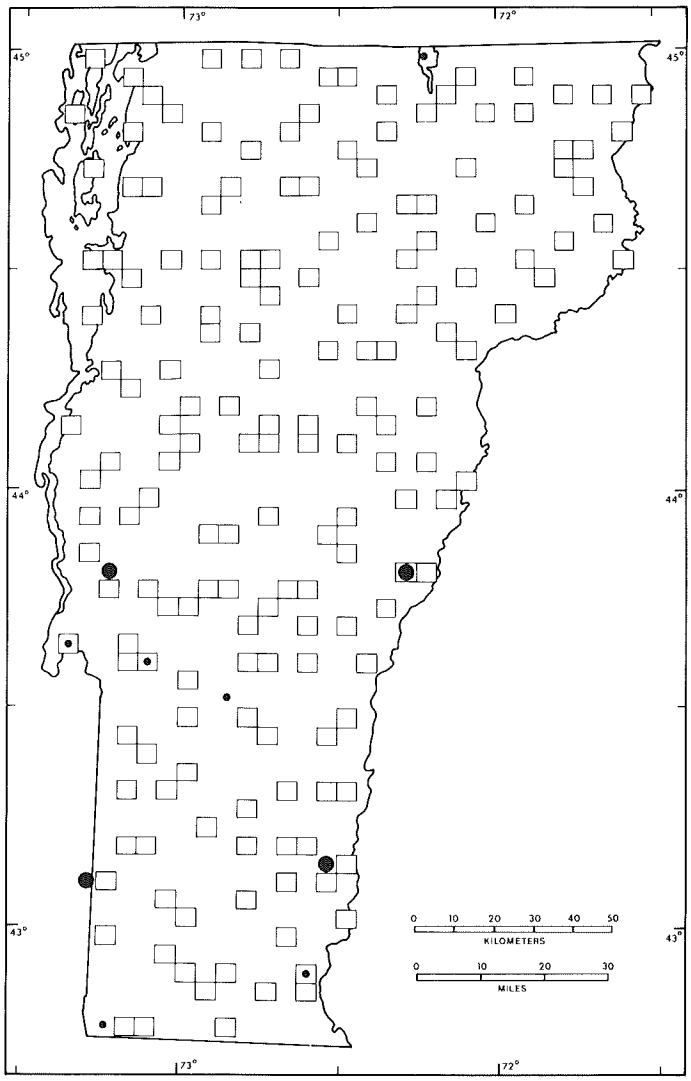
The Blue-winged Warbler is a rare species in Vermont; the first breeding record for the state was established in 1976 during the Atlas Project (ASR, A. Pistorius). The Blue-wing prefers young second-growth forest but accepts a wide range of vegetative density. It is most frequently found in brushy, neglected fields and pastures, 30 to 70 years into secondary succession (Confer and Knapp 1979); woodland openings and edges; and open swamps and streamside thickets.

Territories usually encompass a little more than an acre, but vary in size according to habitat. The species is most easily located in mid May by the distinctive *bee buzz* song it delivers, usually from a relatively high, exposed perch. Sexual activity is most intense just before and during the first day of nest building (Ficken and Ficken 1968a).

The nest, made of coarse grasses, bark shreds, and dead leaves, forms a deep and somewhat narrow cuplike structure that is lined with fine grapevine bark shreds, grass stems, or hair. Supported on a sturdy foundation of dead leaves close to or on the ground, it is built among and attached to upright stems of weeds and grass clumps (Chapman 1907; Bent 1953; Harrison 1975).

Incubation of the 4 to 6 eggs takes 10 to 11 days; the young leave the nest about 10 days after hatching. Three of the four Atlas Project confirmations were made in early July when the adults were busy feeding the young (FY). Vermont's nesting data are limited, but most are similar to those listed by Bull (1974) for New York State: egg dates, May 18-June 17; nestlings, June 4-July 11; fledglings, June 16-August 12. Generally, the Blue-winged Warbler spends a scant 3 months on its breeding grounds, leaving Vermont by the second week in August to return to its wintering grounds, which extend from southern Mexico to Nicaragua.

It has been known for some time that the Blue-winged Warbler hybridizes with the closely related Golden-winged Warbler over an extensive area of eastern North America, where their respective ranges overlap. The similarity of courtship displays, the rapidity of courtship bond formation, and the shared habitats of these birds probably facilitate this hybridization (Ficken and Ficken 1968a). There are two general hybrid types. "Brewster's" (*Vermivora "leucobronchialis"*), by far the most common, has been recorded in the Sudbury, Vermont area since 1974. During the Atlas Project, three instances of male "Brewster's" mated with female Blue-wings were reported: at Sudbury, summer 1976 (ASR, A. Pistorius); at Rice's Mills, summer 1977 (ASR, W. G. Ellison); and at West Haven, summer 1981 (ASR, S. B. Laughlin). In addition, a singing male "Brewster's" was located in the summer of 1981 in Castleton (ASR, S. B. Laughlin), and another in Middlebury (RVB, Spring 1979). In Williston, a "Brewster's" was present in an area with singing male Golden-wings. Crossbreeding with the Golden-winged parental form may produce a much rarer, recessive hybrid, the "Lawrence's" (*V. "lawrencii"*). There have been only three reports of "Lawrence's" for Vermont: at Sudbury on June 15, 1966 (G. Shampany, GMAS records); at Manchester on May 12–13, 1975 (a heterozygous Golden-winged Warbler) (T. Will, pers. comm.); and at Missisquoi National Wildlife Refuge on May 17, 1980 (RVB, Spring 1980). The initial (1976) record for a Blue-winged Warbler breeding in Vermont was of a male "Brewster's" that had mated with a female Blue-winged War-



No. of priority blocks in which recorded

TOTAL 4 (2%)

Possible breeding:	3 (75% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	1 (25% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	1	3	25
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	1	6	25
Eastern Foothills	2	8	50

bler, located with young in Sudbury (ASR, A. Pistorius). Of the four state breeding confirmations, two were of "Brewster's" mated to Blue-wings.

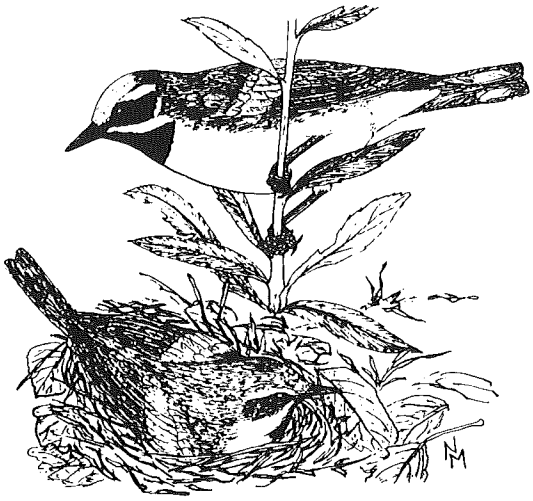
Historically, Blue-wings occurred primarily west of the Appalachians (Cooke 1904; Short 1962). Very little was known of the species' nesting habits in southern New England before about 1880, when nests were found in southern Connecticut (Bent 1953). The Blue-wing was listed by Perkins and Howe (1901) as a rare visitant in Vermont; sightings existed, however, as far north as St. Johnsbury and Lunenburg.

The Blue-winged Warbler seems to be expanding at the expense of the Golden-winged Warbler. Studies show a general pattern of Blue-wings replacing Golden-wings within 50 years of the initial hybridization (Confer and Knapp 1981). This replacement has already been evidenced at a few of the older southern Vermont breeding locations. If the patterns established in New York (Bull 1974), Connecticut, Michigan, and Ohio (Gill 1980) hold true, the Blue-wing should increase in Vermont in the years to come.

DONALD B. CLARK

Golden-winged Warbler

Vermivora chrysoptera

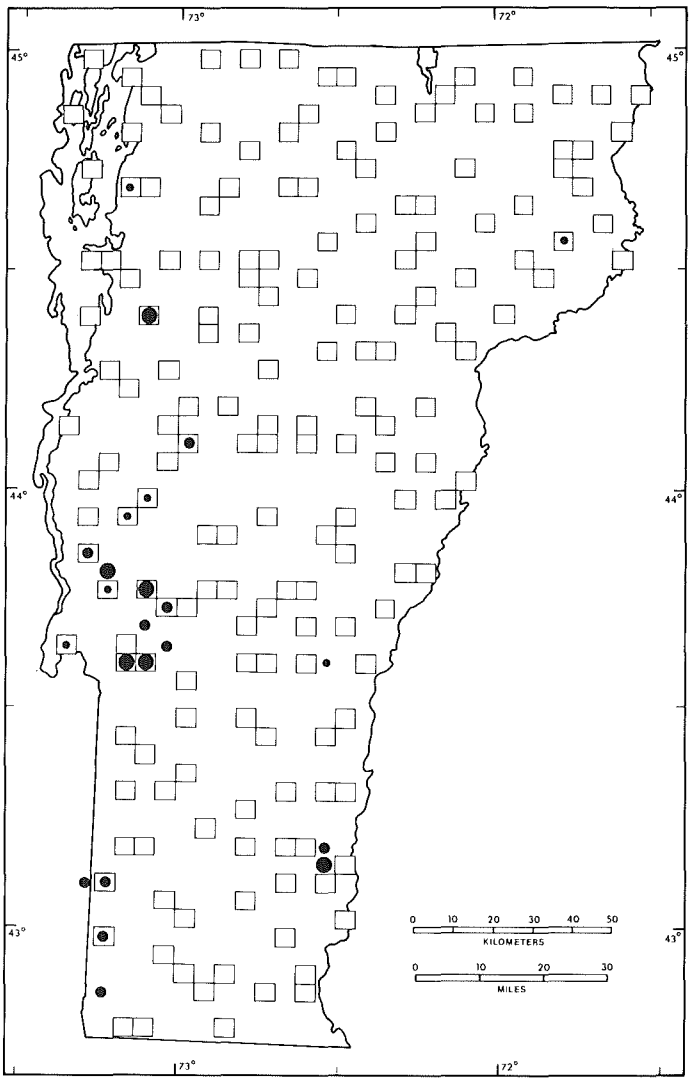


The Golden-winged Warbler seems to be adapted to transitional and early successional habitat (Confer and Knapp 1979). Its preference for open, brushy areas with few trees restricts the species almost entirely to fields last farmed 10 to 30 years ago (Confer and Knapp 1979) and to swampy thickets (Chapman 1907). The recent disappearance of the species from parts of its range (Bull 1974) may have resulted from changing land use and the absence of large tracts of recently abandoned farmland.

The male Golden-wing arrives in Vermont during the second week of May and sets up his territory. Territories are usually a little larger than an acre (Ficken and Ficken 1968b), but are highly variable in size from area to area and are sometimes as large as 2 ha (5 a) (T. Will, pers. comm.). This is the best time to locate the species, as the male throws his head back and gives a persistent buzzy *bee-bz-bz-bz* call, usually from an exposed perch. The female usually arrives a day or two after the male, and, as with the Blue-winged Warbler, pair formation occurs rapidly (Ficken and Ficken 1968a). The late arrival and early departure of these two *Vermivora* species, which may be related to their specialized feeding habits, shorten the time available for reproduction, possibly necessitating a more rapid courtship. Hybridization between the two *Vermivora* species is probably facilitated by the rapidity of courtship and similarities in their courtship displays (Ficken and Ficken 1968a).

The nest of the Golden-wing, built by the female on or near the ground, is usually supported by weed stocks, a small sapling, or tufts of grass on a foundation of dead leaves. It is a loose, bulky structure of grasses, tendrils, and bark shreds lined with hair or fine grasses (Chapman 1907; Bent 1953; Harrison 1975). Three to 6 (more commonly 4 to 5) eggs are incubated by the female for 10 to 11 days. The young, able to leave the nest 10 days after hatching, acquire their first winter plumage about a month later (Bent 1953). Sprightly when feeding, the Golden-winged Warbler swings upside down on twigs from treetops to lower branches like a chickadee (Bent 1953), while eating caterpillars, spiders, ants, and beetles. Vermont egg dates are from May 18 to June 16; on May 27, 1959, a nest with 5 eggs was located in Union Village (Wellman 1959). Nestlings have been located from June 8 to July 6; fledglings from June 27 to August 6 (males were feeding young on July 4 in Rutland County and on July 9 in Sudbury). Because the birds are most active during the nestling and fledgling stages, the majority (four out of six) of Atlas Project confirmations (FY) were made during that period.

The Golden-winged Warbler has been expanding its range northward and eastward in the eastern U.S. for about 175 years (Confer and Knapp 1981). Reported from Vermont as early as 1893 by Hiram Cutting (Stearns and Coues 1893), the species was listed as a rare summer resident at the turn of the century (Perkins and Howe 1901) and a rare migrant in Windham County in 1907 (Davenport 1907). From 1913 to 1918 regular reports of singing males came from Muddy Pond on Pine Hill in Rutland (Kent 1919). The species was also listed as a migrant and local summer resident in Rutland County, as a rare summer resident in West Haven on Lake Champlain, and as a visitant at Hartland (Ross 1934; Morgan and Marble 1935).



No. of priority blocks in which recorded

TOTAL 15 (8%)

Possible breeding:	6 (40% of total)
Probable breeding:	5 (33% of total)
Confirmed breeding:	4 (27% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	6	19	40
Green Mountains	2	4	13
North Central	0	0	0
Northeast Highlands	1	6	7
East Central	0	0	0
Taconic Mountains	6	37	40
Eastern Foothills	0	0	0

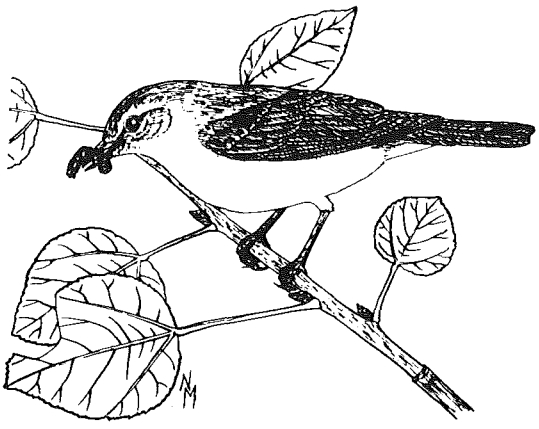
Considering data from both priority and non-priority blocks, Atlas Project workers found Golden-winged Warblers in all but the North and East Central regions of Vermont, with the majority of sightings (12 of 23) and confirmations (4) coming from the Taconic Mountains. Noteworthy was the sighting of a Golden-wing in the Northeast Highlands near Victory.

The Golden-wing was placed on the National Audubon Society's Blue List in 1982, as it continued to experience genetic swamping by Blue-wings (Tate and Tate 1982). Gill (1980) has shown that the arrival of Blue-wings and the local extinction of Golden-wings in an area are closely related; the Golden-wings are usually gone within 50 years. Will (1982) has stated that the Blue-wing may be socially dominant over the Golden-wing, which may adversely affect the Golden-wings' success in fledging young where the two species' territories overlap. The early successional stages of abandoned farmland in the eastern U.S. probably provided the habitat needed for expansion of the Golden-wing's range; today much of that habitat is gone. Gill (1980) believed that if the present trend continues for another 100 years, the species will be very rare, if not extinct.

DONALD B. CLARK

Tennessee Warbler

Vermivora peregrina



The Tennessee Warbler, a bird of the Nearctic boreal forest zone, breeds only rarely and sporadically in Vermont, largely in the northeastern quarter of the state; however, breeding has been confirmed south to Winhall and Rutland. Most summer reports are from the cool spruce-fir forests in the vicinity of Island Pond.

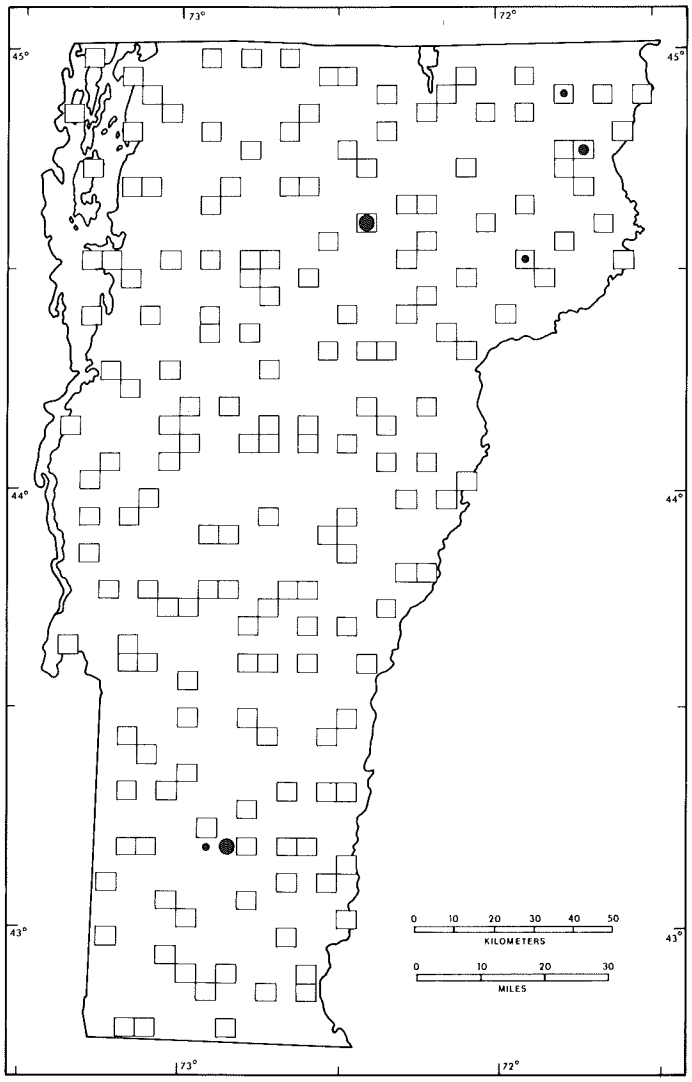
There are few reports of breeding for Vermont. Ross (1906) observed two pairs of Tennessees in Mount Holly in June 1897; Evans reported a pair in Townshend during the summers of 1890 and 1899 (Howe 1902); Eldred found one or more pairs breeding in the Morgan area during the second half of the 1960s (Eldred, Field notes). There were two confirmations during the Atlas Project: a pair feeding four to five fledglings, July 13, 1978, at Bear Swamp in Wolcott (ASR, G. F. Oatman and C. Schultz); and an adult feeding a stub-tailed young near Winhall, August 8 and 9, 1981 (ASR, W. J. Norse). One probable and four possible reports were also tallied during the Atlas Project. In addition, two highly suggestive reports came from the Vermont Institute of Natural Science's banding station in Woodstock: on August 5, 1975 and July 29, 1976 hatching-year Tennessees, looking very recently fledged, were captured and banded. The Tennessee is probably as rare in Vermont as these few records suggest, since many promising nesting habitats covered by the Atlas Project census as unique and fragile areas failed to yield them.

In the East, the Tennessee's breeding range extends south to southern Maine, central New Hampshire, southern Vermont, and northeastern New York (AOU 1983). Some researchers believe the Tennessee is much more numerous now than it was in the last century (Bent 1953; Bull 1974). As it prefers openings and clearings in coniferous forests for breeding, this species may have benefited from increased human use of northern boreal forests. It favors brushy areas, scattered with small conifers, at the edges of bogs, streams, and other damp places. On its breeding grounds the Tennessee is not overly difficult to find as males sing their rather loud, ringing song as often as 6 to 9 times per minute (Robbins et al. 1966).

The nest is placed in a hummock of sphagnum moss or under a small bush, and is usually concealed from above by dead vegetation of the previous year. The nest is made of sedge or grass; in it are laid 4 to 7 (commonly 5 to 6) white or creamy white eggs, spotted or speckled with brown (Palmer 1949; Reilly 1979). The incubation period and age at first flight are still unknown (Reilly 1979). Nesting data for Maine are probably roughly applicable to Vermont: eggs advanced in incubation, June 4 and 7; nests with young, June 10 and 15; males singing until August 20 (Palmer 1949).

On its summer territory the Tennessee forages through the leaves and over the branch tips at almost any height. In migration it may appear, often in large numbers, in trees of any type, though in spring it especially favors hunting amid the catkins and blossoms of very tall deciduous trees. It feeds on a variety of insects and spiders; seeds, berries, and grapes are taken to a lesser extent, especially in the fall (Terres 1980).

The Tennessee is normally seen in Vermont as a migrant, uncommon to fairly common in spring, and common in fall. Spring migration usually begins about May 10–14 (extreme date, May 7) and peaks



No. of priority blocks in which recorded

TOTAL 4 (2%)

Possible breeding:	2 (50% of total)
Probable breeding:	1 (25% of total)
Confirmed breeding:	1 (25% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	1	5	25
Northeast Highlands	3	19	75
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

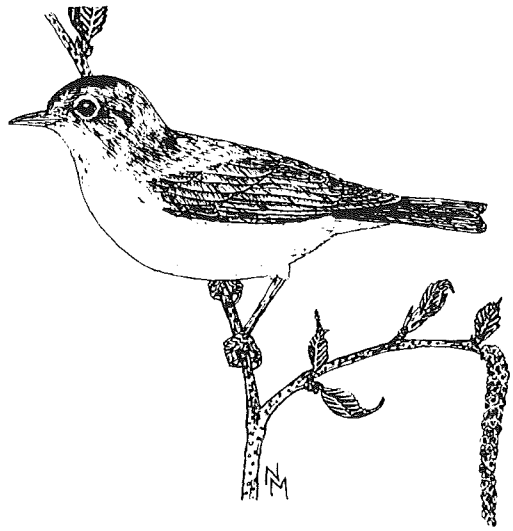
around May 18–26; the spring high count of individuals seen at one time in a single area is 28. The last spring migrants are usually seen from May 27 to 29 (extreme date, June 3).

Like other boreal zone nesters (e.g., the Bay-breasted Warbler), the Tennessee may occasionally linger and even breed well south of its usual range. But observers should beware of assuming that extralimital singing males represent breeding pairs: they may instead merely be lingering, unattached males. Even summer reports from the Northeast Highlands may represent unmated males. Furthermore, Tennessees begin moving in the fall quite soon after breeding; an extreme early departure date in Vermont is July 12, and first departures on July 14–21 are not uncommon. Again, care must be taken to avoid mistaking these individuals for nesters. The fall movement normally peaks from August 23 to September 15, and ends between September 28 and October 22 (extreme date, October 25) (RVB 1973–81).

G. FRANK OATMAN

Nashville Warbler

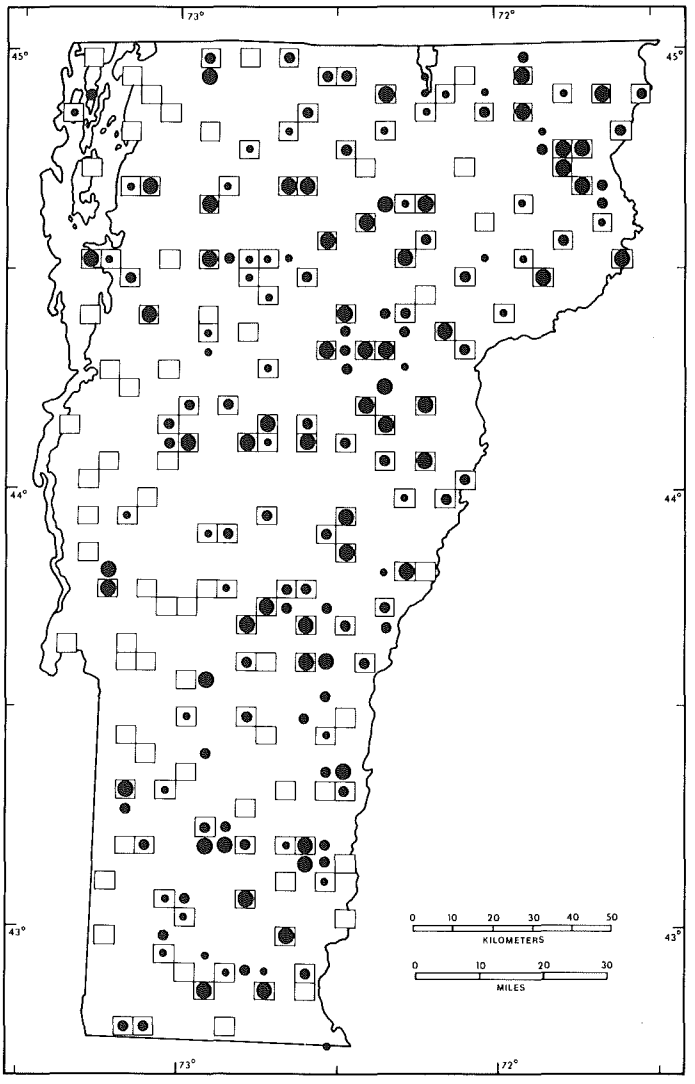
Vermivora ruficapilla



The Nashville Warbler breeds across southern Canada and the northern U.S. from British Columbia east to Nova Scotia and south in the mountains to California and Virginia. Within this large range the species occupies a variety of ecological locales ranging from bog scrublands to dry seral forests and mountaintops. On Mt. Mansfield it is the second most abundant warbler to occur above 1,100 m (3,608 ft), exceeded only by the Blackpoll Warbler (Able and Noon 1976). Although the Nashville Warbler frequently breeds in dry second-growth birch and aspen stands where fire and/or lumbering have occurred, it is most common in and around Vermont's spruce and tamarack bogs and on mountains such as Ascutney. Certainly it has not undergone a dramatic population increase following man's disturbance of the primeval forest, as did the Chestnut-sided Warbler. Although widespread, the Nashville remains one of the less common breeders in the state's abundant abandoned pastures and disturbed seral forest lands. Dawson (1979) suggested that logging may enhance lowland conifer habitat for Nashvilles by increasing edge and shrub growth.

Atlas Project results indicate that Nashville Warblers become progressively less common toward western and southern areas of the state. The species was recorded in every priority block in the Northeast Highlands and East Central region, but in only 39% and 31% of the Champlain Lowlands and Taconic Mountain blocks, respectively. Breeding bird censuses in northern and east central Vermont have recorded five to fifteen pairs of Nashvilles per 40.5 ha (100 a) in second-growth conifer and hardwood habitats (Carpenter 1972, 1973, 1975, 1977, 1978; Williamson 1975; Metcalf 1977). Little information exists on current population trends, but the species is undoubtedly more common today than it was a century ago when much of the state was deforested. What its status in Vermont was before settlement is, of course, unknown, but the Nashville is never found in unbroken forest and was consequently probably limited in its occurrence to the vicinity of burns, beaver meadows, and bogs.

Among the hardiest of Vermont warblers, Nashvilles may be present from the first week of May through the third week of October, when they retreat to their wintering grounds, which extend from southern Florida and Texas south to Guatemala. Although the male may typically be found singing from a high perch or in the canopy of a tree during May and June, a flight song may also be given (Chapman 1907). The nest is placed on the ground, well concealed at the base of a shrub or sapling, or in a grass clump or cluster of dead leaves. Roth (1977) found nests were generally placed in open areas with well-developed herbaceous cover. The nest, built of grasses, pine needles, and mosses, is lined with fine rootlets, grass, and hair. The 4 to 5 brown-speckled creamy white eggs are incubated by the female for 11 to 12 days, and the young fledge after a similar length of time in the nest (Lawrence 1948). Easily flushed, the female may feign injury once disturbed. Courtship feeding of the female on the nest occurs occasionally (Roth 1977). Both adults feed and care for the young, with the male often doing most of the feeding. Fledgling dates for Vermont range from June 25 to August 7 (eight records). Most foraging is reported to occur



No. of priority blocks in which recorded

TOTAL 124 (69%)

Possible breeding:	35 (28% of total)
Probable breeding:	41 (33% of total)
Confirmed breeding:	48 (39% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	12	39	10
Green Mountains	42	78	34
North Central	15	79	12
Northeast Highlands	16	100	13
East Central	19	100	15
Taconic Mountains	5	31	4
Eastern Foothills	15	62	12

low in trees and thickets at the forest edge, with occasional forays to the ground and to the upper canopy. A variety of prey is taken, including gypsy moths and tent caterpillars. There is no evidence as yet that the species responds to outbreaks of these prey, as do some of the boreal forest warblers to outbreaks of spruce budworms. Nashville Warbler nests are difficult to locate, and Atlas Project workers made 70% of their breeding confirmations through observations of adults feeding young.

The Nashville Warbler may have increased somewhat in Vermont since the late 1800s, when it was considered a rare summer resident (Perkins and Howe 1901). Although the species currently occurs more frequently than before in U.S. Fish and Wildlife Service Breeding Bird surveys in the Northeast (BBS 1966–79), its occurrence on Vermont routes has remained relatively low. Perhaps plant succession on Vermont's abandoned farmlands has passed the stage where these areas are attractive to Nashville Warblers. Nashvilles may still be found relatively easily in all but extreme western Vermont by a persistent observer familiar with the species' song and habitat.

DOUGLAS P. KIBBE

Northern Parula

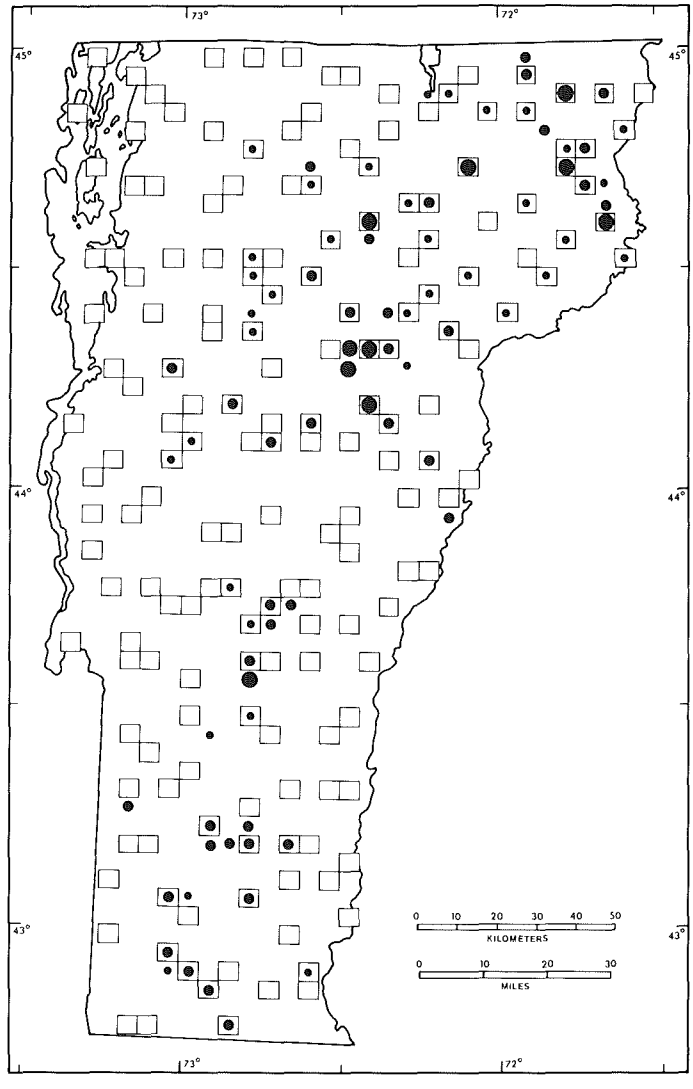
Parula americana

The diminutive Northern Parula, the smallest warbler in North America, regularly migrates to central Mexico and Nicaragua to winter and returns in the first week of May to its Vermont breeding grounds. The parula is well known for its fondness for "old-man's-beard" (*Usnea*) lichens, in which, in late May and early June, the parula hollows out a pendulous, well-concealed nest. This penchant for lichens has markedly reduced the parula's range and abundance in the Northeast, where it was formerly widespread. Lichens are particularly sensitive to air pollution and have been drastically reduced, especially near the metropolitan portions of the mid-Atlantic coast. Although not possessing metropolitan areas, Vermont is not immune to the insidious effects of acid rain, ozone, and other air pollutants generated by midwestern industrial developments, according to recent evidence. The long-term effects of polluted precipitation remain to be seen, but a continued decline in Northern Parulas is probably among them. In the absence of lichens the parula occasionally utilizes clumps of twigs, dead leaves, or adventitious roots as a nesting substrate (Petrides 1942). In the South it nests in the epiphytic Spanish moss that festoons swamp forests.

The current distribution of Northern Parulas in Vermont is defined by the Northeast Highlands, North Central region, and Green Mountains, where it was found in 88%, 79% and 46% of the Atlas Project priority blocks, respectively. Eighty-three percent of all sightings came from these three regions. Although local populations as high as 18 pairs per 40.5 ha (18 per 100 a) in coniferous forest have been recorded (Metcalf 1977), densities throughout most of the parula's current breeding range in Vermont are probably much lower. Low density and concealed nests probably contributed to the difficulty most observers had in confirming this species. Confirmed in only 11% of the Atlas Project priority blocks, the Northern Parula had a very low rate of confirmation.

Although it occurs in a variety of forest habitats during migration, the parula is most frequently found breeding in moist spruce and balsam forests where *Usnea* lichens proliferate. Despite its penchant for coniferous forests in the Northeast, the Northern Parula is apparently a relative newcomer (evolutionarily speaking) to the North (Mengel 1964). In the Southeast, where the parula is most abundant, the species prefers moist, bottomland hardwoods. It is interesting, therefore, that its primary nesting habitat in Vermont is coniferous forest, since this habitat type is cohabited by a large variety of potentially competitive species. The parula is subordinate to the majority of its cohabitants (e.g., Yellow-rumped and Black-throated Green warblers), but apparently reduces competition by foraging on the tips of conifer foliage, using deciduous growth later in the breeding season, and exhibiting considerable plasticity in its general habitat requirements (Morse 1967, 1971).

Parulas prefer to establish territory around openings in or at the edge of coniferous stands (Morse 1967) where competition with "sprucewoods warblers" is reduced and lichen growth is more prolific. Margins of bogs, ponds, and streams provide excellent habitats for observation. The male's persistent buzzy trill may be heard well into



No. of priority blocks in which recorded

TOTAL 62 (35%)

Possible breeding:	29 (47% of total)
Probable breeding:	26 (42% of total)
Confirmed breeding:	7 (11% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	1	3	2
Green Mountains	25	46	40
North Central	15	79	24
Northeast Highlands	14	88	22
East Central	6	31	10
Taconic Mountains	0	0	0
Eastern Foothills	1	4	2

July as he patrols his domain. The female incubates her clutch of 4 to 5 (maximum 7) brown-speckled, creamy white eggs in the sparsely lined nest for 12 to 14 days. Age to fledging is at least 10 days (Graber and Graber 1951). Insufficient information is available to ascertain Vermont nestling dates. Bull (1974) gave nestling dates for New York from June 5 to July 24; curiously, he also cited August 26 as a late date for a "fledgling." Far hardier than its tiny stature suggests, the Northern Parula may linger in Vermont until the first week of October. A parula originally banded in Marshfield, Vermont, was recaptured there at an age of 4 years, 3 months (Kennard 1975). This longevity record was subsequently exceeded by 8 months by a banded parula recaptured in Maryland (Klimkiewicz et al. 1983).

The future of the Northern Parula in Vermont is difficult to predict. Maturing forests within the state will offer good habitat provided air pollution does not further degrade nesting substrates.

DOUGLAS P. KIBBE

Yellow Warbler

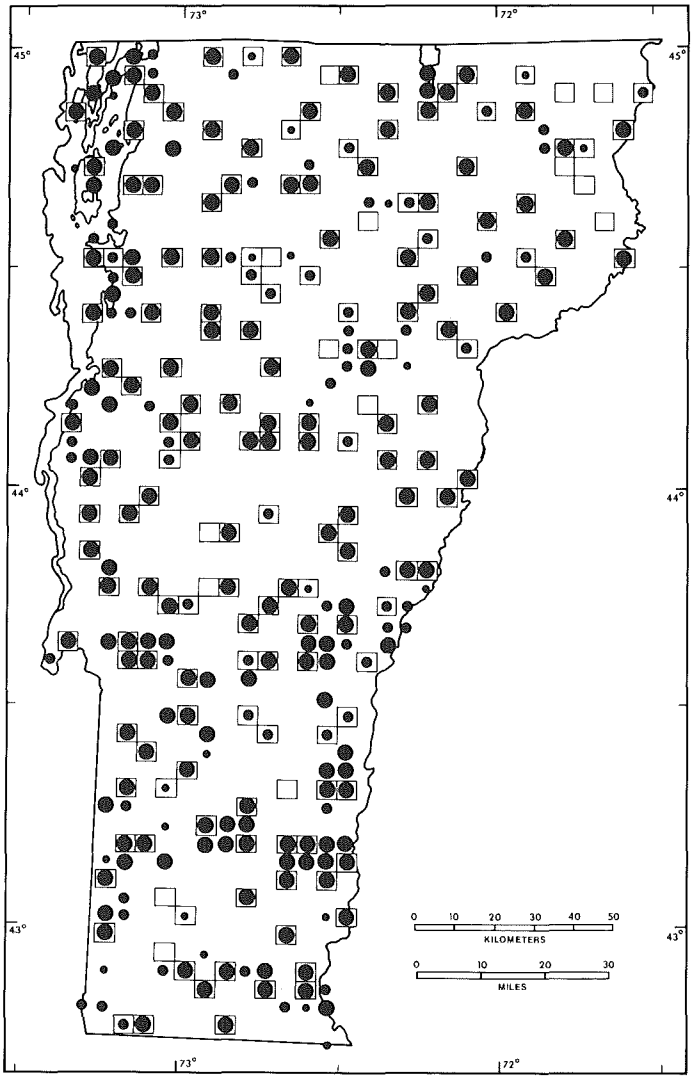
Dendroica petechia

The Yellow Warbler, by virtue of its boisterous, incessant song and brilliant plumage, is one of the most well-known members of the Parulinae in Vermont. The species displays a decided preference for moist, shrubby habitats and may be abundant in alder thickets and swamps. On upland sites Yellow Warblers tend to be replaced by Chestnut-sided Warblers, although their habitats overlap.

The Yellow Warbler was found in all but 16 of the priority blocks. The apparent blanks on its distribution map may be a consequence of scanty coverage in inaccessible blocks rather than of actual discontinuities in its range. The species' preferred habitat is least widespread in the Northeastern Highlands, where extensive coniferous growth dominates the landscape and population densities are, as a consequence, lower. The Yellow Warbler is, and apparently always has been, one of Vermont's most abundant breeding species. Perkins considered it the most common warbler in the state in 1901. Greatest densities recorded on recent Vermont territory mapping studies are 24 pairs per 100 ha (10 pairs per 100 a) (Breault and Farrar 1972) along a rural stream border. Greater densities probably occur in shrubby, swampy forest habitats that are still uncensused because of their inaccessibility. Yellow Warblers are regularly found on all U.S. Fish and Wildlife Service Breeding Bird Survey routes run in the state, and the species is second only to the Chestnut-sided Warbler as the most abundant *Dendroica* warbler tallied annually.

One of the first warblers to return in the spring from its wintering grounds in southern Mexico and northern South America, male Yellow Warblers may arrive on territories in southern Vermont in the first week of May. By mid May females are busy constructing nests under the attentive eyes of territorial males. Defended territories may range in size from 0.06 to 0.4 ha (0.15 to 1.95 a) (Brewer 1955), but foraging occurs regularly well outside the area actually defended against intruding males (Kendeigh 1941). From 3 to 6 (average 4) glossy gray-, green-, or blue-white eggs, wreathed on the large end with brown, are laid in the nest. The nest may be wedged in a crotch 1–18 m (2 to 60 ft)—usually 1.8–2.4 m (6–8 ft)—above the ground. The nest is constructed of plant down, mosses, and fine grasses bound with spider webs, and is lined with plant down and hair. The Yellow Warbler is one of the most frequent hosts to Brown-headed Cowbird eggs (Friedmann 1963), although the female displays a novel response to such parasitism. Upon discovering a cowbird's egg(s) in her nest, the female warbler may build a second nest atop the entire clutch and lay a new set. Such layering of nests has been repeated up to five times in response to persistent parasitism (Wallace and Mahan 1975). Alternatively, the warbler pair may abandon the entire clutch and start a new nest elsewhere. Nonetheless, it is not uncommon to see a pair of Yellow Warblers working overtime to feed a young cowbird twice their size.

Normal incubation takes 11 days and is the sole responsibility of the female. Egg dates for 23 Vermont nests extend from May 23 to June 30. The nestling period is 9 to 12 days; young are tended by both parents. Vermont nestling dates are concentrated in mid June, indicating that most nest initiation and egg laying takes place in the latter half of May. Nestlings have been found



No. of priority blocks in which recorded

TOTAL 163 (91%)

Possible breeding:	8 (5% of total)
Probable breeding:	24 (15% of total)
Confirmed breeding:	131 (80% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	19.0
Green Mountains	48	89	29.5
North Central	17	89	10.4
Northeast Highlands	11	69	6.8
East Central	17	89	10.4
Taconic Mountains	16	100	9.8
Eastern Foothills	23	96	14.1

as early as June 5. Four fledgling dates fall between June 30 and July 9.

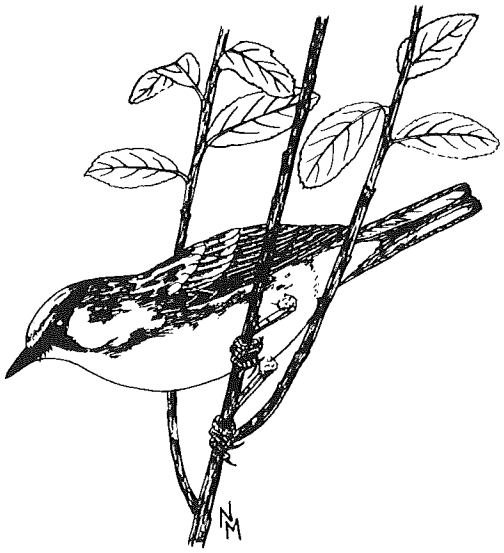
Yellow Warblers waste little time on the breeding grounds. Southward migration appears to be initiated as soon as the young are independent. Most local birds leave in July and early August. Although Yellow Warblers may be found occasionally in flocks of migrants into mid September or, exceptionally, to October 26, these late birds are probably migrants en route from more northerly latitudes.

The Yellow Warbler has one of the widest ranges of any North American passerine. The species breeds from northern South America north to Newfoundland in the east and to central Alaska in the west. Within this tremendous range it occurs from sea level to timberline in a wide gradient of seral communities. Population declines in the southwestern U.S., where clearing of riparian habitats has eliminated the species from large tracts of its original range, have evoked recent concern (Tate and Tate 1982). Elsewhere in its extensive range it continues to thrive, and U.S. Fish and Wildlife Service Breeding Bird survey data (Robbins 1982b) show a 2.5% annual increase among Yellow Warblers in the Northeast. Certainly no decline is evident in Vermont.

DOUGLAS P. KIBBE

Chestnut-sided Warbler

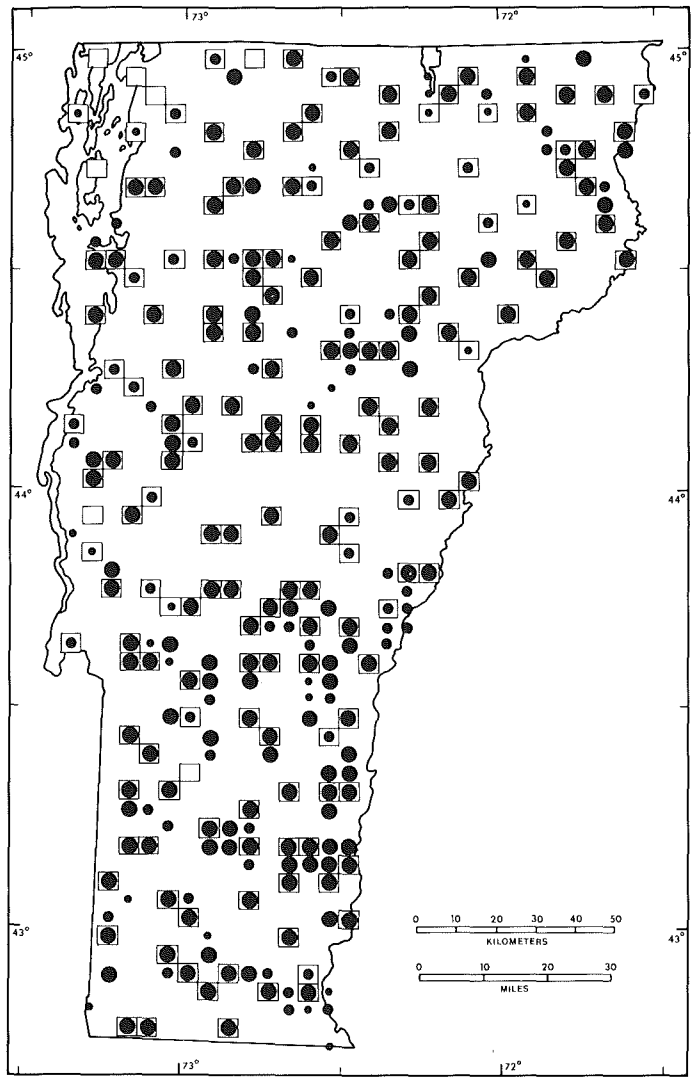
Dendroica pensylvanica



Few species can rival the Chestnut-sided Warbler's distribution and abundance in Vermont. This gaily-colored denizen of brushlands and early seral-stage forests can be found throughout the state. It is surprising to learn, in light of the species' current abundance and apparent versatility, that Audubon and other early nineteenth-century naturalists considered this species to be one of the rarest of North American birds (Bent 1953). The clearing of the forests doubtless had a positive effect on this warbler, since by the mid-1800s Minot (1895) considered it common in New England, a status it still enjoys today. In mixed forest and edge communities in Vermont, densities of 15 to 19 pairs per 40.5 ha (100 a) have been noted (Breault and Farrar 1972; Nicholson 1973, 1975). The species is one of the most conspicuous warblers in U.S. Fish and Wildlife Service Breeding Bird surveys in Vermont, occurring at an average of 10 birds per route—more frequently than any species except the Common Yellowthroat (BBS 1966–79). Since these surveys are essentially restricted to roadside habitats (which are generally disturbed), such a finding is biased and may not reflect abundances in more remote areas. Chestnut-sided Warblers are usually absent from unbroken mature woodlands. Nonetheless, Atlas Project workers had little difficulty finding the species in most (96%) of the priority blocks throughout the state, except for the northwestern corner, where its distribution is apparently quite localized.

Chestnut-sided Warblers begin returning to Vermont from their Central American wintering grounds by the second week of May. Males return first (Ficken and Ficken 1965) and immediately establish territories in a variety of seral deciduous and mixed coniferous habitats. The small—0.5–1 ha (1.2–2.5 a)—territories (Kendeigh 1945b) are defended both by vigorous song and agonistic encounters. Territorial displays in the Chestnut-sided Warbler are relatively unritualized (Ficken and Ficken 1965); territorial defense consists primarily of direct pursuits and fighting.

Preferred nest sites have dense cover within 1 m (3.3 ft) of the ground. The nest, constructed by the female, is placed 0.3–1.2 m (1–4 ft) above the ground immediately beneath the dense canopy of a low sapling or shrub, frequently spiraea, blackberry, maple, cherry, or viburnum. A nest in Michigan composed of a foundation, sides, and lining, and built of interwoven grass and spider web, bark, and rootlets, took 5 days to complete (Tate 1970). Nest building has been observed as early as May 15 in Vermont. During nest building, courtship activities (gliding, fluffed displays, extended quivering wings) by the male increase (Kendeigh 1945b; Ficken and Ficken 1967). The interval between completion of the nest and commencement of egg laying varies from 1 to 6 days (Tate 1970). Three to 5 (usually 4) off-white eggs, blotched with brown and purple, constitute the clutch, which is incubated by the female for 10 to 12 days (Burns 1921; Sawyer 1947; Lawrence 1948). Vermont egg dates extend from June 5 to July 12 (29 nests). Chestnut-sideds are reportedly frequent hosts to Brown-headed Cowbird eggs (Friedmann 1963), although only 2 of 28 Vermont nests were parasitized. While Chestnut-sided Warblers, like Ameri-



No. of priority blocks in which recorded

TOTAL 172 (96%)

Possible breeding:	8 (4.6% of total)
Probable breeding:	27 (15.7% of total)
Confirmed breeding:	137 (79.6% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	25	81	14.5
Green Mountains	53	98	30.8
North Central	19	100	11.1
Northeast Highlands	16	100	9.3
East Central	19	100	11.1
Taconic Mountains	16	100	9.3
Eastern Foothills	24	100	13.9

can Redstarts, may occasionally bury cowbird eggs in their nest (Tate 1970), this behavior is weakly evolved in contrast to that shown by Yellow Warblers. The incubating female, who may beg and be fed by the male, is very attentive, averaging only 8 minutes away from the nest per foray (Tate 1970). Lawrence (1948) believed the hatchlings are fed by the female by regurgitation for the first several days, but most authors indicate that both parents attend the young. Because of their attentiveness and abundance, Chestnut-sided Warblers are easy to confirm; 66% of all Atlas Project confirmations were of adults carrying food for young.

The young may prematurely desert the nest as early as the seventh day if disturbed (Tate 1970) and may fly short distances at 9 days, but 10 to 12 days is apparently the usual nestling period. Fledglings continue to beg and be fed for up to 4 weeks after leaving the nest (Lawrence 1948). Fledglings in Vermont have been noted from June 22 to as late as August 7 (L. H. Ross, Field notes). By mid August, migration is under way; the last stragglers usually leave by the third week in September. The record late departure, however, is October 16.

DOUGLAS P. KIBBE

Magnolia Warbler

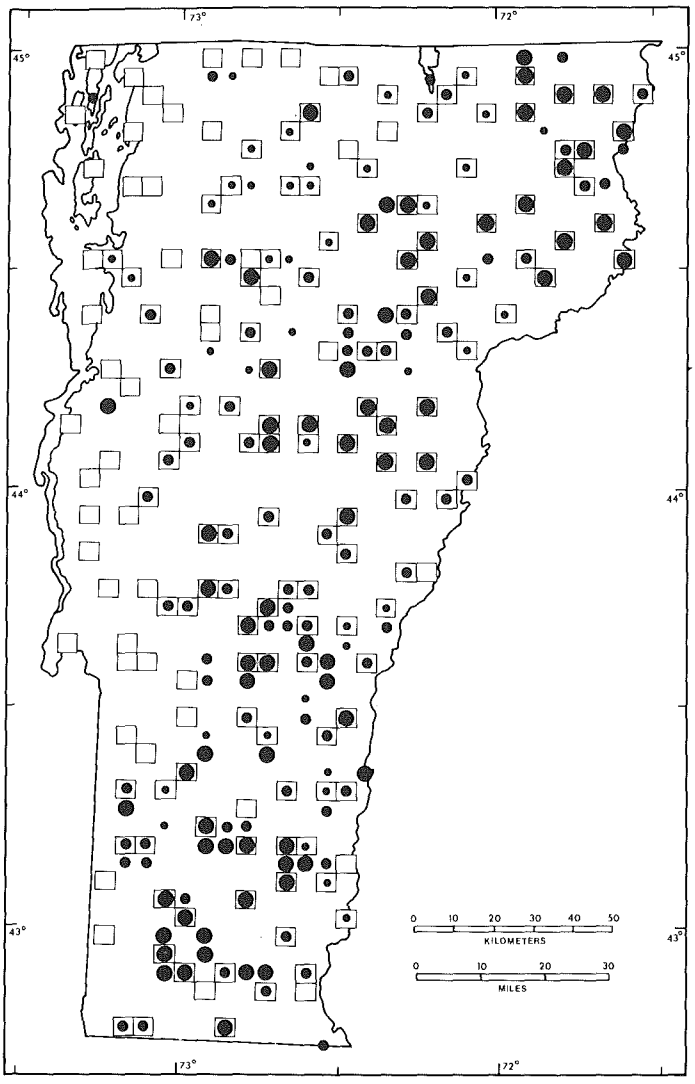
Dendroica magnolia

Few birds native to Vermont can rival in plumage the colorful Magnolia Warbler. The resplendent males begin appearing on their Vermont breeding grounds during the first week of May, after wintering in Central America. Throughout its broad breeding range, which extends in Canada from British Columbia to Newfoundland and in the eastern U.S. south to West Virginia, it is characteristically associated with boreal forests. The Magnolia can also be found in mixed coniferous-deciduous forests, and is one of the first forest warblers to colonize the young white pine and sapling hardwood associations that typically spring up in abandoned pastures throughout the Vermont hills. This relationship is reflected in the results of 1966–79 U.S. Fish and Wildlife Service Breeding Bird surveys (Robbins 1982b); during that period Magnolia Warbler populations increased more than 6% per year in Vermont. Presumably much of this increase is attributable to the regrowth of abandoned fields into white pine, eastern hemlock, and northern hardwood forests, which were colonized by Magnolia Warblers as soon as the forests reached sufficient age. As a result of reforestation efforts prompted by state foresters during the 1950s, many pine and spruce plantations were planted that are now old enough to support boreal forest species; these plantations may also have contributed to the Magnolia's increase.

Although distributed throughout the state where suitable habitat is present, the extensive agricultural lands in the Champlain Lowlands precluded this species from much of that region, where it was found in only 22% of the Atlas Project priority blocks. In the remainder of the state suitable habitats are widely distributed and Magnolia Warblers can be readily found. In the Taconic Mountains, however, the species proved to be relatively uncommon (found in 31% of the priority blocks), perhaps because suitable coniferous habitats are more restricted in that region. Even in the southwestern portion of the state Magnolias can be easily found, provided suitable habitat is present. In northern and central Vermont breeding bird densities of 12 to 46 pairs per 100 ha (247 a) have been recorded in deciduous-coniferous second-growth and mixed forest/old field communities (Nicholson 1973; Carpenter 1978), with greatest densities—up to 76 pairs per 100 ha (247 a)—in coniferous forests near Wolcott (Metcalf 1977).

The Magnolia Warbler's nest is built in late May on a horizontal branch or against the trunk of a conifer, 0.3–10.7 m (1–35 ft)—usually less than 5 m (15 ft)—above the ground. It is loosely constructed of twigs and coarse grasses and lined with black rootlets. In it are laid in late May or June 3 to 5 (usually 4) white eggs, flecked with brown on the large end. Vermont nests with eggs dates extend from June 9 through July 12 (11 records). Incubation requires from 11 to 13 days, and the young spend an additional 8 to 10 days in the nest before fledging. Magnolia Warblers proved easiest to confirm as breeders while feeding young: 65% of all confirmations were of adults with food. Fledglings have been recorded in Vermont as early as June 26 and as late as July 26 (5 records). Fifteen percent of all confirmations were of fledglings.

Although most Magnolias migrate in September, a few may be found in Vermont as late as the second week of October. These late birds may be stragglers from more north-



No. of priority blocks in which recorded

TOTAL 129 (72%)

Possible breeding:	29 (22% of total)
Probable breeding:	50 (39% of total)
Confirmed breeding:	50 (39% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	7	22	5.4
Green Mountains	43	80	33.3
North Central	19	100	14.7
Northeast Highlands	16	100	12.4
East Central	18	95	14.0
Taconic Mountains	5	31	3.9
Eastern Foothills	21	88	16.3

ern breeding areas. During the fall this is one of the most abundant woodland warblers, and can be found in a wide variety of coniferous and deciduous habitat types.

The Magnolia Warbler is currently undergoing a population boom in Vermont. Certainly it is more abundant today than it was in the late 1800s, when Perkins and Howe (1901) termed it "not common." It is likely, however, that its population will level off and stabilize in the future. With three-quarters of the state already forested, further increases in forest cover are unlikely to be appreciable. Timbering operations may initially affect local populations adversely, but may be beneficial in subsequent years, because Magnolia Warblers appear to reach greatest population densities in seral stage spruce and pine forests rather than in mature northern hardwoods.

DOUGLAS P. KIBBE

Cape May Warbler

Dendroica tigrina

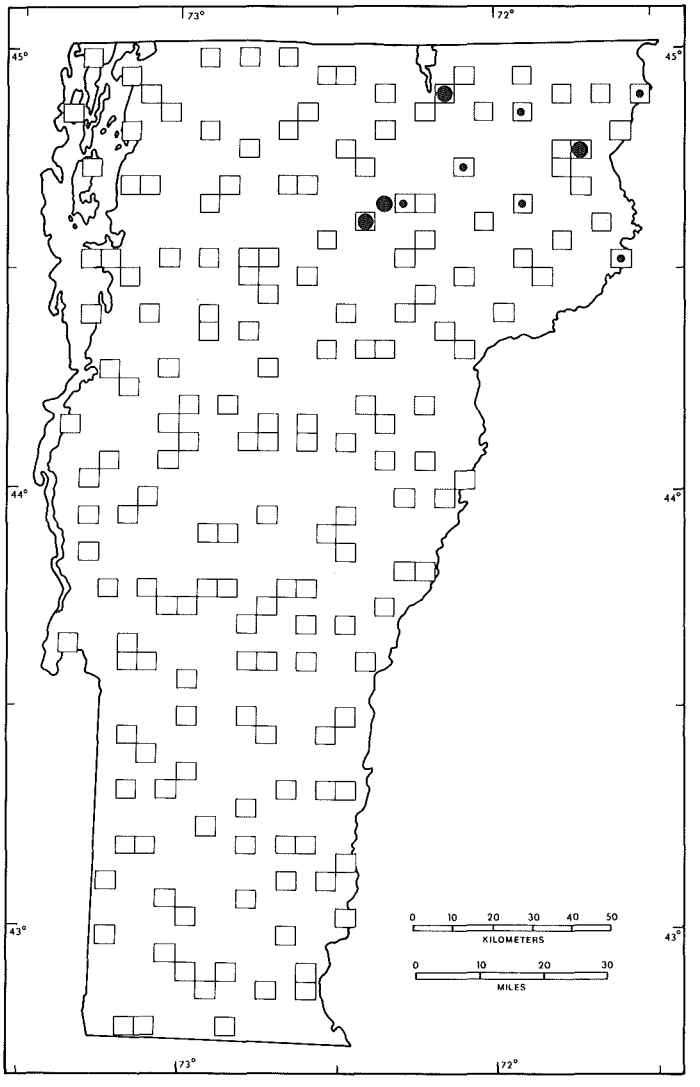
The Cape May Warbler is a scarce to uncommon breeder in the Northeast Highlands and North Central region of Vermont, where nesting pairs are widely scattered and highly localized. Like the Bay-breasted and Tennessee warblers, the Cape May is largely restricted to the northern coniferous forests of the boreal zone, but unlike the other two, the Cape May is adapted to breeding in more southerly, marginal extensions of that zone and is therefore a regular part of Vermont's avifauna.

Breeding from northeast British Columbia and Alberta across much of the northern part of the continent, the Cape May's range extends in the eastern U.S. south to southern Maine, northern New Hampshire, northeastern Vermont, and northeastern New York. Only four records of Vermont breeding existed before the Atlas Project; two of them (on Mt. Killington in 1888 and in Sandgate in 1975) were well south of the Cape May's usual range. Atlas Project confirmation was obtained in one block in the Northeast Highlands and in three blocks in the North Central region.

Like the Bay-breasted Warbler, the Cape May undergoes noticeable population fluctuations, at least some of which seem to result from increases in areas infested with spruce budworms. Wilson (1808–14) named the species from a specimen shot at Cape May, New Jersey and given to him in 1811; the Cape May was not reported there again until nearly a century later (Reilly 1979). In 1925 Forbush stated that the Cape May was extremely rare in New England in his boyhood, but seemed to become more common beginning around 1909.

The Cape May's favored Vermont habitat consists of dense stands of fairly small spruces (black spruces or second-growth stands of other spruces) growing in damp places where bogs, clearings, or roads provide openings. The densest state populations are, not surprisingly, in the black spruce–balsam fir forests east of Island Pond, where a high count of four to five singing males was made on June 18, 1975 in one 1.6–2 ha (4–5 a) area (G. F. Oatman, T. S. Will, W. Scott, pers. observ.). Metcalf (1977) found 22 pairs per 40.5 ha (100 a) in a territory-mapping study near Wolcott. In its preferred habitat the Cape May is not overly difficult to locate if the observer knows its song, as males sing quite persistently (up to 8 to 12 times per minute), usually from the top of a tall spruce.

Actual confirmation of breeding is difficult because the nest is usually placed in a dense terminal foliage clump near the top of a tall spruce, and because the fledglings seem to keep well out of sight within the foliage of tall conifers. The nest, comparatively large for a warbler, is made of sphagnum moss, fine twigs, and grasses, and is lined with feathers, hair, or fur (Reilly 1979). The 4 to 9 (usually 6 to 7) creamy white eggs are spotted with browns and grays; the incubation period and age when the young first fly are still unknown (Terres 1980). Eggs have been found only once in Vermont: a nest with 3 eggs was found in July 1975 in a spruce in Sandgate (H. Toolan, pers. comm.). Adults were seen feeding young on June 21 near Moose Bog in Ferdinand (ASR, C. Schultz). On their breeding grounds, Cape Mays forage for insects and their larvae, spiders, and harvestmen, both within the interior of conifers and on terminal branches of the canopy. They also dart out after flying insects occasionally, and in



No. of priority blocks in which recorded

TOTAL 9 (5%)

Possible breeding:	6 (67% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	3 (33% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	4	21	44.5
Northeast Highlands	5	31	55.5
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

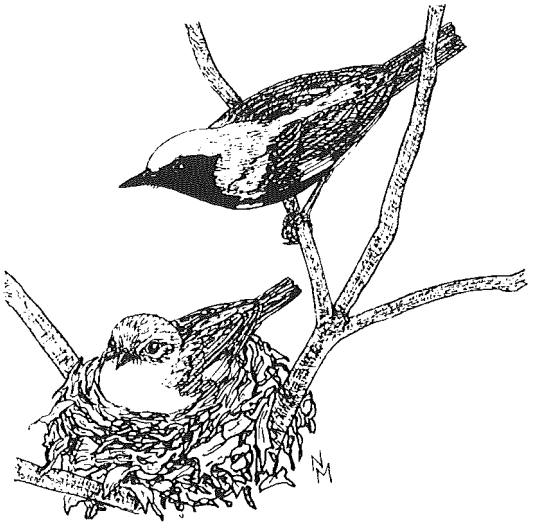
fall migration they have been known to puncture grapes and to take mulberries and other berries (Bent 1953). In migration Cape Mays often appear in quite low trees and bushes; they remain partial to conifers.

Most Cape Mays seen in Vermont are migrants, uncommon to scarce in both spring and fall. Spring migration normally begins between May 6 and 12 and peaks between May 14 and 26. Migrants normally disappear from May 25 to 28 (extreme date, June 1). Fall migration usually begins around August 15–20 (extreme date, August 3), and peaks between August 27 and September 10. The last autumn migrants are normally reported from September 14 to October 1 (extreme date, October 6). A Cape May found in the Essex, New York portion of the Ferrisburg Christmas Bird Count circle on December 14, 1974 is a remarkable and noteworthy record, though seen just outside of Vermont. As the Cape May is subject to fluctuations in population, numbers seen in migration may vary considerably from year to year (RVB 1973–81).

G. FRANK OATMAN

Black-throated Blue Warbler

Dendroica caerulescens



Few species of North American wood warblers show as marked sexual dimorphism as the Black-throated Blue Warbler. The radiant blue male with his jet black throat differs so radically from his somber-hued, gray-green mate that inexperienced observers have difficulty identifying both members as a pair. Fortunately, the small white wing patch is normally present in both sexes, but even this key field mark may be lacking in some fall-plumaged birds.

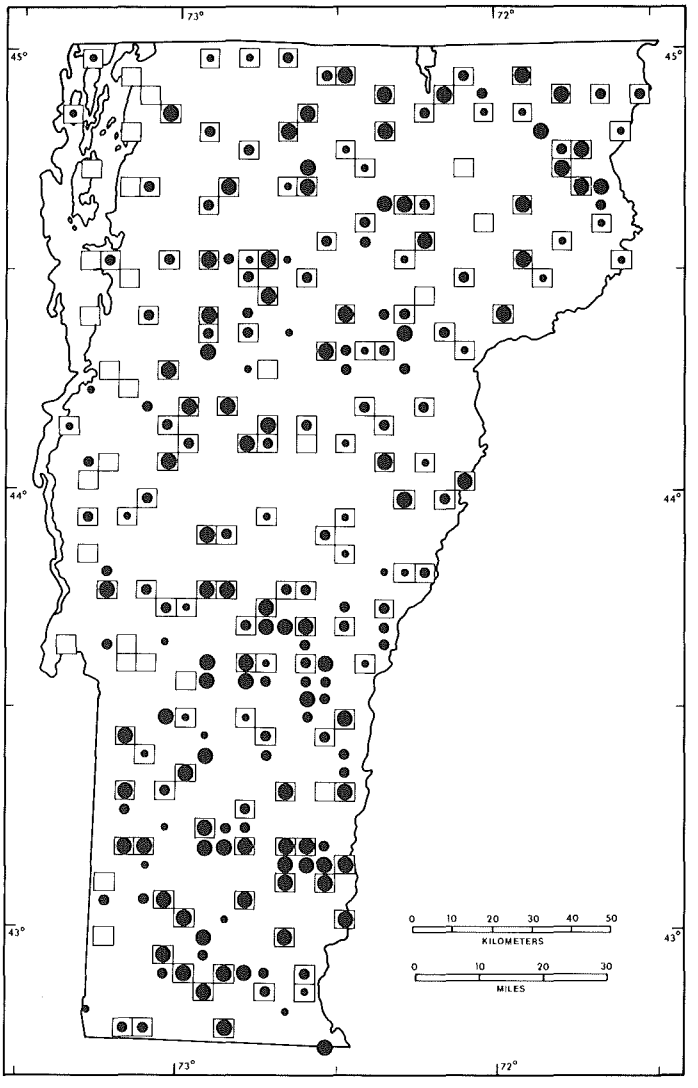
Wintering in the Caribbean, this species returns to Vermont in early May. Black-throated Blue Warblers prefer to breed in dense undergrowth within upland deciduous forests. Although their precise habitat requirements are ill defined, the species appears to require much more overstory than some warblers that inhabit thickets (such as the Common Yellowthroat), and prefers drier areas than others (such as Northern Waterthrush) that inhabit bogs and swamps. Black-throated Blues may frequently be found with Mourning Warblers in seral habitats that spring up after selective cutting, provided considerable canopy remains. Black-throated Blues are less often associated with bramble thickets, however, preferring instead dense stands of hobblebush, mountain and striped maple, deciduous saplings, or, when available, laurel and rhododendron thickets (Harding 1931; Black 1975).

Populations may be locally distributed even in apparently suitable habitat. In New Hampshire, Black (1975) found that densities varied from 41 to 55 pairs per 40.5 ha (100 a), but lower densities are more typical in Vermont (D. P. Kibbe, pers. observ.). In second-growth northwoods, Carpenter (1972, 1978) found densities ranged from 6.5 to 20 pairs per 100 ha (3 to 8 pairs per 100 a), and that in intervening years the species was absent. In Vermont, greatest densities are probably found in the thick understory that springs up after selective cutting, but actual survey data are lacking.

The species is generally, if locally, distributed throughout Vermont, although it is uncommon to rare in the Champlain Lowlands, where suitably forested habitat is generally lacking. Elsewhere in the state Black-throated Blues may be readily found, particularly at higher elevations, unless excluded by homogeneous coniferous growth or the lack of a dense understory.

Black-throated Blue Warblers take arthropod prey from the foliage of shrubs and the lower canopy of deciduous vegetation. Males and females have similar foraging strategies throughout the breeding season; however, males forage more in the subcanopy, at 5–15 m (16.4–49 ft), than do females, who utilize the lower shrub zone at less than 5 m (16.4 ft) (Black 1975).

Although the pair jointly visits prospective nest sites and initiates nest construction, the majority of the building is done by the female over a period of 3 to 4 days. The nest is typically constructed of bark fibers and cobwebs, 23–91 cm (9–36 in) above ground, in the dominant shrub strata. The nest may be moored to surrounding vegetation by cobwebs. Laying commences a day or more after the nest is complete. Incubation of the whitish eggs, which are wreathed with brown blotches at their larger end, commences with the laying of the fourth, and final, egg. Egg dates for Vermont (10 nests) range from June 7 to July 26, but nest



No. of priority blocks in which recorded

TOTAL 153 (85%)

Possible breeding:	33 (22% of total)
Probable breeding:	54 (35% of total)
Confirmed breeding:	66 (43% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	17	55	11.1
Green Mountains	54	100	35.3
North Central	16	84	10.5
Northeast Highlands	16	100	10.5
East Central	17	89	11.1
Taconic Mountains	10	62	6.5
Eastern Foothills	23	96	15.0

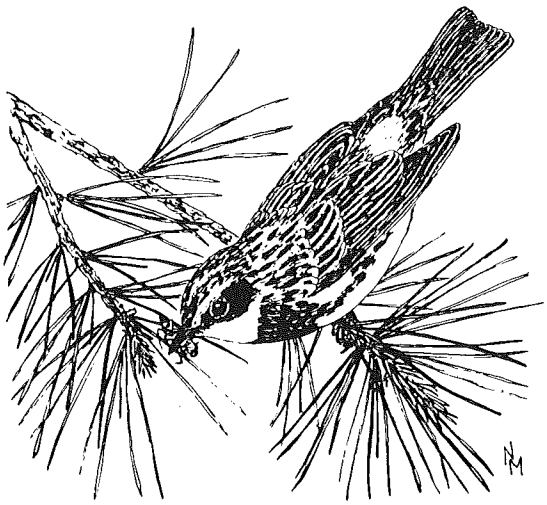
building has been recorded as early as May 24 and as late as July 9.

Incubation, also the female's dominion, usually takes 12 to 13 days (Harding 1931). The female eats or carries away the empty eggshells as the young hatch. Both parents feed the young in the nest for 10 to 14 days. Nestling dates for Vermont (eight records) range from June 17 to August 8. Fecal sacs are eaten or, later in the nestling period, carried to a dead branch for disposal. Ten-day-old fledglings might more aptly be called groundlings, since they are incapable of sustained flight. Fledglings may remain on the territory to be fed for 5 to 10 days, and the male may continue to actively defend the territory a week or more after he has stopped feeding the fledglings (Black 1975). The species lingers in Vermont through early October. Fledglings have been noted as early as June 25 and as late as August 9 in Vermont (nine records). Perhaps because the young remain under the care of the adults for a prolonged period, more than 60% of the Atlas Project breeding confirmations were for young being fed (FY). Adults are exceptionally tame while feeding young (Terres 1980), thus making breeding easy to confirm.

DOUGLAS P. KIBBE

Yellow-rumped Warbler

Dendroica coronata



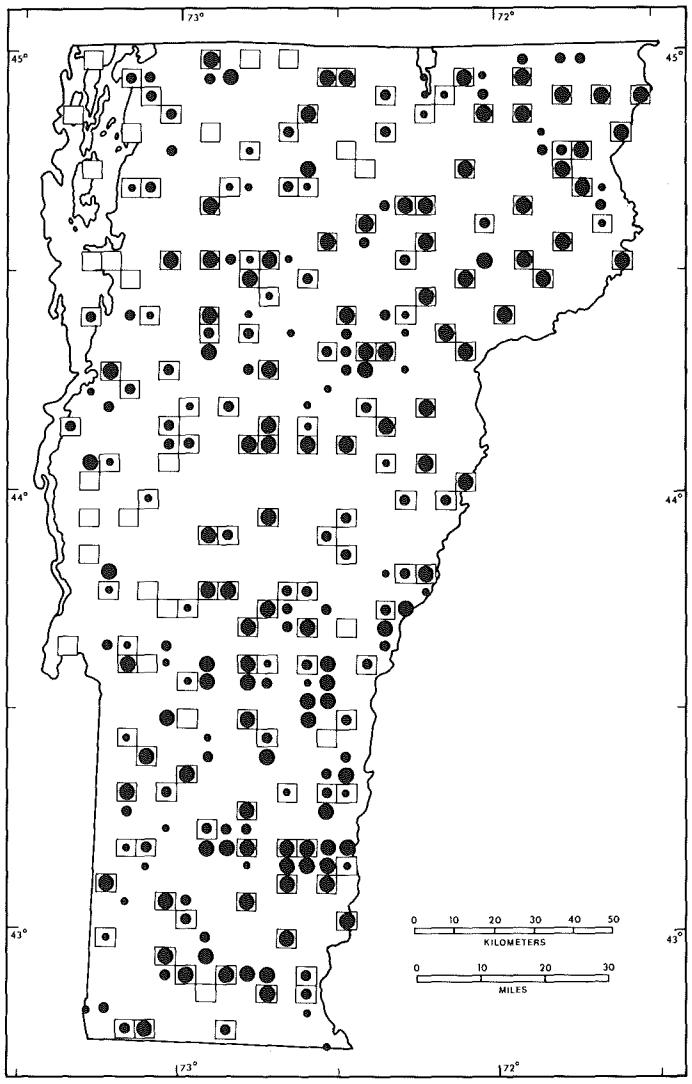
Yellow-rumped Warblers occur in a variety of open coniferous or mixed woodlands, and edge situations where conifers are prominent. The species breeds across much of Canada and the northern U.S. In Vermont, and in the White Mountains of New Hampshire (Sabo 1980), the species is most uniformly distributed in stunted subalpine spruce-fir woodland. Metcalf (1977) found densities of 25 pairs per 40.5 ha (100 a) in coniferous forest. Yellow-rumps are also found in spruce bogs, along the edges of low-elevation mature spruce-fir forest, in tall open stands of white pine and, occasionally, in hemlock.

Because of its predilection for ground and aerial foraging and for long flights across its territory (MacArthur 1958), the Yellow-rumped Warbler is easier to see than most wood warblers. As with other warblers, the song calls attention to the bird on breeding territory. The song is an erratic, shivering trill with a rather thin, bell-like quality that distinguishes it from the more robust trill of the Dark-eyed Junco. Most (61%) confirmations of breeding during the Atlas Project were obtained via the FY code (parents observed with food for young). The fledglings of this species have a distinctive, harsh begging call that makes them easy to detect; 20% of Vermont confirmations were for dependent young.

Yellow-rumped Warblers winter farther north than any other wood warblers; they have been found in southern Ontario and coastal Maine (AOU 1983). Yellow-rumps arrive in Vermont in early and mid April; the spring return movement peaks in late April and early May. Breeding behavior is most evident by late May. The nest is a fairly bulky structure of twigs, strips of bark, moss, and lichen, lined with feathers—often those of the Ruffed Grouse (Harrison 1975). The nest is generally placed on a side fork more than halfway out from the trunk of a conifer, 1.2–15.2 m (4–50 ft) up (Harrison 1975); the average nest height is 4.6–6.1 m (15–20 ft) from the ground (Bent 1953; MacArthur 1958).

The eggs, white with red-brown spots and blotches arranged in a wreath about the large end, number from 3 to 5. MacArthur (1958) determined that an average clutch numbered 4.1 eggs, on the basis of 24 records. Four egg dates from Vermont range from June 2 to July 17. The incubation period lasts from 12 to 13 days (Bent 1953). Nestling dates have never been reported in Vermont; nestlings have been noted in New York State from early June until early September (Bull 1974; Cook 1982). The young remain in the nest for 12 to 14 days (Bent 1953); dependent young have been recorded in Vermont on seven dates from June 23 to August 5. Autumn migration is first evident in late August, and peaks in late September or early October. Most Yellow-rumps have left the state by late October; however, a few are seen annually into November and even into early winter. In fall and winter they supplement their normally insectivorous diet with fruit and berries.

Historically, the Yellow-rumped Warbler was considered common only at high elevations and in the northeastern part of the state (Fortner et al. 1933). During the Atlas Project, the species was reported from 86% of the priority blocks, indicating a great increase in distribution. Much of the aban-



No. of priority blocks in which recorded

TOTAL 154 (86%)

Possible breeding:	27 (17.5% of total)
Probable breeding:	46 (30.0% of total)
Confirmed breeding:	81 (52.5% of total)

Physiographic regions in which recorded

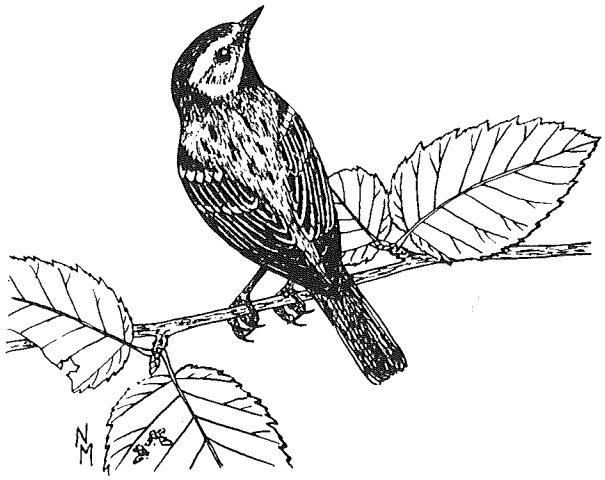
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	17	55	11.1
Green Mountains	49	91	31.8
North Central	19	100	12.3
Northeast Highlands	16	100	10.4
East Central	19	100	12.3
Taconic Mountains	12	75	7.8
Eastern Foothills	22	92	14.3

doned agricultural land in Vermont at low elevations has been taken over by white pine, and at higher altitudes by red spruce and balsam fir, creating favorable nesting conditions for Yellow-rumped Warblers. Possibly because of its adaptability or the scarcity of other conifer-nesting *Dendroica* warblers, of the boreal warblers the Yellow-rumped is the most frequently encountered in the Champlain Lowlands.

WALTER G. ELLISON

Black-throated Green Warbler

Dendroica virens



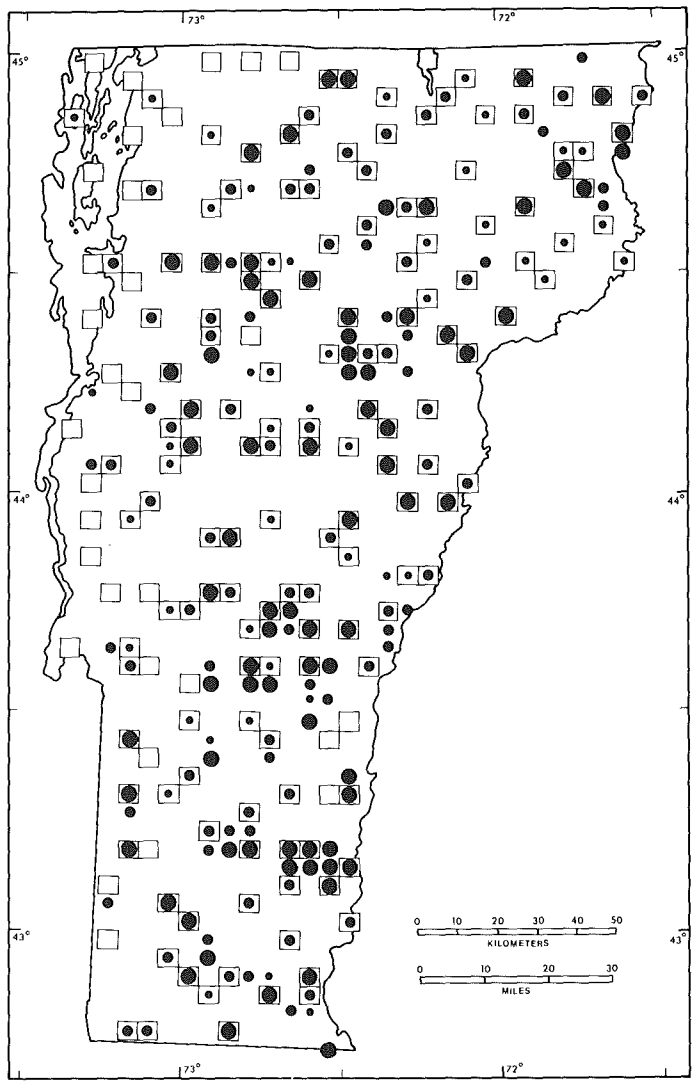
The Black-throated Green Warbler is generally considered common in coniferous woodlands, yet Collins (1983) has shown this to be an oversimplification; the species may be found in a broad array of woodland habitats. Sabo and Holmes (1983) indicated that mixed woodland constitutes the species' usual habitat in northern New Hampshire, and this also appears to be true in Vermont. In the Green Mountain State the Black-throated Green generally occurs in northern hardwood forest having stands of or scattered individual hemlocks or red spruce. Only occasionally does it inhabit pure deciduous or coniferous forests in this state.

Though an active and not particularly shy bird, the Black-throated Green Warbler spends much of its time concealed in thick midstory foliage, which often makes it difficult to see. The species can be located easily by listening for its distinctive, high-pitched, wheezy song. The song consists of 5 to 6 notes of varying intensity. There are two common arrangements of notes: one is of 2 high notes, followed by 2 low notes and another high note; the other is of 3 to 4 high notes, 1 low note, and a final high note.

The Black-throated Green Warbler arrives in Vermont during the first week of May; most have reclaimed territory by midmonth. Nests are placed at low to intermediate heights. The average height of six Vermont nests was 3.7 m (12.2 ft). Nests are constructed in either a conifer or a hardwood in a trunk fork, or on a side fork of a branch well out from the trunk. The nest is built of twigs, bark strips, grasses, and rootlets, and decorated externally with birch bark. The lining is composed of grass, rootlets, hair, and a few feathers.

The eggs are white with red-brown spots concentrated around the large end, and number from 4 to 5; the usual clutch is 4 eggs. Egg dates from six Vermont records range from May 27 to June 13. Notations on sets in the Pember Collection at the University of Vermont in Burlington indicate that eggs may not hatch until at least the fourth week of June. The incubation period lasts about 12 days (Pitelka 1940). There is one report of nestlings for Vermont; young have been seen in the nest from June 14 to 21. Nestlings have been reported in New York State from mid June to late July (Bull 1974). The nestling period lasts from 8 to 10 days (Forbush 1929; Pitelka 1940), and fledglings remain with their parents for about a month (Pitelka 1940). Five dates for dependent young in Vermont range from June 24 to July 27. Seventy-seven percent of all Atlas Project confirmations for the species were by observation of parents with food for their young. The autumn migration begins in late August, and peaks from early to mid September. Most Black-throated Green Warblers have departed from the state by late September; a few may be seen to mid October in most years.

The Black-throated Green Warbler occurs widely in Vermont in moderate numbers. The species averaged 0.92 per route on U.S. Fish and Wildlife Service Breeding Bird surveys from 1976 to 1979 (BBS 1966–79), and one field observer recorded approximately 4 per block during the Atlas Project (W. G. Ellison, pers. observ.). Densities of 5 to 31 pairs per 40.5 ha (100 a) were demonstrated by territory-mapping studies in coniferous forests (Metcalf 1977) and



No. of priority blocks in which recorded

TOTAL 148 (83%)

Possible breeding:	36 (24% of total)
Probable breeding:	57 (39% of total)
Confirmed breeding:	55 (37% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	13	42	9
Green Mountains	52	96	35
North Central	19	100	13
Northeast Highlands	16	100	11
East Central	19	100	13
Taconic Mountains	8	50	5
Eastern Foothills	21	87	14

deciduous-coniferous forests (Carpenter 1973). Atlas Project data reveal that the species is much more widespread in the cooler eastern part of the state than in the Taconic Mountains and Champlain Lowlands.

WALTER G. ELLISON

Blackburnian Warbler

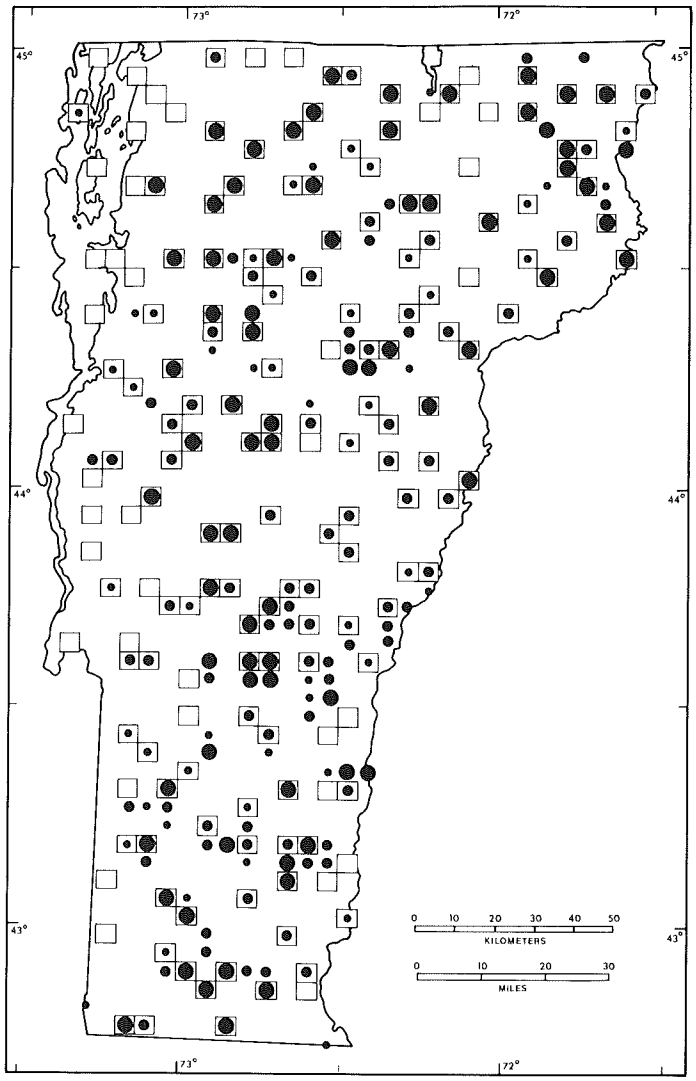
Dendroica fusca

The Blackburnian Warbler is closely associated with mature coniferous trees. The species prefers old-growth stands that contain either exclusively coniferous growth or mixed conifer-deciduous stands, but will occupy territories within northern deciduous forests that contain only a single tall red spruce or hemlock. Habitat studies indicate that the species prefers to forage and nest in conifers. MacArthur (1958) indicated that because of this warbler's preference for foraging in the topmost branches, it places a premium on tall, mature forests for habitat. He also hypothesized that because of overlap in foraging behavior, this species may compete with the Black-throated Green Warbler (*D. virens*).

A treetop bird that possesses a sibilant song, the Blackburnian Warbler is difficult to detect. The most reliable way to locate this bird is by its voice. Its song consists of a rapid series of high, "stitching" notes, followed by a normally upward-inflected note that trails off beyond the range of human hearing. Variations on this theme are many, including unadorned sibilant, slurred high notes, and a version that ends in a downward-inflected note. The nest is exceedingly difficult to find because it is placed high among coniferous greenery, which camouflages it. Nests may be sometimes located by watching parents fly back to them. The most frequent confirmation code used by Atlas Project workers for this species was FY (parents with food for young), which accounted for more than 72% of all confirmations.

Blackburnian Warblers typically arrive from central and northern South America in the first weeks of May; the earliest record is for April 30. The species begins nesting in late May, and is single-brooded. The nest is usually saddled on a side branch well out from the trunk of a conifer; sometimes it is placed in a trunk fork near the top. It is constructed of twigs and plant fibers, attached to the supporting limb with spider webbing, and lined with black rootlets, hair, or fine grass. Nest heights of five Vermont nests averaged 7.9 m (26 ft) above ground; this is probably low, as most accounts indicate that nest heights are generally more than 10 m (33 ft) up. Egg dates for Vermont (three nests) extend from June 9 to June 22. Clutch sizes range from 3 to 5 eggs, with 4 being most frequent by far. Young have been detected in the nest as late as July 13. Fledglings have been reported only as late as July 14; in New York, fledged young have been noted into early August (Bull 1974). Blackburnian Warblers depart from Vermont in late August and early September; occasional individuals may remain into early October.

This species is common in Vermont, though often highly localized. In much of Vermont's northern hardwood forest the species is represented by scattered pairs whose territories center on one or more tall hemlocks or red spruces. The coniferous species with which the Blackburnian Warbler is found vary with the physiographic regions it occupies. It inhabits stands of balsam fir and black spruce in the Northeast Highlands, red spruce in the Green Mountains, hemlock and spruce in the Eastern Foothills and Taconic Mountains, and even tall, open stands of white pine on occasion in the Connecticut River valley and Champlain Lowlands. The historical status of the



No. of priority blocks in which recorded

TOTAL 140 (78%)

Possible breeding:	30 (22% of total)
Probable breeding:	48 (34% of total)
Confirmed breeding:	62 (44% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	13	42	9.3
Green Mountains	53	98	37.9
North Central	15	79	10.7
Northeast Highlands	16	100	11.4
East Central	16	84	11.4
Taconic Mountains	9	56	6.4
Eastern Foothills	18	75	12.9

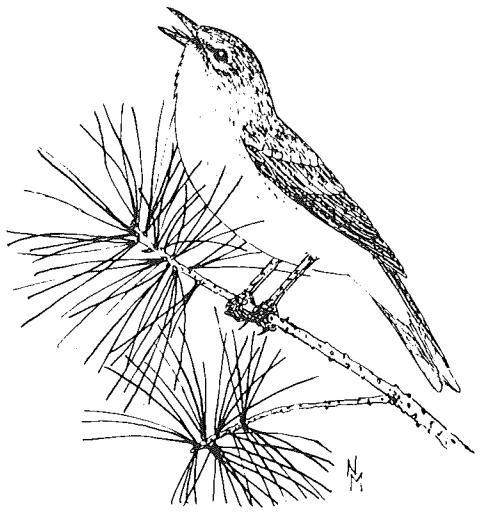
species, as indicated by such authors as Perkins and Howe (1901) and Davenport (1907), has changed little; the species was considered common, if local, before the extensive reforestation of much of the state during the past 100 years. If anything, the species has probably increased with reforestation.

The distribution of the Blackburnian Warbler presents a familiar pattern found in most of the state's boreal warblers. It is noticeably widespread in eastern Vermont and along the spine of the Green Mountains, is absent from more than half of the Champlain Lowlands, and is local in the Taconic Mountains. In western Vermont the region of absence is roughly bounded by the 20° C (68° F) isotherm (the mean temperature for July), indicating this species' need for coniferous trees that are scarcer in this warm region. Because eastern Vermont offers a wider selection of microclimates as a result of its high land relief, the species does not become sporadic until below the 21° C (70° F) isotherm in the southern Connecticut River valley.

WALTER G. ELLISON

Pine Warbler

Dendroica pinus



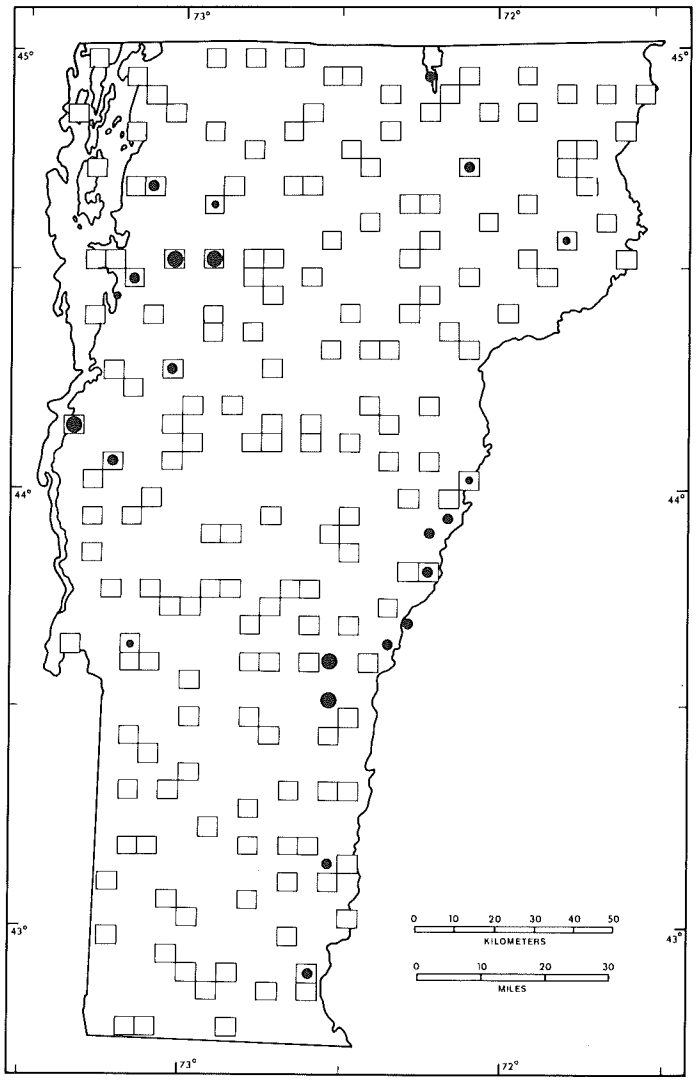
The Pine Warbler is most common among the extensive hard-pine woodlands of southeastern North America. In New England, it is most prevalent in coastal pine barrens. Pine Warblers are needle-gleaning specialists that forage in the outer shell of the canopy (Emlen 1977). In the Green Mountain State, this warbler is found in tall stands of white pine, generally higher than 21.3 m (70 ft), with little undergrowth. In studies by Anderson and Shugart (1974) and Conner et al. (1983), the species selected areas with closed canopies, high percentages of mature pine, and sparse undergrowth.

As with many warblers, the easiest way to detect Pine Warblers is by their song, a soft, surging, fast-paced trill. However, their trill may be confused with those of the Chipping Sparrow or the Dark-eyed Junco by observers unfamiliar with this warbler's song, which is characterized by the soft, slurred quality of the notes. The Pine Warbler's high-ranging habits, low population densities, and well-hidden nests impede confirmation. The most reliable method of finding a nest is to locate a pair and watch them until one of the birds reveals the nest's position; watching for parents carrying food for their young is the best way of gaining breeding confirmation.

The Pine Warbler withdraws to its southeastern U.S. stronghold in winter and returns to northeastern breeding areas early in the spring. In Vermont, the first Pine Warblers arrive in early to mid April. Most have established territories by late April or early May. The nest is a compact cup constructed of stems, bark strips, pine needles, and twigs bound together with webbing and lined with chaff, hair, needles, or feathers. The nest is placed on a horizontal side limb of a pine, often in a cluster of needles. Nest heights above ground are 2.4–24.4 m (8–80 ft); most are recorded at 9.1–15.2 m (30–50 ft) (Bent 1953). The eggs are white with a wreath of brown spots at the large end; they number from 3 to 5, with an average of 4 per clutch. There are no egg or nestling dates for Vermont. Egg dates for other northeastern states range from early May to late June (Bent 1953; Bull 1974). Nestlings have been reported for New York State from the third week of May to the third week of June (Bull 1974). The incubation and nestling periods of the species are unknown. The autumn migration of the species in Vermont apparently starts in late August and continues until late October.

The Pine Warbler is scarce and local in Vermont as it is almost limited to tall, open stands of white pine at low elevations. The species may have declined over the last 50 years. Fortner et al. (1933) listed it as "tolerably common" in the southern half of Vermont and in the Champlain Lowlands, where it is now very local; in light of other historical references, such as Kirk (1911), this assessment of the species' status may have been optimistic even at that time. In view of the fact that in Vermont the species is near the northern limit of its distribution, and that white pine probably constitutes suboptimal habitat (Griscom and Sprunt 1957), it is not surprising that the Pine Warbler is scarce in Vermont.

During the Atlas Project the Pine Warbler was reported principally from two of the state's physiographic regions, the Champlain



No. of priority blocks in which recorded

TOTAL 14 (8%)

Possible breeding:	4 (29% of total)
Probable breeding:	7 (50% of total)
Confirmed breeding:	3 (21% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	8	26	57
Green Mountains	0	0	0
North Central	1	5	7
Northeast Highlands	1	6	7
East Central	0	0	0
Taconic Mountains	1	6	7
Eastern Foothills	3	12	22

Lowlands (57% of the priority block records) and the Eastern Foothills (22% of the priority block records and 44% of all block records). The species is more widespread in the Champlain Lowlands than in the Eastern Foothills, where it is largely restricted to the Connecticut River valley; this distribution indicates a larger potential population in northwestern Vermont. The species may have been underreported, especially in the Taconic Mountains, because of its undistinguished song and specialized habitat requirements.

WALTER G. ELLISON

Prairie Warbler

Dendroica discolor

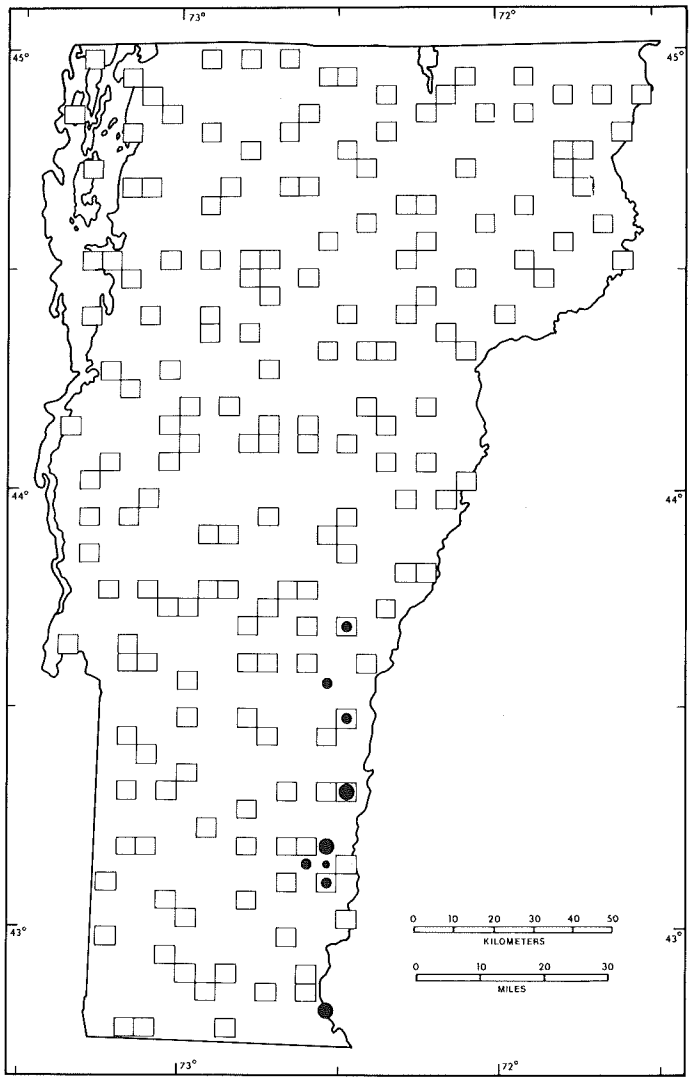
The Prairie Warbler belies its name by inhabiting various forest-edge habitats of the eastern U.S. and Canada, including low scrub and secondary growth, clearings, woodland edges, open woodlands with low undergrowth, and roadside thickets (Chapman 1907; Bent 1953; Harrison 1978). Bent (1953) described the Prairie Warbler as "one of the birds that has benefited by settlement of the country, for the clearing away of the forest has provided suitable habitats for it in brushy clearings and open sproutlands." In Vermont, Atlas Project data show the species to be using abandoned fields and pastures on dry hillsides almost exclusively. Nolan (1978) found Prairie Warblers invaded abandoned fields several years earlier than the Blue-winged Warbler.

The males leave their wintering grounds (Florida to Nicaragua) in March and usually arrive in Vermont during the third week of May. A territory is set up—most often the same as that of the previous year (Nolan 1978)—of around 1.5 ha (3.7 a), depending on population density and vegetation. The species is most easily located at this time by its song, a thin, ascending series of buzzy *zee, zee, zee*'s (similar to the song of the Field Sparrow with which it associates); the song is given by the male, with his head thrown back, usually from a high exposed perch. Females, arriving a few days after the males, "seem to select the nest site" (Nolan 1978).

The nest—a compact cup of plant down and bark shreds woven with fine grasses, bound with spider silk, interwoven with supporting vegetation, and lined with hair, grasses, and feathers—is attached to bushes and briars 0.3–3 m (1–10 ft) above the ground (Harrison 1975). Prairie Warblers reuse nest sites with some regularity.

The 3 to 5 eggs (commonly 4) are normally laid on consecutive days shortly after dawn; the pair spends much time together during this period (Nolan 1978). Incubation takes 12 to 13 days, and young leave the nest in about 10 days (mean dependency is about 40 days). Nolan observed that unhatched eggs were left in the nest. Vermont's limited nesting statistics correspond closely to those given by Bull (1974) for New York State: egg dates, May 25 to June 29; nestlings, June 19 to July 4; fledglings, June 30 to July 14. Two of the three Atlas Project confirmations were made in late June when adults were found feeding young (FY); the third was a broken-wing act (DD) observed in the Brattleboro area on July 9. Both the male and female feed young; caterpillars make up the largest portion of the diet (Nolan 1978; Moore 1980). Nolan observed that females usually flew straight to the nest after foraging. Also he found that during all times of the breeding season the foraging grounds of the Prairie Warbler on the study area seemed more diversified than those of any other species.

Historically, "prior to the arrival of European man in North America, shrub habitats and therefore Prairie Warbler populations were much less generally distributed than they are today" (Nolan 1978). In the early 1860s, Stearns and Coues (1893) considered the Prairie Warbler limited in summer to the Alleghenian fauna, and hence seldom if ever found north of Massachusetts. Bagg and Elliot (1937) reported the species to be established in the Connecticut River valley about 1870. The earliest records for Ver-



No. of priority blocks in which recorded

TOTAL 4 (2%)

Possible breeding:	0 (0% of total)
Probable breeding:	3 (75% of total)
Confirmed breeding:	1 (25% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	4	17	100

mont came from Bennington on May 8 and 9, 1919 and May 3, 1932 (Ross, Field notes). There is also a sight record from Woodstock (Bagg and Elliot 1937). Bent in 1953 defined the breeding range as north to central New York (Schenectady) and southern New Hampshire (Concord and Manchester), but the first confirmation of breeding in Vermont was not made until 1971 when an adult with food for young was discovered near Saxtons River (D. P. Kibbe, pers. comm.).

The Prairie Warbler's breeding distribution in Vermont is confined to the Eastern Foothills, where it is an uncommon nester. Since at least 1972 a colony in Springfield has occupied a dry, south-facing hillside in an abandoned pasture overgrown with juniper, hardhack, cedar, sumac, ash, and apple seedlings (B. Lavaas, pers. comm.); in 1976 eight singing males were present. Perhaps the greatest concentration of Prairie Warblers in Vermont occurs in Pleasant Valley near Saxtons River, where they are generally distributed for 6 to 8 miles along dry shrubby slopes covered with young pines and maples. In abandoned pastures along Vermont's lower Connecticut River valley the species is an uncommon nester; probable nesting has occurred as far north as Woodstock and Quechee.

DONALD B. CLARK

Bay-breasted Warbler

Dendroica castanea

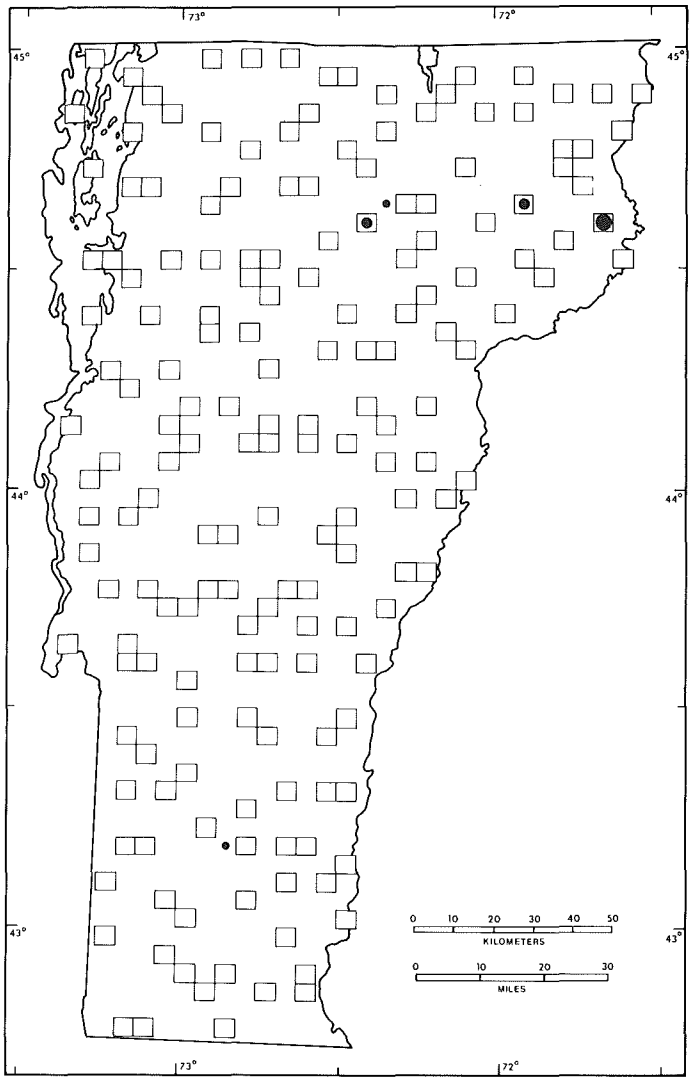
The Bay-breasted Warbler is so closely associated with the boreal forest zone that it has been considered an indicator species of that northern habitat. Its nesting range barely extends into northeastern Vermont, where it has been confirmed as a breeder only once. It must therefore be considered casual or accidental as a breeder in Vermont. The breeding habitat it requires (cool, dense stands of spruces, especially black spruces, with some edge condition) is quite limited in the state.

The American Ornithologists' Union's *Check-list of North American Birds* (1957) listed a breeding record for Tamworth, Vermont, but this is an obvious error of transposition from Bent's (1953) life history of the species (Tamworth is in New Hampshire). The few old records of summer Bay-breasts in Vermont (Perkins and Howe 1901; Spear 1976) do not claim breeding confirmation and doubtless represent lingering or late migrant males. Thus the sighting of a male gathering and carrying food for young on July 5, 1980 at Sable Mountain in the Granby-Guildhall area represented the first (and only) breeding confirmation for Vermont (ASR, D. P. Kibbe). The habitat was a closed spruce woods containing some yellow birches, adjacent to a small stream and alder thicket.

Like other boreal zone breeders (such as the Tennessee Warbler), the Bay-breast may occasionally linger and even breed well south of its usual range. Observers should beware of assuming that extralimital singing males represent breeding pairs: they may instead be merely lingering, unattached males. It is quite likely that singing males seen June 9, 1915 at Barnard (G. H. Ross, G. L. Kirk, GMAS records), on July 4, 1977 at Stratton Mountain (W. J. Norse, pers. observ.), and on June 21–25, 1981 at Winhall (W. J. Norse, pers. observ.), as well as a bird collected at Reading on June 29, 1927 (GMAS record, J. L. Peters) were such; even summer reports from the Northeast Highlands and the North Central region may represent singing but unmated males. Harder to explain are these records: two males between Bourne and Stratton ponds, July 19, 1924; six males at Lake Pleiad, Ripton, June 20 and 21, 1925; males at Sucker Brook Lodge on the Long Trail, June 20, 1925; and males near Breadloaf Mountain below Middlebury Gap, June 21, 1925 (Eaton and Curry 1926).

The Bay-breast is not an easy bird to observe on its breeding grounds. Although the male may sing from the same perch for up to 15 minutes (Reilly 1979), he often chooses a perch out of sight from the ground, and the song does not carry far. Further, Bay-breasts usually forage at the midlevel in conifers, where they move deliberately, searching (often out of sight) among the twigs and needles for their insect and spider food (Reilly 1979).

The nest is normally placed on a horizontal limb or against the trunk of a conifer, 1.5–6.1 m (5–20 ft), occasionally up to 15 m (50 ft), above the ground (Godfrey 1966). The nest is up to 15.2 cm (6 in) in diameter, and is constructed from fine twigs, bark strips, roots, moss, grass, and hair. Clutches number from 3 to 7 eggs, though 4 to 5 is usual. Incubation, which takes 12 to 13 days, is performed by the female alone; the young first fly 11 to 12 days after hatching (Godfrey 1966; Reilly 1979). In Maine, Bay-breasted Warblers have been



No. of priority blocks in which recorded

TOTAL 3 (2%)

Possible breeding:	0 (0% of total)
Probable breeding:	2 (67% of total)
Confirmed breeding:	1 (33% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	1	5	33
Northeast Highlands	2	12	67
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

seen gathering nesting material as early as June 1, and eggs have been found from June 3 to 15 (Palmer 1949; Bent 1953).

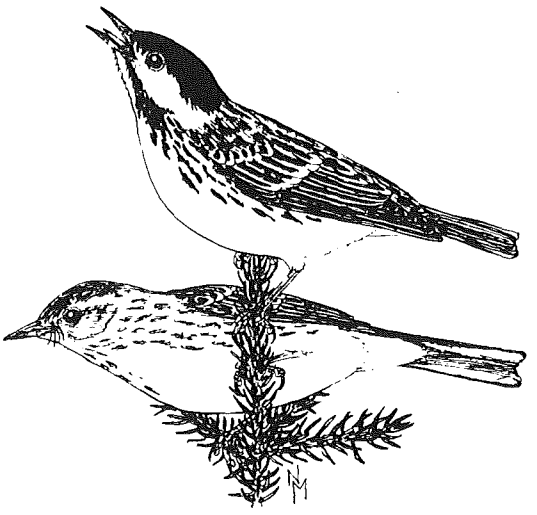
The Bay-breasted Warbler breeds in the boreal forest zone across most of the northern portion of the continent, from British Columbia, Mackenzie, and Alberta east to the Atlantic coast. In the eastern U.S. its breeding range dips south to southern Maine, central New Hampshire, northeastern Vermont, and northeastern New York. Its numbers have varied widely over the years, building to high levels in areas of forests where infestations of spruce budworms occur (Reilly 1979).

Most Bay-breasts seen in Vermont are migrants, passing to or from their Canadian breeding grounds. The species is uncommon in both spring and fall, though at the height of its migration daily totals of 6 to 10 are not unusual. Spring migration normally begins from May 11 to 14, and peaks from May 21 to 24 (when observers have seen as many as 30 a day [RVB, Spring 1973–83]). The last spring migrants are usually seen from May 23 to 30 (extreme date, June 2). Fall migration usually begins between August 11 and 17, and peaks from August 23 to September 17 (Bent 1953; RVB 1973–81).

G. FRANK OATMAN

Blackpoll Warbler

Dendroica striata



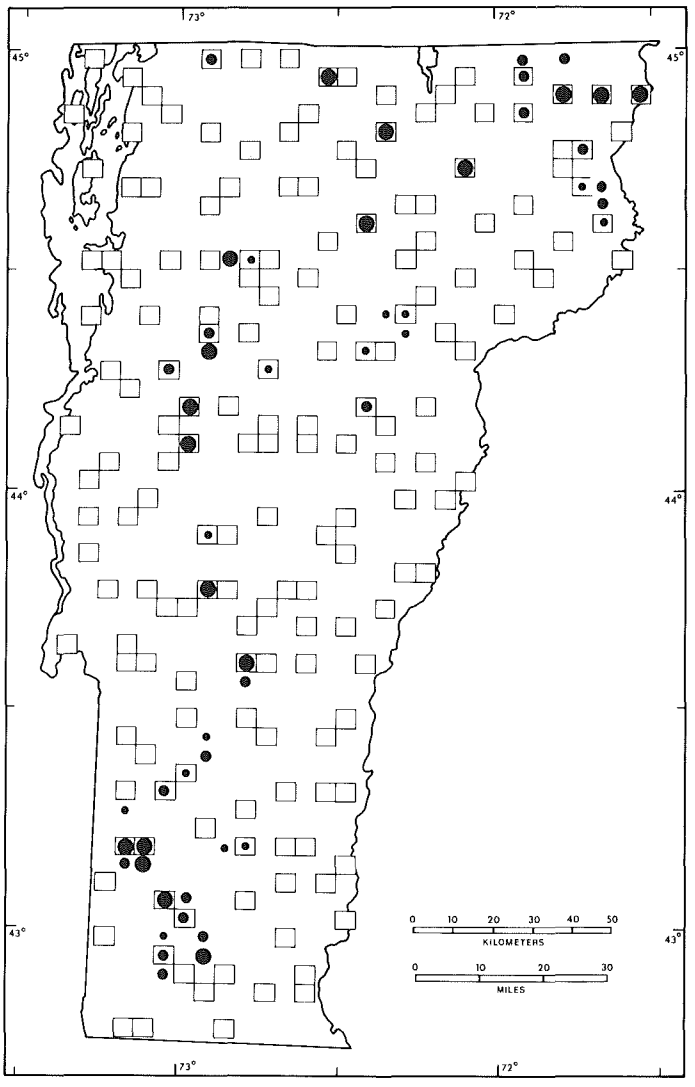
Strictly a denizen of spruce and fir forests, the Blackpoll Warbler is generally restricted to the higher-elevation boreal forests of Vermont, seldom occurring below 610 m (2,000 ft) in southern portions of the state, though more widely distributed at lower elevations further north if suitable habitat is present. Wintering in South America south to Chile and Peru, more than 5,600 km (3,500 mi) from its Vermont breeding grounds, it is one of the last of the wood warblers to return in the spring. Although migrants may begin appearing in the state during the second week in May, transients may be found well into June.

Blackpolls breed from the Alaskan muskeg southeast to the Maritime provinces and western Massachusetts. Northernmost breeders make an annual round trip exceeding 16,093 km (10,000 mi) in length. Radar studies have shown that many, if not most, Blackpolls fly nonstop across water from coastal New England to the coast of South America; their initial course would take them into the South Atlantic Ocean if prevailing winds in southern latitudes did not push them westward toward land (Nisbet 1970).

Blackpolls are among Vermont's largest warblers, a fact that probably stands them in good stead in their immense overwater flight and on the nesting grounds, where temperatures may dip below freezing well into the breeding season. The male, more strikingly marked—with his black cap (or "poll") and streaked sides—than the somber female, sings his high-pitched song (inaudible to some ears) from treetops throughout his territory. During June the song is a characteristic feature of the stunted spruce-fir forests that crown Vermont's higher peaks. Only two territory-mapping studies have been conducted in the Blackpoll's breeding habitat in Vermont. Metcalf (1977) found 30 pairs per 100 ha (247 a) in coniferous forest near Wolcott. Blackpolls generally appear to be fairly abundant in suitable habitat, but data are lacking on how much habitat is necessary to sustain a local population. Small pockets of occupied and unoccupied, yet suitable, higher-elevation breeding habitat are scattered throughout Vermont, but further research is necessary to define the parameters limiting the Blackpoll's occurrence. Morse (1979) speculated that the Blackpoll Warbler might be excluded by its close relative, the Bay-breasted Warbler, from lower elevation coniferous forests in portions of their sympatric range. That the Blackpoll is not more widespread in boreal forests in Vermont, despite the virtual absence of the Bay-breasted Warbler, indicates that other factors must restrict its distribution.

Blackpolls build their bulky, well-concealed nest low in a conifer, next to the trunk or, occasionally, on the ground. Three to 5 creamy buff or greenish eggs, spotted and/or wreathed with brown or lavender, are laid. Vermont egg dates (five nests) range from June 15 to June 26. Incubation and nestling periods last approximately 11 days. Both parents tend the young; age to independence is unknown. Fledglings were reported by June 23 at Woodford (Ross, Field notes).

The Blackpoll Warbler is one of Vermont's most abundant fall migrants, mainly because most members of its Canadian population depart from the East Coast for South America. Departure dates of local breeders



No. of priority blocks in which recorded

TOTAL 33 (18%)

Possible breeding:	9 (27% of total)
Probable breeding:	10 (30% of total)
Confirmed breeding:	14 (43% of total)

Physiographic regions in which recorded

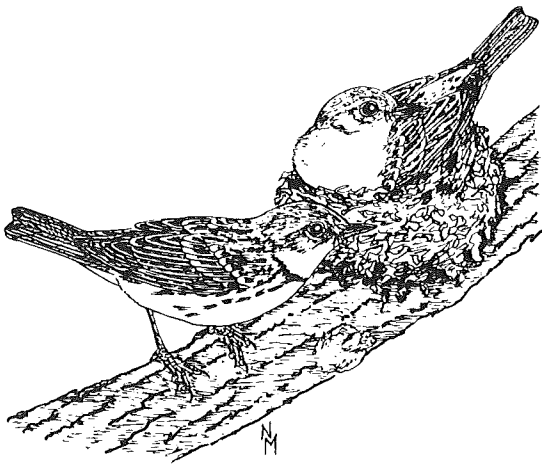
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	2	6	6
Green Mountains	14	26	43
North Central	4	21	12
Northeast Highlands	8	50	24
East Central	2	10	6
Taconic Mountains	3	19	9
Eastern Foothills	0	0	0

are, as a consequence, unknown, but most birds migrate in September; tardy Blackpolls may be present through the first week of October (exceptionally, to October 18). Although earlier authorities (Perkins and Howe 1901; Allen 1909) considered the species a common migrant, they were apparently uncertain about the regularity with which it bred in the state. Currently the Blackpoll Warbler appears to be well distributed in the Green Mountains and Northeast Highlands, with more localized but significant numbers present in the North Central region and Taconic Mountains. Elsewhere the species appears rare or absent, probably because available habitat is lacking. Lumbering activities in the Northeast Kingdom may disturb some local populations, but it is unlikely that the species was ever significantly affected by man's activities in Vermont, even during the height of agricultural clearing in the mid-1800s.

DOUGLAS P. KIBBE

Cerulean Warbler

Dendroica cerulea

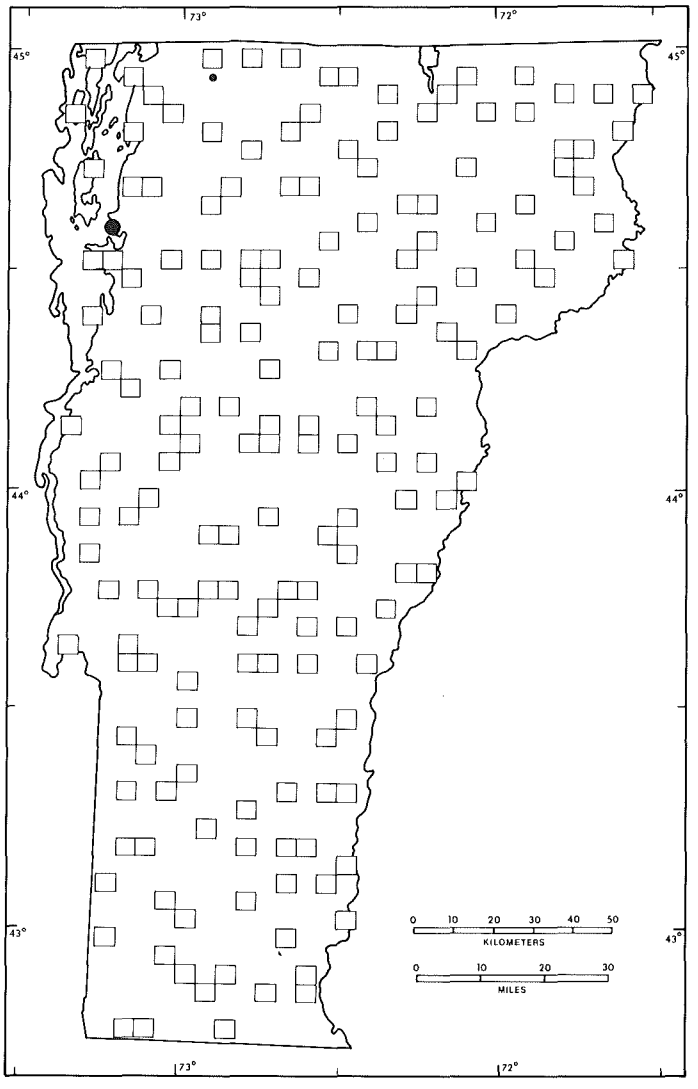


The Cerulean Warbler is closely associated with tall deciduous forest having little mid-story growth. These warblers spend most of their time high in the canopy. In the Northeast the species shows a preference for riparian situations, inhabiting swamps and floodplains. The small Vermont population inhabits tall, riparian forest adjacent to extensive swampland along the Lamoille River in the town of Milton (Chittenden County). The dominant trees in the area are silver maple and eastern cottonwood. The Cerulean was first confirmed as a Vermont breeding species on June 12, 1977 (ASR, W. G. Ellison); the state's population varies from four to six pairs. Because of its small population and occurrence in only one Vermont locality, the Cerulean is proposed for Species of Special Concern status in Vermont.

With its arboreal habits, the Cerulean Warbler is difficult to observe. Its buzzy song serves to locate it long before the observer's search is rewarded with a characteristic underside view. The song is fairly distinctive, but is similar enough to those of the Northern Parula and the Black-throated Blue Warbler to allow it to be overlooked. The reedy song consists of a rapid, spiraling series of notes ending with an upward-inflected, indeterminate buzz. The bird's high-ranging behavior as well as the high placement of the nest, generally above 9 m (30 ft), make confirmation difficult. However, two nests have been located at the one Vermont breeding locality in the Sandbar Wildlife Management Area. The nest is a shallow cup constructed of plant fibers and rootlets, invariably decorated with lichens. It is placed on a side limb, usually above an open space so as to resemble a knot in the limb. Confirmation can be achieved by watching the birds, especially the female, until one of them visits the nest.

Cerulean Warblers are single-brooded, which limits the period for confirmation to about one month. The two Vermont nests contained eggs on May 23 and June 12; these dates are close to the range of the much larger sample for New York State (Bull 1974), which was from May 19 to June 23. There are no known nestling or fledgling dates for Vermont. In New York, nestlings are known from the second week of June to the first week of July, and fledglings are reported from the third week of June to the third week of July (Bull 1974). Cerulean Warblers arrive in Chittenden County, Vermont, in mid-May, and have been detected there as late as August 11.

In the Northeast the Cerulean Warbler has expanded slowly but steadily. Late in the nineteenth century, it was already known to be present on the Ontario Lake plains in New York. Eaton (1914) speculated that the species had originated from the Ohio River valley at some point during the preceding century. As early as 1894, the species appeared on the east bank of the Hudson River in Dutchess County, New York. A small population has bred there since at least 1922 (Bull 1974). The first New England records included a sighting at Stratford, Connecticut, in 1841 and a specimen from Cohasset, Massachusetts, in 1874 (Forbush 1929). Forbush cited fewer than 20 records for New England in 1929, 4 of which were from Vermont; however, details from 3 of these records are highly questionable, and at present, there are no available published details on the fourth (a mid-May 1927 sighting from Montpelier). There was



No. of priority blocks in which recorded

TOTAL 0 (0%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

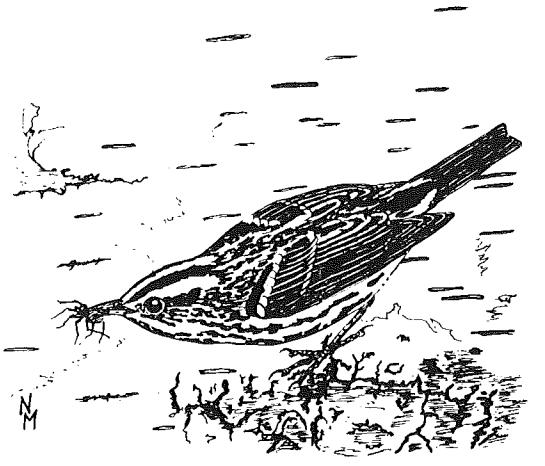
a subsequent sighting of a Cerulean at St. Johnsbury on May 5, 1950 (F. Mold, Fairbanks Museum record).

Records of the Cerulean Warbler in southern New England increased in the late 1940s and 1950s to annual reports, leading Griscom and Sprunt (1957) to speculate that it would breed there. In 1972, a pair was found nesting at Canton, Connecticut (Finch 1972). In 1950, the Cerulean Warbler was recorded for the first time in southern Quebec, at St. Helen's Island (Ouellet 1967), where it continues to be seen annually. In addition, breeding has been postulated at Mt. St. Hilaire in the Richelieu River valley since 1965 (Ouellet 1967). Possibly these birds arrived via the St. Lawrence River valley from populations around Lake Ontario. An alternative theory is that the colonists arrived from the New York population in Dutchess, Rensselaer, and Schoharie counties. In support of the Ontario theory is a summer record (June 14, 1981) for Lake Carmi State Park in Franklin, Vermont. A singing male at Lake Bomoseen State Park in Hubbardton, May 12–15, 1979, might indicate colonization of Vermont from the Hudson River population.

WALTER G. ELLISON

Black-and-white Warbler

Mniotilta varia

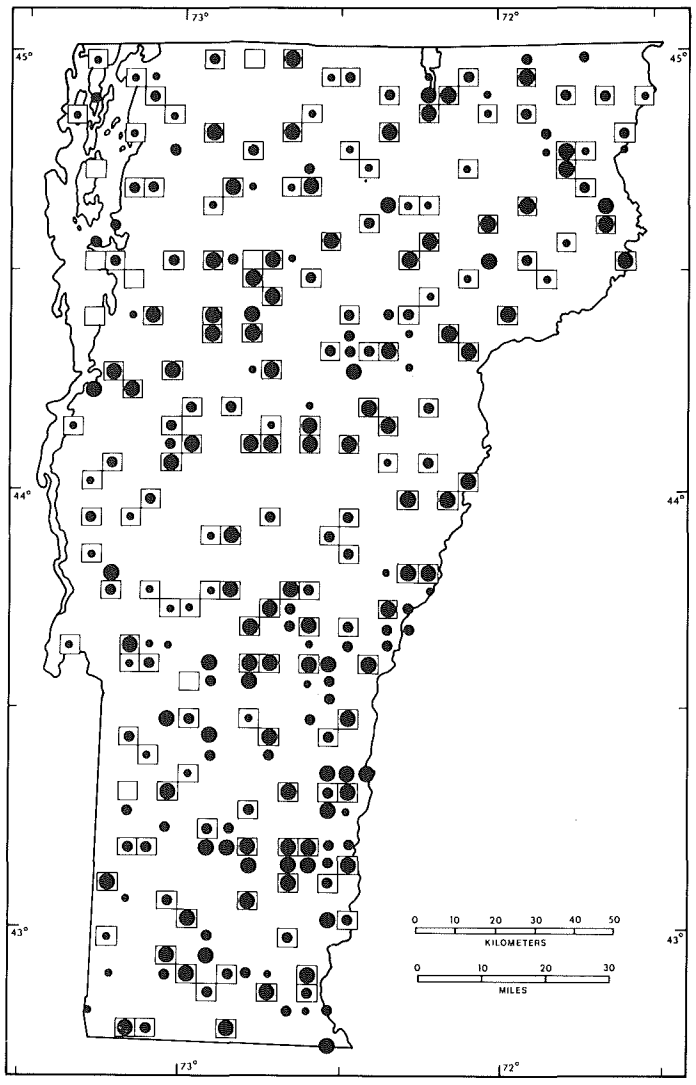


The Black-and-white Warbler is a bark-foraging specialist. It is frequently encountered assiduously creeping along trunks and branches searching for insects and their eggs, and spiders. The species so resembles the Brown Creeper in shape and habits that it was once considered closely related to it. Black-and-white Warblers inhabit a variety of deciduous and mixed woodlands. This bird appears to occur in higher densities in stands of medium-aged second growth with well-developed understories, rather than in more mature closed-canopy forests. It appears to be particularly sensitive to the fragmentation of sizeable woodlands into scattered small woodlots. Galli et al. (1976) and Whitcomb et al. (1977) both found that the species' presence depends on woodlot size; Whitcomb et al. (1977) noted that Black-and-white Warblers disappear from fragmented woodlands.

This small bird has a distinctive song composed of a series of high-pitched disyllabic phrases that have been likened to the sound of a turning, unoiled metal crank. Because the nest is placed on the forest floor and is well concealed in the leaf litter, it is very difficult to find: fewer than 10% of Atlas Project confirmations for the species involved the discovery of an active nest. Black-and-white Warblers may give away the nest location through their vigorous distraction displays. Fledglings, though often noisy, are far from conspicuous, and provided only slightly more than 10% of the confirmations. By far the most common method of confirming this species was the detection of parents with food for their young, which accounted for 76% of all confirmations in Vermont.

The first Black-and-white Warblers arrive in Vermont during the last week of April. Significant numbers appear about a week later. Nesting gets under way by mid May. The nest is a fairly substantial cup of bark strips, rootlets, dead leaves, and grass, nestled into leaf litter and often domed over with dead leaves. Eggs have been recorded in Vermont on five dates from May 26 to June 19. Clutch size may range from 4 to 5 eggs (Harrison 1978). The eggs are white with brown speckling. Incubation and nestling periods are 10 to 12 and 8 to 12 days, respectively. Nests containing young are not on record for Vermont; in New York State dates for nestlings range from early June to late July (Bull 1974). Dependent young have been reported in Vermont from June 30 to July 28 on the basis of four dates. The autumn migration to tropical and subtropical wintering grounds commences in late July, and peaks during late August. A few birds remain into late September or, occasionally, later.

The Black-and-white Warbler is a fairly common and widely distributed species in Vermont. It was located in 96% of the priority blocks. Of the eight priority blocks where it was absent, five were in the Champlain Lowlands, where the species was confirmed in only 27% of the blocks in which it occurred; this contrasts with confirmation in 67% of the blocks in the Eastern Foothills. This disparity appears to be a result of forest fragmentation in the Champlain Lowlands, where land is subdivided into small woodlots. Black-and-whites were considered common in Vermont by Fortner et al. in 1933. Ross (1914, Field notes) found them present above 458 m (1,500 ft) in the Bennington area during the breeding season. The Black-and-white apparently con-



No. of priority blocks in which recorded

TOTAL 171 (96%)

Possible breeding:	38 (22% of total)
Probable breeding:	53 (31% of total)
Confirmed breeding:	80 (47% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	26	79	15
Green Mountains	53	98	31
North Central	19	100	11
Northeast Highlands	16	100	10
East Central	19	100	11
Taconic Mountains	14	87	8
Eastern Foothills	24	100	14

tinues to be largely restricted to higher elevations in southwestern Vermont, as it was missed in two blocks in the Taconic Mountains and was confirmed there in only 21% of the blocks. The species occurred in highest numbers in the Eastern Foothills and East Central regions, where it averaged 6.1 per route in U.S. Fish and Wildlife Service Breeding Bird survey data (BBS 1966–79). Always considered common in the state (Allen 1909), the Black-and-white Warbler has probably benefited from the ongoing reforestation of Vermont.

WALTER G. ELLISON

American Redstart

Setophaga ruticilla

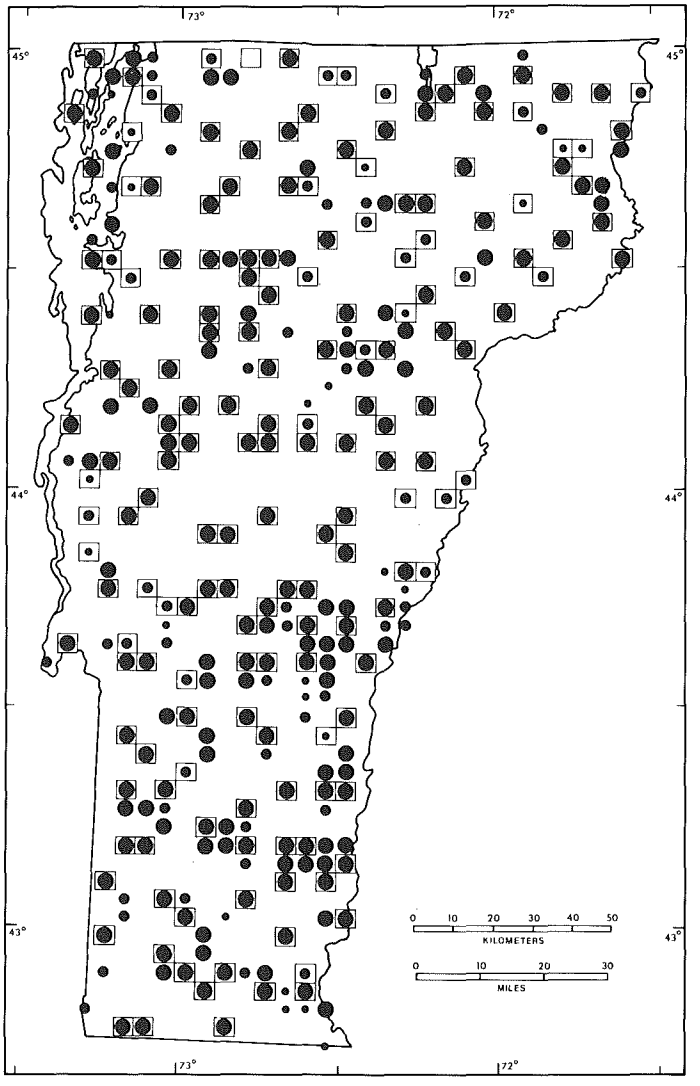
The American Redstart prefers deciduous growth, both young and mature. The species is most abundant in mature second-growth northern hardwood forests with a thick understory growth of saplings. Redstarts also occupy clear cuts, reforesting farmland, hedgerows, and alder or willow thickets. The species may also occur in habitats dominated by conifers (Ficken and Ficken 1967; Sabo 1980); even in these habitats the species prefers deciduous growth: redstarts foraged in conifers less than 10% of the time in subalpine forest in the White Mountains of New Hampshire (Sabo and Holmes 1983).

The vigorously whistled songs of male American Redstarts readily call attention to territorial birds. When territories are being established, swiftly uttered and sharply accented songs are frequent. Unaccented songs seem to predominate later in the season, from about mid June on. Redstarts are fairly easy to observe because they usually forage at middle levels in the forest, and use much tail fanning and wing flashing, revealing bright patches of orange or yellow in their plumage. Most confirmations (52%) for the species during the Atlas Project were of parents observed with food for their young. Twenty-five percent of the confirmations were of active nests.

American Redstarts arrive in Vermont in the first or second week of May. Females arrive after the adult males. Yearling males, which closely resemble the gray and yellow females except for some black feathering about the face and breast, arrive still later—on average, about 2 weeks later than the older males (Ficken and Ficken 1967). Nest building commences in late May and continues to the first week of June; renesting attempts are noted through the third week of June. Nests are commonly situated in a three-way crotch in a deciduous tree or shrub (Ficken 1964). Nests are placed 0.6–25 m (2–82 ft) above the ground (T. Sherry, pers. comm.). The heights of 21 Vermont nests averaged 5 m (16 ft).

Redstarts lay 3 to 5 whitish eggs spotted with gray and brown. The eggs are laid early in the morning on consecutive days (Sturm 1945). The average size of 8 Vermont clutches was 4 eggs. Dates for 22 nests containing eggs in Vermont range from May 27 to July 6. The incubation period lasts 11 to 12 days (Sturm 1945). Nestlings have been reported on eight dates in Vermont, from June 2 to June 28; the lack of July dates reflects low levels of fieldwork during that month. The young are in the nest for a period of 8 to 10 days (Sturm 1945). Thirteen records of dependent young for Vermont range from June 17 to August 9. The species is an early migrant, commencing movement as early as late July in some cases. The peak of departure is in late August, with a few remaining into late September or, occasionally, early October.

The American Redstart is common to very common throughout Vermont, and was located in all but 1 of the 179 priority blocks in the state. The lowest densities of this warbler occur in the drier portions of the Champlain Lowlands, in coniferous forests at high elevation, and in the Northeast Highlands. The species can exist within a broad array of habitats and exhibits considerable behavioral plasticity (Sherry 1979). In a foraging study in West Virginia, Seidel



No. of priority blocks in which recorded

TOTAL 178 (99%)

Possible breeding:	10 (6% of total)
Probable breeding:	29 (16% of total)
Confirmed breeding:	139 (78% of total)

Physiographic regions in which recorded

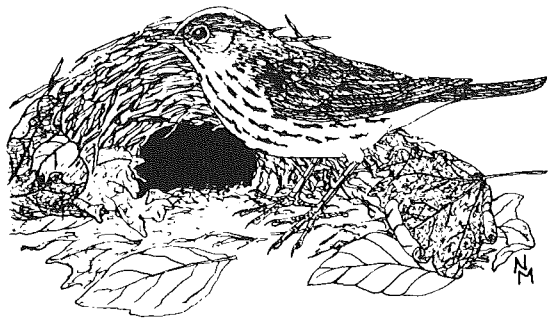
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	30	97	17
Green Mountains	54	100	30
North Central	19	100	11
Northeast Highlands	16	100	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	13

and Whitmore (1982) found that redstarts utilized similarly structured areas within forests whose overall structure was quite varied. Sherry (1979), during a study at the Hubbard Brook Experimental Forest in central New Hampshire, found that Least Flycatchers, which are similar in structure, foraging behavior, and habitat selection to American Redstarts, are behaviorally dominant over redstarts and exclude them from some areas. Because of the abundance of deciduous woodlands and shrub habitats in Vermont, the American Redstart ranks as one of Vermont's most common wood warblers.

WALTER G. ELLISON

Ovenbird

Seiurus aurocapillus

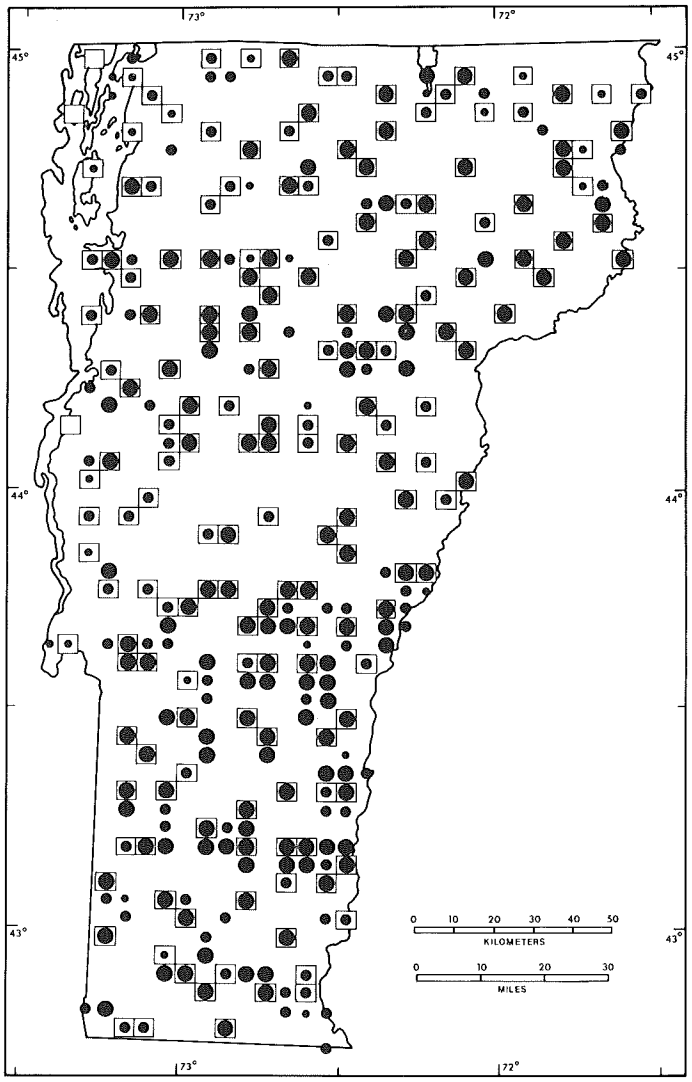


The Ovenbird's loud ringing song is one of the most familiar sounds of the forests of Vermont. This species was located in 176 of the 179 Atlas Project priority blocks, being overlooked in or absent from only 3 largely unforested and dry blocks in the Champlain Lowlands. Ovenbirds inhabit almost every variety of woodland in the state, ranging from stands of young aspen to spruce-fir forests. Kendeigh (1945a) suggested that a variety of broad-leaved trees may be required to supply the dead leaves used by the species in building its distinctive domed nest in the forest litter. Ovenbirds are most common in northern hardwood forest of beech, sugar maple, yellow birch, and hemlock. The species is least common in extensive spruce-fir woods. The Ovenbird is generally absent from the cool, moist, stunted subalpine forest of the state's mountains.

By far the most arresting characteristic of the Ovenbird is its powerful voice, and the species is most often located by its call. Its song is ringing and strident and builds to a crescendo; it consists of a series of paired phrases, the first note of which is normally higher-pitched than the second, which is lower and carries farther. A more complex song is generally given in flight at night. This impressive vocalizer is a rather small, brown, thrushlike bird that is often difficult to glimpse. The domed nest built into the forest floor is the best camouflaged of such structures. Perhaps because the species often builds along trails and old wood roads, location of nests accounted for 24% of its Atlas Project confirmations. As was the case in locating many other breeding songbirds, parents detected with food for their young accounted for a large percentage of the confirmations (42%); recently fledged young accounted for another 23%.

Ovenbirds generally arrive in Vermont during the first week of May. Nest building commences during the third week of the month. The nest is built into a natural or excavated hollow from which litter has been cleared; it is domed over with dead leaves, grasses, and pine needles. Sometimes living herbs and ferns are incorporated into the structure. The nest is then lined with fine grass, rootlets, or hair. Egg dates for 25 Vermont nests range from May 27 to July 23. The white eggs, which are speckled at the large end with purple, number from 3 to 6, although most clutches contain either 4 or 5 eggs. Twenty-two Vermont clutches averaged 4 eggs. Incubation usually requires 12 days, and the young leave the nest on foot at 8 to 10 days of age. Records of 7 nests with young include dates from June 7 to June 20, although nestlings are likely to be found well into July. Recently fledged young have been noted on 18 dates from June 21 to August 3. The autumn migration commences in August and peaks in early September. Most Ovenbirds are gone by the last two weeks of September, but there are several later records.

The Ovenbird is common in Vermont. The species has averaged up to 10 per route on U.S. Fish and Wildlife Service Breeding Bird surveys, and one observer averaged 12 per block over four years of the Atlas Project. There are two principal areas from which the Ovenbird is absent: the largely open Champlain Lowlands, in particular Grand Isle County, where it was not recorded in 2 priority blocks; and at elevations above 915 m (3,000 ft). The Ovenbird has been defined as "area sensitive," meaning that the species is not present in smaller woodlots (MacClintock et al. 1977). The Ovenbird's



No. of priority blocks in which recorded

TOTAL 176 (98%)

Possible breeding:	16 (9% of total)
Probable breeding:	53 (30% of total)
Confirmed breeding:	107 (61% of total)

Physiographic regions in which recorded

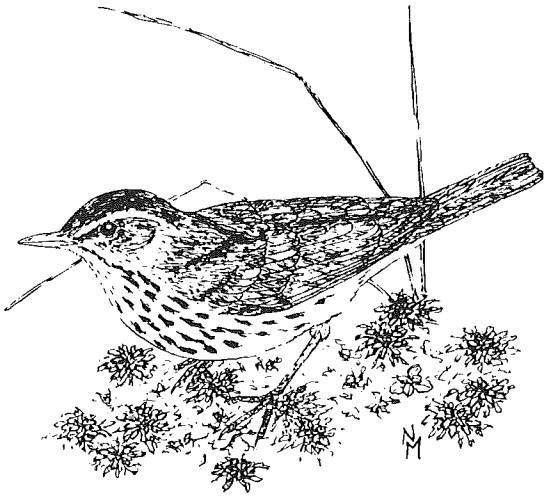
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	28	90	16
Green Mountains	54	100	31
North Central	19	100	11
Northeast Highlands	16	100	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	13

population has apparently not changed significantly over the last 100 years, as most early authorities for Vermont refer to it as a common species.

WALTER G. ELLISON

Northern Waterthrush

Seiurus noveboracensis



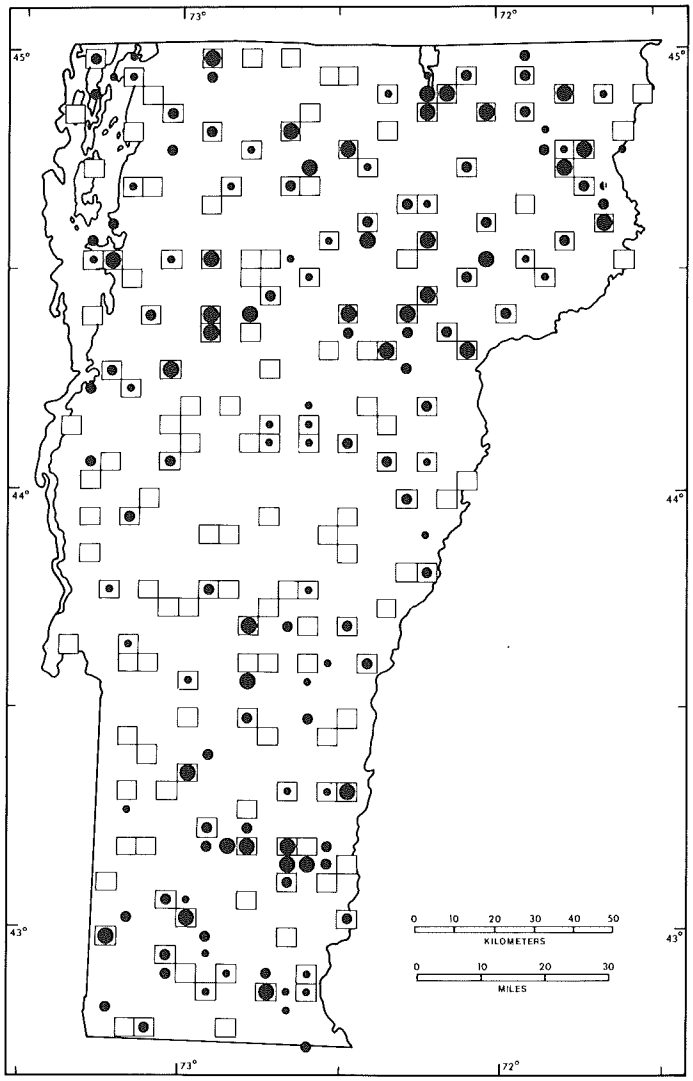
The Northern Waterthrush is distributed throughout Vermont, from the Champlain Lowlands to the higher elevations of the Green Mountains, wherever wooded wetlands occur. This species is fond of dense shrubbery near water. Alder swales, bog margins, and black spruce swamps often host dense populations. More open areas, such as the margins of beaver ponds, usually support only scattered pairs. The species is sometimes present in streamside wetlands and occurs at many high-elevation bogs, but unlike the Louisiana Waterthrush, it does not frequent rushing streams. The Northern Waterthrush is the more abundant and widely distributed of these two species in Vermont. Factors contributing to its success may include its capacities to exist in extremely high densities and to occupy a wide range of moist deciduous and coniferous habitats at any elevation.

The Northern Waterthrush breeds commonly across North America from the limits of the muskeg in Alaska east to Newfoundland, south to northern New England, and, locally in the mountains, south to North Carolina and Idaho. The species winters from southern Mexico and the West Indies to northern South America, returning to Vermont during the first week of May.

The species is most readily located by its loud, ringing staccato song, which the males give from any available low perch; in addition, flight songs are often given at dusk. Breeding pairs tend to concentrate in small portions of apparently suitable habitat. Individual territories are small, varying from 0.8 to 1.5 ha (1.9 to 3.7 a). There is some evidence that polygyny may occur occasionally (Eaton 1957). Up to three females have even been found to utilize the same uprooted tree stump as a nest site (Griscom and Sprunt 1957). A territory-mapping study conducted in coniferous forest at Wolcott (Metcalf 1977) yielded 12 pairs per 40.5 ha (100 a), but local densities in prime habitat may be even greater (D. P. Kibbe, pers. observ.). Unfortunately, greatest densities are reached in the wettest, most impenetrable habitats, which are consequently least likely to be surveyed.

Northern Waterthrushes place their nests on the ground, frequently beside water among the roots of a downed tree. The nest is a bulky structure constructed mostly from moss by the female. Usually from 4 to 5 creamy white eggs marked with reddish brown are laid. Only one clutch (with 4 eggs, on May 26) has been reported in Vermont. Incubation, performed by the female, lasts 12 days. The female is an extremely tight sitter and sneaks on foot to and from the clutch, making nests exceptionally difficult to locate; if flushed, however, she gives an agitated distraction display. The nestlings may desert the nest at 9 days of age if disturbed, although they are unable to fly even short distances until several days later. At 3 weeks of age the young are still being fed occasionally by the parents (Eaton 1957).

Since both parents feed and are very attentive to the young, confirmations are relatively easy to obtain during the nestling and fledgling periods. Adults with food, fledglings, and nests with young accounted for 58%, 21%, and 8%, respectively, of all Atlas Project confirmations. Fledglings were noted as early as June 16 and as late as July 15. The departure dates of Northern Water-



No. of priority blocks in which recorded

TOTAL 96 (54.0%)

Possible breeding:	31 (32% of total)
Probable breeding:	36 (38% of total)
Confirmed breeding:	29 (30% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	16	52	16.7
Green Mountains	27	50	28.1
North Central	16	84	16.7
Northeast Highlands	12	75	12.5
East Central	10	53	10.4
Taconic Mountains	4	25	4.2
Eastern Foothills	11	46	11.4

thrushes nesting in Vermont are unknown, since their place is taken by migrants from the vast breeding grounds in Canada. All, however, are gone by the end of September. A Northern Waterthrush banded on May 13, 1973 and recaptured on October 5, 1980 at Marshfield, Vermont holds the species' current longevity record of 7 years 11 months (Klimkiewicz et al. 1983).

The Northern Waterthrush has apparently always been well distributed throughout Vermont. Habitats occupied by Northern Waterthrushes, with the exception of some shoreline and spruce-fir areas, are relatively undisturbed by human activity. Unlike its southern counterpart, the Northern Waterthrush is evenly distributed throughout most physiographic regions of the state, including the Champlain Lowlands. Elevation at Vermont's latitude has little effect on the distribution if habitat is available. Only in the Taconic Mountains, where the Northern Waterthrush occurred in 25% of the priority blocks, was the species relatively scarce.

DOUGLAS P. KIBBE

Louisiana Waterthrush

Seiurus motacilla

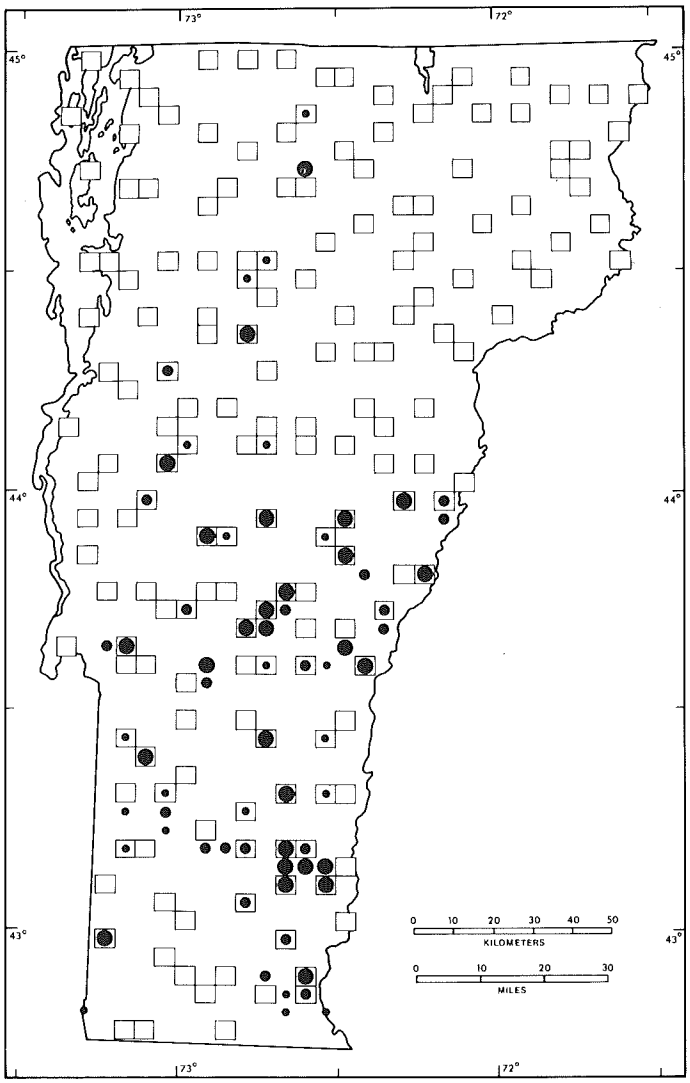
True to its name, the Louisiana Waterthrush shares with its northern cousin an innate fondness for water and is rarely found more than a few yards from a brook or river. The two species are seldom present in the same area, however, as the Louisiana prefers rushing waters, while the Northern Waterthrush inhabits alder swamps, bogs, and the margins of ponds. This behavioral difference may be partly a result of interspecific competition; south of the Northern's range the Louisiana Waterthrush may also be found in swampy, standing-water habitats. In Vermont, where the Louisiana reaches its northern breeding limit, habitat segregation is quite distinct.

The Louisiana, which winters from central Mexico and the West Indies south to northern South America, is one of the earliest warblers to return to Vermont each spring. Males set up streamside territories in the last week of April; April 24 at West Dummerston is the earliest Vermont arrival on record (Bent 1953). Males arrive up to nine days before their mates (Eaton 1958). Louisiana Waterthrushes lay claim to quarter-mile sections of a stream, singing from horizontal branches high above the water and challenging all conspecific intruding males. Their song is loud and ringing, perhaps to be heard above the spring torrents. Songs are rarely given on the ground or when in pursuit. Unlike the Northern Waterthrush and the Ovenbird, a twittering evening flight song is rarely given by the Louisiana. Eaton (1958) has provided an excellent study of the species' life history in New York.

Like the Northern, the Louisiana teeters head to tail like a Spotted Sandpiper, bobbing almost constantly while walking along the stony streambed. It pauses periodically to flip wet leaves with its bill as it searches for aquatic prey.

The Louisiana Waterthrush typically places its nest in an excavated cavity beneath an overhanging bank. The base of an uprooted tree may provide another likely nesting site. The bulky nest is constructed by both adults from dead leaves, moss, and rootlets, and is lined with grass. Only four nest records exist for Vermont, dating from mid May to June 23. Four to 6 white eggs speckled with brown or gray are laid. The female is a tight sitter. Incubation by the female takes 12 to 14 days. She may feign injury along the streambed if flushed from the nest. The male may feed the female on the nest toward the end of incubation, and assists in feeding the young. The young fledge at 10 to 12 days of age (Eaton 1958; Forbes and O'Regan 1960). Fledglings may require up to 4 weeks to attain independence. All six Vermont fledgling dates fall between June 12 and June 29. Louisiana Waterthrushes depart early, and usually have left Vermont by the first week in August.

The current distribution of the Louisiana Waterthrush in Vermont clearly reflects its southern origin and predilection for streams with steep gradients. It is rare to absent from the northern end of the state and in the Champlain Lowlands, where the streams are sluggish and where streamside woodlands have in general been replaced by agricultural fields. Although most numerous in the Green Mountains, it is absent from the extreme southern portion of that region, where boreal habitats predominate. It occurs most regularly in the Green Mountains along the border of that region and the Eastern Foothills in the southeastern portion of the state.



No. of priority blocks in which recorded

TOTAL 46 (26%)

Possible breeding:	14 (30% of total)
Probable breeding:	11 (24% of total)
Confirmed breeding:	21 (46% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	1	3	2
Green Mountains	18	33	39
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	6	32	13
Taconic Mountains	6	38	13
Eastern Foothills	15	62	33

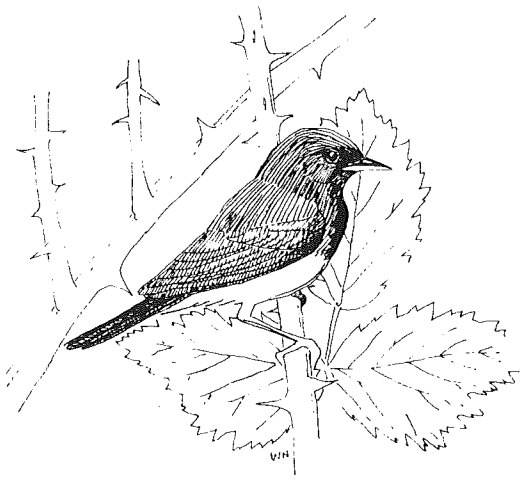
An early nester occurring in low densities (e.g., 4 pairs per mile of suitable stream), the Louisiana was easily overlooked by many observers who initiated their Atlas Project efforts in mid June, by which time Louisianas have largely fallen silent. Low density and early breeding probably also explain why only 2 of 27 confirmations were of nests with eggs or young. Fledglings and adults with food for the young accounted for other confirmations.

Many early ornithologists failed to distinguish the Louisiana from the Northern Waterthrush. Consequently, older references yield little insight into its historical distribution and status in the northeast and in Vermont. The suspicion that the species may have increased and extended its range in recent decades is supported by U.S. Fish and Wildlife Service Breeding Bird survey data (BBS 1966–79), which demonstrate an increase in sightings in Vermont since 1970. Data from other northeastern states, meanwhile, indicate that the populations have remained stable. It will be the job of future observers to ascertain whether this species' distribution remains static in Vermont.

DOUGLAS P. KIBBE

Mourning Warbler

Oporornis philadelphia



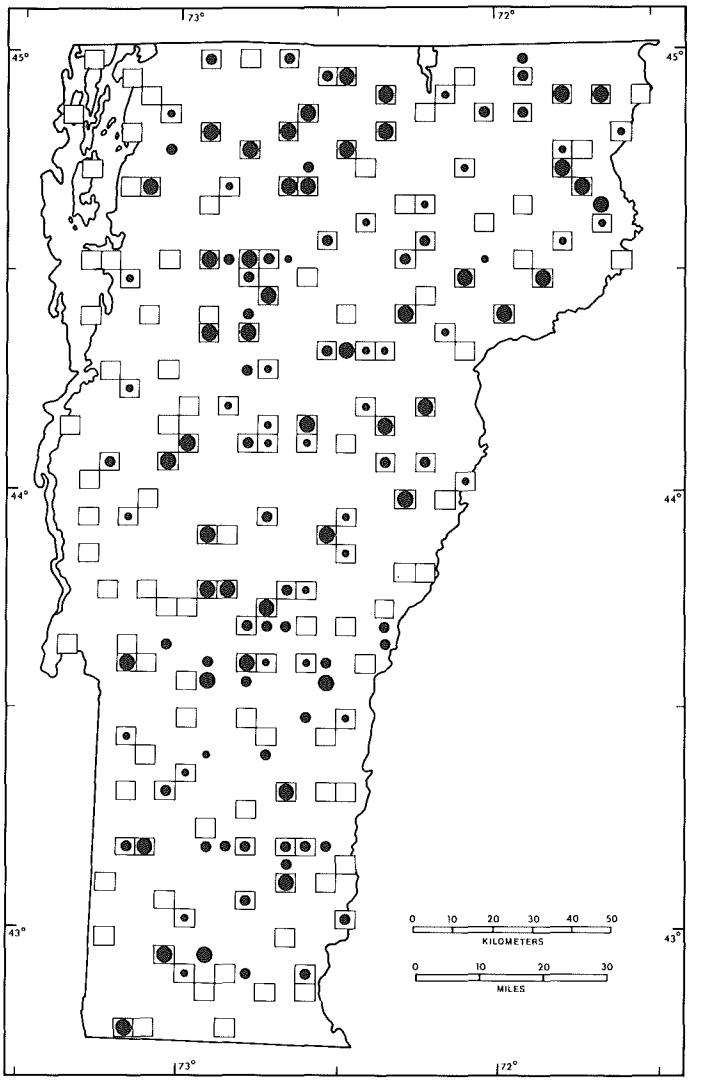
Once one learns its distinctive song and call note, the Mourning Warbler seems surprisingly more common than might be expected. Many observers consider it to be one of the rarer warblers, because its behavior makes it inconspicuous, yet it is a typical bird of the northwoods country. It occurred in 57% of Vermont's Atlas Project priority blocks and in all of the physiographic regions. It is difficult to know, as Peterson suggested in Griscom and Sprunt (1957), whether the early naturalists such as Audubon and Wilson simply did not detect Mourning Warblers, or whether the species was much rarer in the past than at present, and has increased in recent years as appropriate habitat has been created by forest clearing and regeneration.

In summer, Mourning Warblers range from northern Alberta, central Quebec, and Newfoundland south to Minnesota and central Massachusetts, and in the Appalachians south to West Virginia and Maryland. In Vermont they are found at all elevations in shrubby second growth. In the more southern parts of the state they are more usual at elevations above 457 m (1,500 ft). They skulk in dry hillside thickets of blackberry and pin cherry, in underbrush in cleared and burned-over areas, in moist groves of jewelweed and nettles, and in overgrowth at margins of swamps and bogs. They are frequently located at the brushy edges of ski trails. Mourning Warblers arrive in Vermont in late May and early June, when they are difficult to observe because of the newly leaved understory.

Despite their retiring nature, Mourning Warblers are easily detected by their sound. According to Cox (1960), males sing at any height from near ground level to the tops of shrubs and saplings 7.6 m (25 ft) high. When disturbed from these perches, they retire to a vegetative tangle from whence they frequently continue singing. They respond well to taped calls. Numbers of Mourning Warblers were located by Atlas Project workers through the birds' singing (S), agitated behavior (D), or distraction display (DD).

Cox (1960) found territories in Minnesota to average about 0.8 ha (1.9 a), and referred to the area of a pair in New Hampshire as being about 0.6 ha (1.5 a). Territories are defended by both sexes. The Mourning Warbler's nest is placed on the ground or up to 0.9 m (3 ft) above the ground, and is well concealed in thick plant growth; it is often fastened to a number of stems of a leafy shrub. Nests have a bulky exterior of dried leaves, coarse grasses, weed stalks, and fibrous bark, and are lined with fine grasses, rootlets, and hair. Three to 5 eggs, commonly 4, are laid; they are incubated solely by the female. A nest containing 4 eggs was found in East Wallingford, Vermont on June 17, 1923. A nest with 4 eggs was located on June 10, 1920 at Mendon; this clutch had increased to 5 eggs when revisited on June 14 (Kirk 1921). In New York, Bull (1974) recorded nesting from May 28 to July 7. Forbush (1929) wrote that nesting occurred in June in Maine, New Hampshire, and southern Ontario. Incubation may begin the day before the last egg is laid, and lasts about 12 days. The female sits closely on the eggs, and never flies directly from the nest, leaving instead in a mouselike fashion. The male feeds the female at or away from the nest during incubation.

The young are tended by both parents; they remain in the nest for 7 to 9 days, and



No. of priority blocks in which recorded

TOTAL 102 (57%)

Possible breeding:	33 (32% of total)
Probable breeding:	27 (27% of total)
Confirmed breeding:	42 (41% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	10	32	10
Green Mountains	38	70	37
North Central	13	68	13
Northeast Highlands	11	69	11
East Central	16	84	15
Taconic Mountains	5	31	5
Eastern Foothills	9	37	9

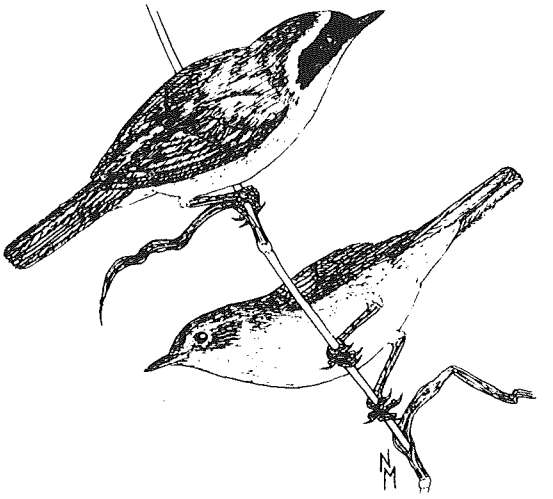
leave the nest unable to fly. They remain with the adults for 2 to 3 weeks. Nesting Mourning Warblers become easily agitated when they are feeding young and are conspicuous at this time. In late summer Mourning Warblers remain silent and are extremely hard to locate. Because they leave their breeding grounds soon after nesting they are seldom observed in the fall. Immature birds often appear south of their breeding range in early August. Mourning Warblers winter from southern Nicaragua south through Panama to Colombia, eastern Ecuador, and southern Venezuela (AOU 1983).

The bird's name comes from the male's dark gray head and throat and his black, irregularly marked upper breast, which suggest the black crepe once commonly worn by mourners.

WHITNEY NICHOLS

Common Yellowthroat

Geothlypis trichas

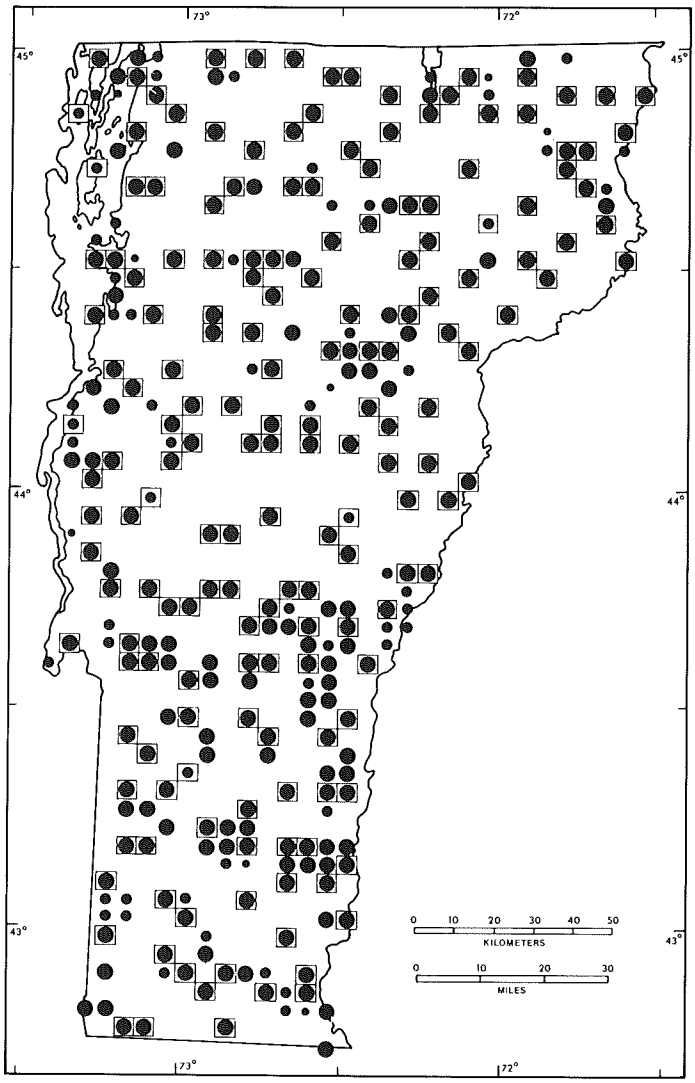


Common Yellowthroats are prevalent among open areas with dense, low vegetation. Yellowthroats occur in higher numbers in areas with moist soil because such conditions promote the growth of rank vegetation (Kendeigh 1945a). This species tends to inhabit subclimax habitat—marshes, swales, and bogs—or areas disturbed by external agencies—burns, beaver meadows, overgrown pastures or fields, clear cuts, and ski trails. Yellowthroats may be seen throughout Vermont, from the lowest elevations to some of the highest mountains (e.g., Jay Peak, at 1,100 m [3,608 ft]). However, Ross (1934) found it most abundant below 305 m (1,000 ft) in Bennington County.

Although the Common Yellowthroat is a small bird and forages in low vegetation, it occurs in such high densities and is such a loud and persistent singer that it is difficult to overlook. The song, a loud *wichity* rendered in series of threes or more, is easily recognized. Yellowthroats nest on or near the ground in dense shrubbery or coarse herbs. Most (nearly 64%) of the yellowthroat breedings confirmed by Atlas Project workers were of adults carrying food to nestlings or fledglings. Seven and a half percent of yellowthroat confirmations were of parents putting on distraction displays to protect nests and young (DD)—a relatively high occurrence for this code.

The Common Yellowthroat is among the first 10 species of warblers to arrive in Vermont in the spring. Males usually return during the first and second weeks of May, with most on territory by midmonth. Females arrive after the males—an average of four days later according to the Vermont Institute of Natural Science's banding data. The nest is a rather bulky structure of grass or grasslike leaves, supported by or braced against surrounding vegetation, and lined with fine grass, sedge, rootlets, or hair. Nest heights rarely exceed 48.3 cm (19 in). The eggs are white with red-brown spotting wreathing the large end; they number from 3 to 5 per clutch. The average size of 8 Vermont clutches was 3.9 eggs. Ten Vermont egg dates range from May 29 to July 28. The incubation period lasts from 11 to 13 days, averaging 12 (Stewart 1953). Nestlings have been reported on four dates in Vermont, ranging from June 17 to July 23. The young remain in the nest from 8 to 9 days, usually departing the nest before they are capable of sustained flight (Stewart 1953). Fledglings have been reported from June 27 to August 14 in Vermont (four records). Yellowthroats are often double-brooded, and may attempt a third nesting if one of the initial two fails. The autumn migration begins in late August, and large numbers of migrants are reported through late September. Most yellowthroats are gone by mid October; a few remain annually into November.

When Cutting (1884) stated that "any bush in Vermont may contain [a yellowthroat]," he only exaggerated slightly. From the mid-nineteenth century to the present, the Common Yellowthroat has been among the most abundant of Vermont's many warblers. It is the most abundant warbler recorded on the U.S. Fish and Wildlife Service Breeding Bird surveys in the state (BBS 1966–79). The species was reported from all of the Atlas Project's priority blocks and, as befits an abundant and well-known species, confirmed in 96% of the priority blocks. There was no significant difference among regional confirmation rates, although



No. of priority blocks in which recorded

TOTAL 179 (100%)

Possible breeding:	0 (0% of total)
Probable breeding:	7 (4% of total)
Confirmed breeding:	172 (96% of total)

Physiographic regions in which recorded

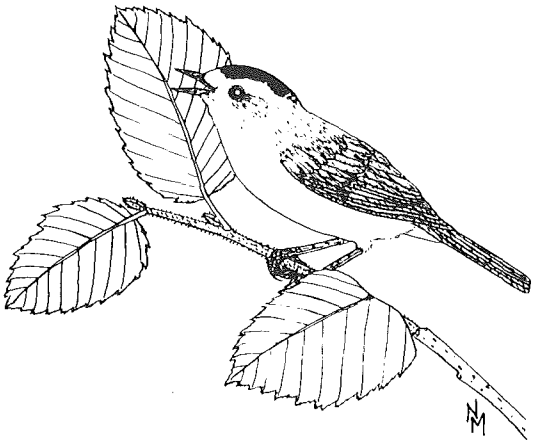
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17
Green Mountains	54	100	30
North Central	19	100	11
Northeast Highlands	16	100	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	13

the species was confirmed in slightly fewer blocks in the Champlain Lowlands. More than 22 yellowthroats per block were recorded during the Atlas Project by one observer, the highest figure in his compilations for any member of the Parulinae (W. G. Ellison, pers. observ.). Nicholson (1974, 1978) found densities of 26 pairs per 40.5 ha (100 a) in mixed forest and old field habitat. As long as there are wetlands, abandoned agricultural land in early successional stages, and other damp, brushy habitats, this adaptable species will continue to flourish in Vermont.

WALTER G. ELLISON

Wilson's Warbler

Wilsonia pusilla



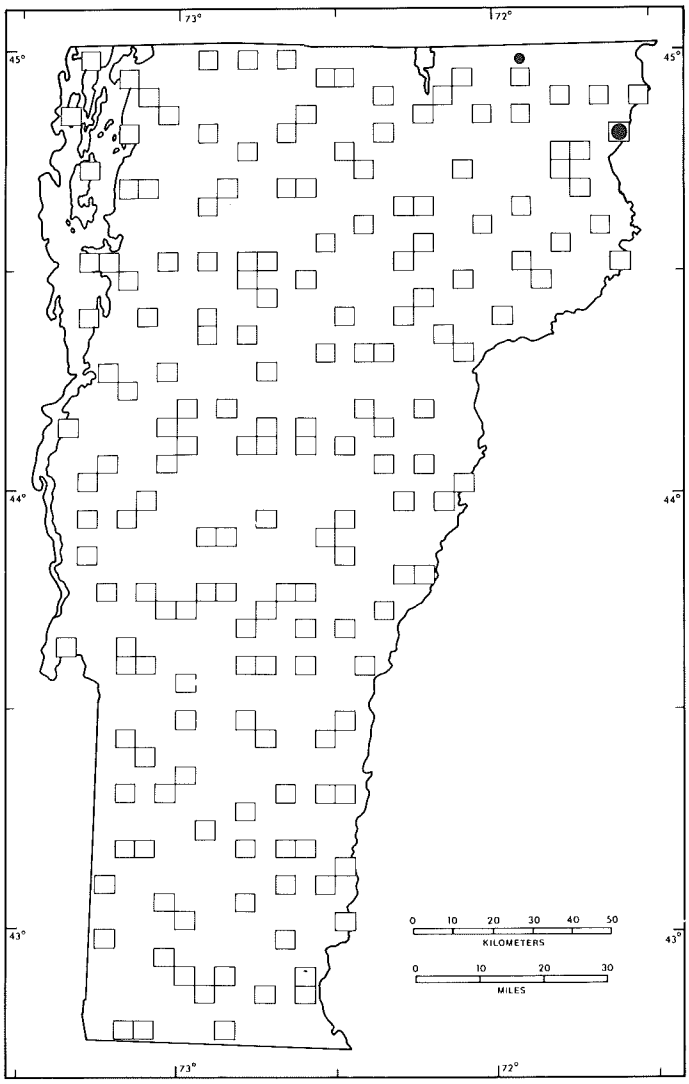
The Wilson's Warbler breeds across the entire northern part of the continent, its range dipping south in the East to central Maine, northern New Hampshire, northern Vermont, and northeastern New York (Godfrey 1966; AOU 1983). Although the Wilson's habitat preferences may vary over its huge range, eastern continental populations of the species prefer somewhat open, damp areas edged with alder or willow stands, or areas of boreal spruce-fir-tamarack forest with stunted conifers. In Vermont, it is a rare, localized, and irregular breeder. Breeding habitat in the state—cool, boggy or swampy associations in boreal forest—is limited. The Northeast Highlands, the only region in which breeding by this warbler has been recorded recently, is threatened by clear-cutting.

Only four breeding records exist for Vermont. On July 8, 1977, an adult was recorded feeding a small fledgling in Bloomfield, in the far northeastern corner of the state (ASR, W. G. Ellison and R. Prum); the habitat was an open, wet meadow interspersed with alders and small white spruces, and bordered by coniferous forest. A male was found singing on territory at Holland Pond in the same region and in similar habitat in the summer of 1978—an Atlas Project probable record (ASR, L. N. Metcalf). There are two older records as well: in the 1950s the Wilson's was called a "regular breeder in small numbers in alder swamp" in the township of Morgan, within the North Central Region (Eldred, Field notes); and two sources (AOU 1957; Bent 1958) list northeastern Vermont as within the breeding range of the Wilson's, on the basis of unspecified records from St. Johnsbury. Many promising nesting habitats specially targeted by the Atlas Project as Unique and Fragile Areas (e.g., Moose Bog, Bear Swamp, and the swamp-marsh areas of Lake Memphremagog) failed to turn up more pairs.

Confirmation of breeding is most easily obtained by searching among the lower parts of trees and shrubs, since this species forages primarily within 3–4.6 m (10–15 ft) of the ground (Pough 1949; Stewart 1973), and by listening for the Wilson's distinctive song. Males sing frequently in the early part of the breeding season. The nest, bulky for the size of the bird, is constructed of grasses, leaves, and mosses, with a lining of fine grasses and, occasionally, hair. It is usually placed on the ground at the base of a shrub or small tree, often well hidden in a tussock of grass or moss. The eggs, generally 4 to 6 per set, are white with reddish brown speckling concentrated at the larger end (Griscom and Sprunt 1957; Bent 1958; Godfrey 1966). Four dates for eggs found in Maine—June 1, 4, 12, and 19 (Palmer 1949)—are probably roughly applicable to Vermont. The incubation period lasts about 12 days, and young seem to require an equal time in the nest after hatching (Stewart 1973).

Stewart (1973), studying the western race, found a mean territory size defended by breeding males of 0.6 ha (1.4 a) in one area and 0.5 ha (1.2 a) in another area. The species behaves boldly near its nest, and a persistent observer may stand quite close to a suspected nest site and be rewarded by views of adults returning to incubate or to feed young. Wilson's Warblers are almost entirely insectivorous, obtaining their food by a wide variety of techniques from leaf searching to flycatching (Bent 1958).

The Wilson's Warbler is normally encountered in Vermont migrating to or from its



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	1 (100% of total)

Physiographic regions in which recorded

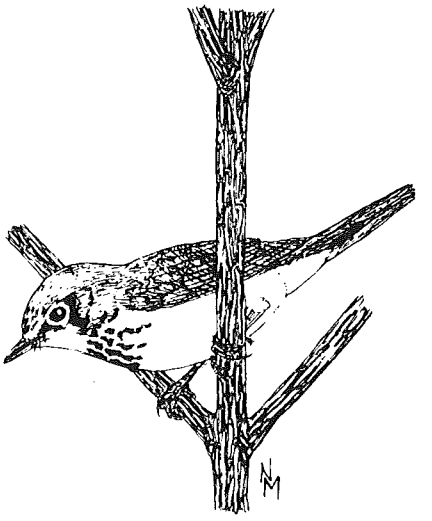
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	1	6	100
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

more northerly breeding territories. May 5 is the earliest report for spring, but Wilson's Warblers usually begin arriving in Vermont around May 11–12, and normally peak around May 15–25. The last spring migrants are usually reported about May 26–28, but the record late date is June 1. Only 7 to 15 birds are normally reported for the entire spring season, while daily counts of 4 to 6 birds, by a single observer, are not uncommon in the fall (though more observers are afield in the spring). The earliest report for fall is for August 7, though birds usually first appear on August 16–19 and peak from September 4 to 15. Wilson's Warblers have usually completed passage through Vermont by the end of September or the first few days of October; the latest fall report is for October 9 (RVB, Fall 1973–81).

G. FRANK OATMAN

Canada Warbler

Wilsonia canadensis

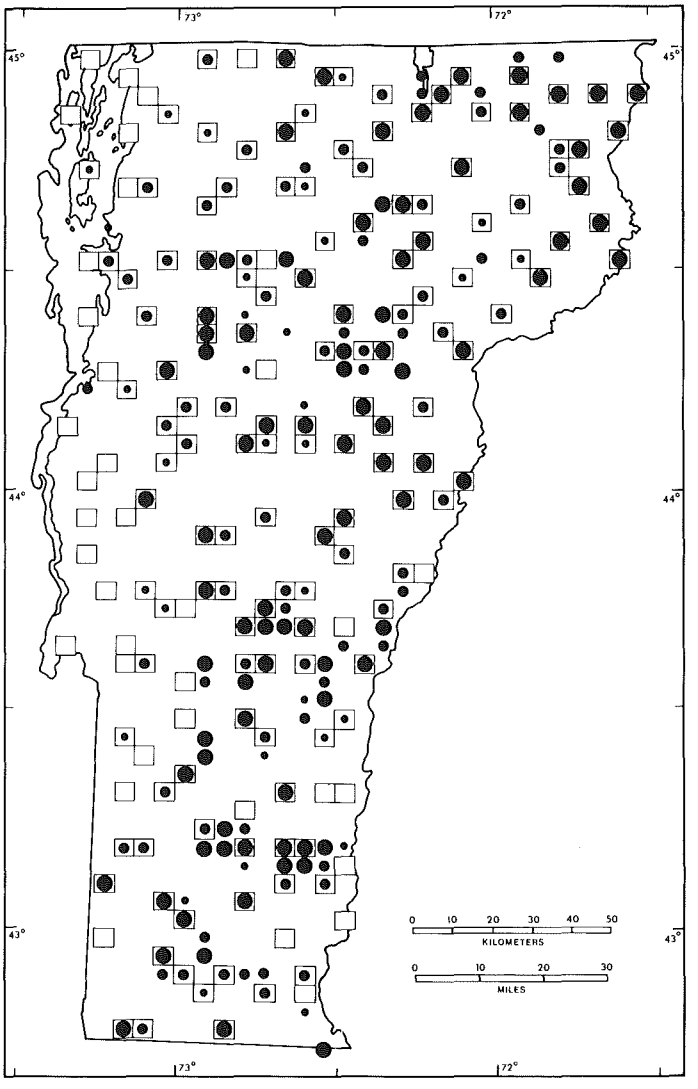


The Canada Warbler occupies a variety of habitats associated with northern hardwood and coniferous forests. Some unifying characteristics of these habitats include low, thick, deciduous growth, an uneven forest floor, and damp conditions. Given these requirements, the species' habitats include reforested talus slopes, clear cuts, hemlock ravines, subalpine forest, bogs, and willow, alder, and cedar swamps. Kendeigh (1945a) indicated that cover for the nest site, usually provided by an overhanging bank, log, stump, or mossy hummock, may be an important habitat requirement. Foliage density may also be important, as the species does nearly all of its foraging below 5 m (16 ft).

Canada Warblers migrate fairly late in the spring. They usually arrive in Vermont during the second week of May (an extreme date is May 1). They begin to leave by early August and are scarce after the first week of September; the latest record is for September 29. Once on territory, the Canada Warbler is easily detected by its song. The song is generally delivered from a low perch, and consists of a *chip* followed by an explosive jumble of short notes that invariably ends with a three-note phrase, the last note of which is loud and rising in pitch. Once located, birds on nesting territory may be lured into view with swishing or squeaking sounds. Such sounds often elicit agitated behavior—wing flipping, bill cleaning, and sharp *chup* calls—from one or both of the adults. When the observer nears the well-concealed ground nest, the birds will descend to the ground and put on a distraction display with fanned tail and wings fluttering above the back. The easiest way to confirm nesting, however, is to encounter the parents carrying food for the young. Atlas Project data underscore this fact, as in 63% of the confirmations the FY code—for parents with food—was used. The fact that only 5% of all confirmations referred to the location of a nest reflects how difficult the nest is to find.

Canada Warblers are single-brooded, and the period for confirmation of their breeding extends from the end of May, when nest building is under way, to late July, when the latest breeders have fledged their young. Egg dates are almost nonexistent for Vermont: only one clutch is recorded for the state. Dates for fledged young are from June 27 to July 31 (only five records). From this range, dates for eggs may be roughly estimated to fall between the first week of June and the first week of July; data from surrounding states and provinces indicate an egg range from late May to late June (Forbush 1929; Bent 1958; Bull 1974). Clutch size is somewhat variable, ranging from 3 to 5 eggs; 4 or 5 are laid with equal frequency.

The Canada Warbler is common in eastern Vermont and the Green Mountains. In the Champlain Lowlands it is very local, being limited to scattered swamps; and in the Taconic Mountains it is uncommon. The species' status has apparently changed little in the last 75 years, although it may have increased since the early twentieth century as forest cover has increased (Davenport 1907; Fortner et al. 1933). Many local and statewide listings of birds from the early years of this century reveal that the Canada Warbler's numbers were limited, and that it was found largely in more mountainous areas. Atlas Project data indicate that the Canada Warbler was found in fewer than



No. of priority blocks in which recorded

TOTAL 142 (79%)

Possible breeding:	22 (15.5% of total)
Probable breeding:	54 (38.0% of total)
Confirmed breeding:	66 (46.5% of total)

Physiographic regions in which recorded

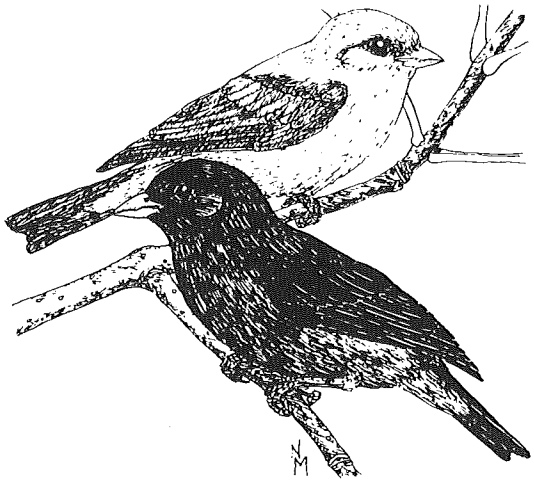
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	14	45	10
Green Mountains	50	93	35
North Central	19	100	13
Northeast Highlands	16	100	11
East Central	18	95	13
Taconic Mountains	8	50	6
Eastern Foothills	17	71	12

half of the priority blocks in the Champlain Lowlands and in only half of the blocks in the Taconic Mountains, and was absent from fewer than a third of those in the Eastern Foothills. Distribution in the Eastern Foothills shows that the species is most scarce in the southern Connecticut River valley, though present in the hills just west of the valley. These data seem to indicate a close correlation of the distribution of the Canada Warbler with cool, moist climates, as it is least common in warm, dry regions.

WALTER G. ELLISON

Scarlet Tanager

Piranga olivacea

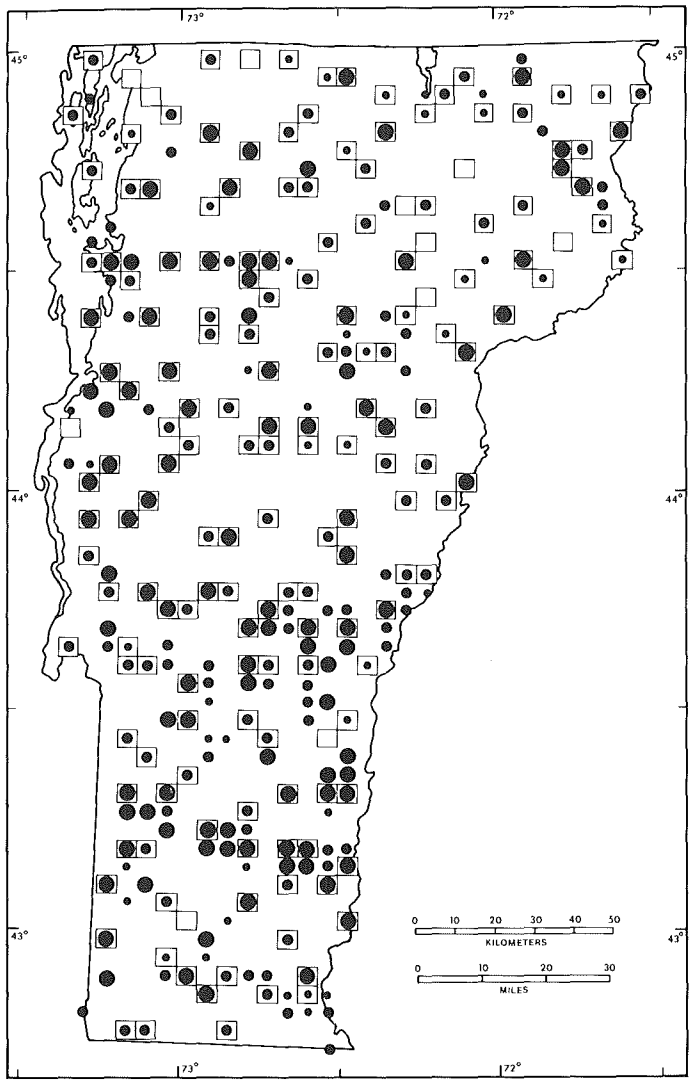


The Scarlet Tanager inhabits deciduous and mixed woodlands, where it is often found in oaks and beeches, apparently finding the open arrangement of these trees' foliage well suited to its hover-glean method of foraging (Holmes and Robinson 1981). Galli et al. (1976) recorded that the species shows a marked dependency on woodlot size; they did not find tanagers consistently in woodlots of fewer than 10 ha (25 a). Tanagers prefer mature forests, as they build their nests quite high above the ground and forage in the upper forest canopy. Prescott (1965) found 68% of tanager nests studied in trees with a DBH greater than or equal to 23 cm (9 in).

Despite the male's bright plumage, Scarlet Tanagers are notorious for being more often heard than seen. Their high-ranging habits and their tendency to inhabit trees with broad, leafy crowns make tanagers difficult to see. Once located, Scarlet Tanagers may be easily studied because of their method of foraging. The tanager's song provides a reliable method for finding its breeding territories. Similar in some respects to that of the vireos, the song consists of an indeterminate series of coupled phrases. Although the tone of the sound is not unlike that produced by an American Robin or Rose-breasted Grosbeak, it has a unique, rough, burry quality. When not singing, Scarlet Tanagers may be located by their distinctive alarm note or location call, which can be rendered as *quick-churr* or simply *quick*. Careful observation of the adults is the most effective way to gain confirmation of breeding. The most frequently used confirmation codes during the Atlas Project were those for parents with food (FY), 54%; recently fledged young (FL), 18%; and nest with eggs (NE), 14%.

Scarlet Tanagers return to Vermont by the second week (occasionally the first week) of May. Nest building is well under way by the fourth week of May. Eggs have been reported from May 25 to June 20 (12 records); nests with young have been reported from June 10 to June 28 (5 records); and fledglings have been reported from June 20 to August 3 (5 records). The nest is a loosely constructed platform of twigs and rootlets, lined with grasses, stems, and fine strips of bark. It is usually placed away from the trunk of the support tree and is well shaded and accessible to the parents (Prescott 1965). Nest heights of 17 Vermont nests averaged 10 m (33 ft) above ground, within a range of 2–17 m (6.5–56 ft). Out of 15 Vermont nests, more than 50% were located in conifers, predominantly hemlock. Clutch size ranges from 3 to 5 eggs, usually 4. Tanagers depart from Vermont in August and September; their autumnal movement peaks in mid September. Some linger into October in mild years; an extreme date is October 27.

The Scarlet Tanager is thinly but widely distributed through the deciduous and mixed woodlands of Vermont. The species was located in 94% of the priority blocks, with the lowest occurrences in the intensively farmed Champlain Lowlands (87% of the priority blocks) and the North Central region (79% of the priority blocks); relatively low occurrence in the former may be a result of forest fragmentation, while factors affecting the distribution of the species in the North Central region include some forest fragmentation and decreases in the abundance of favored tree species, such as beeches and oaks. Tanagers may have increased in numbers in Vermont over the last 50 years.



No. of priority blocks in which recorded

TOTAL 168 (94%)

Possible breeding:	24 (14.5% of total)
Probable breeding:	71 (42.0% of total)
Confirmed breeding:	73 (43.5% of total)

Physiographic regions in which recorded

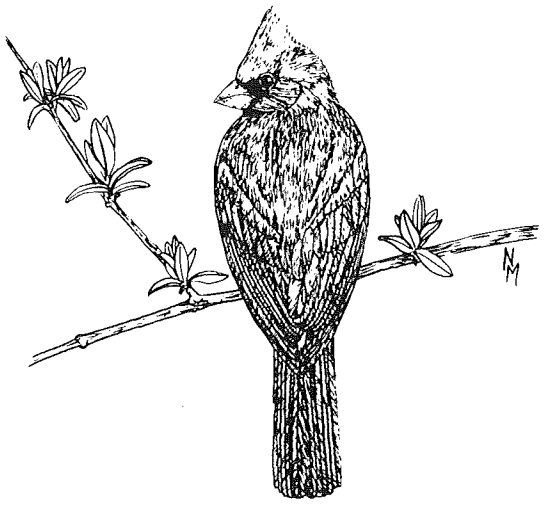
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	27	87	16
Green Mountains	53	98	32
North Central	15	79	9
Northeast Highlands	15	94	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	23	96	14

Ross (1914) and Fortner et al. (1933) indicated that the Scarlet Tanager was "not common" and "uncommon to rare" during the early 1900s. Reforestation probably explains its population increase in southern Vermont.

WALTER G. ELLISON

Northern Cardinal

Cardinalis cardinalis



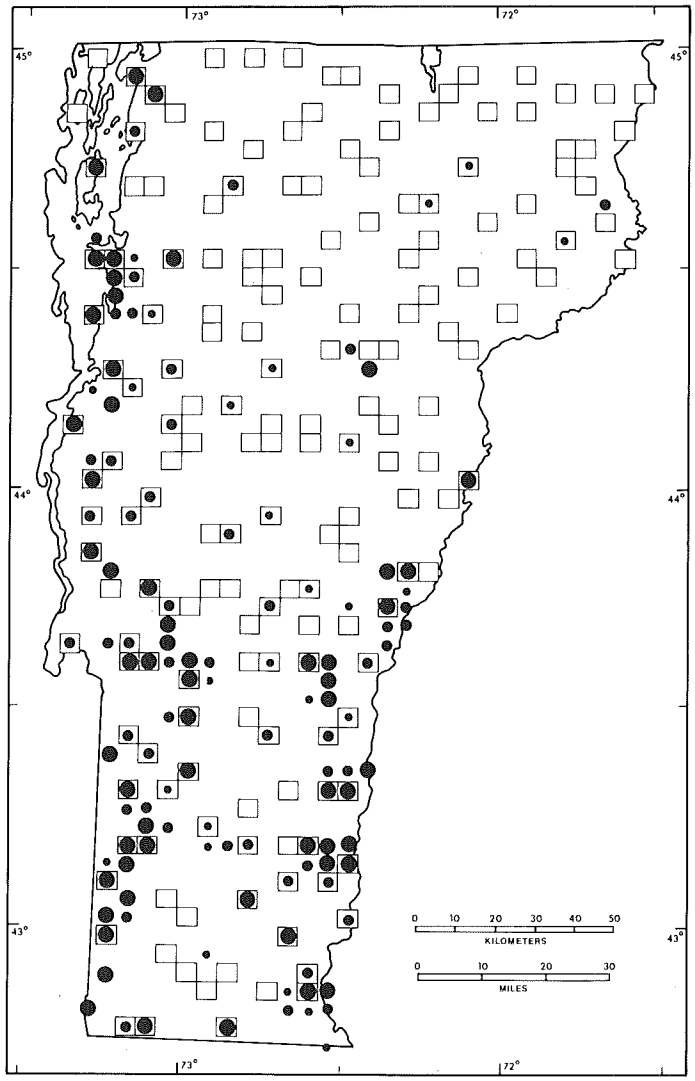
The Northern Cardinal inhabits the thickets, vines, and bushes associated with forest edges, residential gardens, parks, abandoned farms, open woodlands, and swamps. It is less common in deep forests unless thickets are present (DeGraaf et al. 1980).

The Northern Cardinal's range in Vermont has increased dramatically during the past 20 years. The increase is particularly evident in the Taconic Mountains and the Champlain Lowlands, as well as in the Eastern Foothills and the East Central region. The first documented record for a wild Northern Cardinal in Vermont was a male at a feeder in Montpelier during the winter of 1958 (GMAS records, D. H. Allen). Although Perkins and Howe (1901) mentioned specimens taken in Vermont, and Fortner et al. (1933) mentioned a sight record at Wells River, these authors believed the records to be of escaped caged birds. Cardinals were not sighted again until the Christmas Bird Counts of 1960–61, when one cardinal was sighted at Bennington, another at Burlington, and a third at Saxtons River (CBC 1960–61). The first nesting record was in 1962 in Fair Haven (GMAS records, F. H. Allen). By the Christmas Bird Counts of 1970–71, the numbers had grown to 53, 6, and 13 (CBC 1970–71); two decades later, during the winter of 1980–81, 80, 135, and 30 cardinals were counted respectively for the same three towns (CBC 1980–81). The cardinal's winter range seems to have been stabilized and sustained by the presence of birdfeeders (Bent 1968).

As the map indicates, the northward move of the Northern Cardinal in Vermont has involved expansion along river valleys as the breeding distribution and density has increased (RVB 1973–83). Beddall (1963) noted that such expansion may be more dramatic when population pressure leads to the invasion of a suitable area from which the species has previously been excluded by geographical barriers. Pairs and small groups of cardinals are becoming increasingly common at Vermont birdfeeders during the winter months. The breeding range of the Northern Cardinal in Vermont correlates with its winter range, which supports the observation that the cardinal is a nonmigratory species (Beddall 1963).

Both male and female sing, an unusual situation among songbirds, among which song is usually performed only by the male (Terres 1980). With the advent of spring, the male is heard singing his arrestingly loud song a week or two before the female begins singing.

The nest is normally built by the female. Usually well hidden, it may be located in evergreen or deciduous shrubs, vines, bushes, hedges, or saplings; it is seldom more than 6.1 m (20 ft) from the ground, most often in the 1.2–1.5 m (4–5 ft) range. The nest, a loose, sometimes untidy basket of weed stems, pliable twigs, and strips of bark, is occasionally lined with fine grasses and hair. Although the nest itself may take from 3 to 9 days to build, it is not until 5 or 6 days later that the first egg is laid. Three eggs constitute a normal clutch, though as many as 5 and as few as 2 are possible—fewer if the season is well advanced (Laskey 1944). Vermont has few nesting dates for cardinals: 4 egg dates range from May 15 to June 28; 3 nestling dates range from May 25 to July 7; and 2 fledgling dates are for June 18 and July 14. Eggs hatch 12 to 13 days after the last egg is laid; the female is



No. of priority blocks in which recorded

TOTAL 74 (41%)

Possible breeding:	14 (19% of total)
Probable breeding:	25 (34% of total)
Confirmed breeding:	35 (47% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	21	68	28.4
Green Mountains	14	26	18.9
North Central	2	10	2.7
Northeast Highlands	1	6	1.3
East Central	3	16	4.1
Taconic Mountains	15	94	20.3
Eastern Foothills	18	75	24.3

responsible for both incubation and brooding. The nestling period is from 7 to 11 days, but usually lasts 9 to 10 days, with the male assisting in the feeding and nest cleaning (Laskey 1944). The cardinal nest is parasitized by the Brown-headed Cowbird (Bent 1968).

If multiple broods are attempted by cardinals, the male cares for the fledglings while the female prepares a new nest. In Tennessee, Laskey (1944) noted that four nestings are not uncommon, while Bull (1974) reported that in New York State triple-broodedness is undoubtedly a factor in the cardinal's range expansion and success. The cardinal's range expansion into and within Vermont seems to presuppose double-broodedness, but data are presently lacking.

ROY W. PILCHER

Rose-breasted Grosbeak

Pheucticus ludovicianus

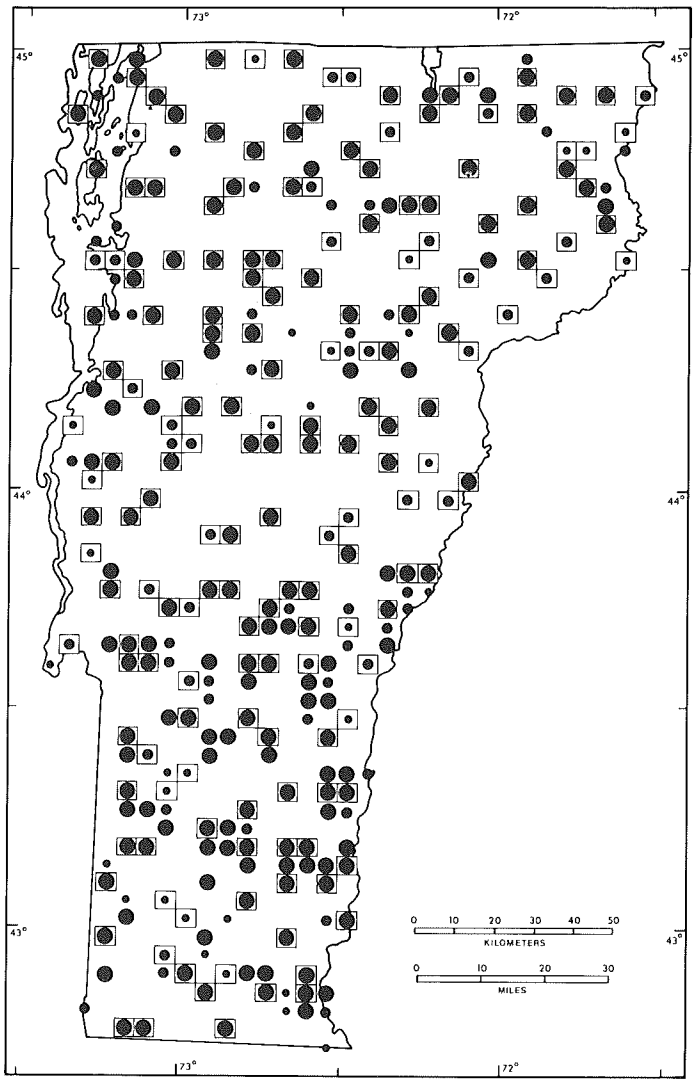
The Rose-breasted Grosbeak is one of the most widespread residents of deciduous forest and its edge in Vermont. While it is not as abundant as the less conspicuous Red-eyed Vireo or as well adapted to urban areas as the familiar American Robin, this handsome bird may be readily encountered in almost any part of the state. This species was one of seven that were represented in all 179 priority blocks. The broad climatic tolerance and distribution of these birds suggest that this species is close to the center of its range. The upper elevational limit of the Rose-breasted Grosbeak's range is about 765 m (2,510 ft).

Habitats utilized by Rose-breasted Grosbeaks are characterized by deciduous trees of medium to considerable height that form a canopy over a thick growth of tall shrubbery or saplings. These birds are also found in brushy ecotones at the edges of woodlands such as clear cuts, overgrown pastures, shrub swamps, and overgrown orchards. Tall trees are required for song perches and foraging. Nests at Hubbard Brook, New Hampshire were placed at a mean height of 14.5 m (47.6 ft) (R. Holmes, pers. comm.); the average height of 12 Vermont nests was 5.2 m (17 ft). The nest is often placed in the fork of a branch in a large tree, away from the bole (R. Holmes, pers. comm.); it is a loose platform constructed of sticks and weed stems, lined with grasses. Anderson and Daugherty (1974), in their study of hybridization in *Pheucticus* grosbeaks in South Dakota, found that nests above 4.6 m (15 ft) were more frequent in woodlots having poorly developed understories; they also reported that grosbeaks more than a year old distinctly preferred denser woods with well-developed understories.

The first Rose-breasted Grosbeaks return to Vermont during the first week of May. Location of pairs is made relatively easy by the male's melodious warbling song and bright coloration, as well as by the species' tendency to inhabit edges and to visit summer feeding stations. The low to medium height of the nest also facilitates confirmation. Males share incubation duties, and sometimes lead observers to the nest by bursting into song while still on the nest. Active nests provided the means of confirmation for 16% of the breeding grosbeaks recorded by the Atlas Project in Vermont. More frequently, parents carrying food or noisy family groups provided the means of confirmation (43% and 34%, respectively).

Eggs are laid in late May and early June in most cases; records from 10 nests in Vermont range from May 26 to June 28. Six records of nests with young extend from June 13 to July 12, and dependent young have been reported from June 21 to July 31 (16 records). Clutch size may range from 3 to 6 eggs, with 4 being most common. The species is single-brooded, although some pairs will renest when a clutch is destroyed during incubation. The autumn migration commences in August and peaks during early September. Most Rose-breasted Grosbeaks are gone by late September, but a handful of records extend into October. With the recent increase in popularity of winter bird-feeding, records of this quintessential summer bird have increased in the northeastern U.S. during winter. Rose-breasted Grosbeaks normally winter from central Mexico to northern South America.

Most early authors of accounts of Vermont bird life found Rose-breasted Grosbeaks at least locally common in deciduous



No. of priority blocks in which recorded

TOTAL 179 (100%)

Possible breeding:	20 (11.0% of total)
Probable breeding:	33 (18.5% of total)
Confirmed breeding:	126 (70.5% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17
Green Mountains	54	100	30
North Central	19	100	11
Northeast Highlands	16	100	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	13

forests at the turn of the century. Apparently the species experienced an adaptive shift early in this century or late in the 1800s: the number of Rose-breasted Grosbeaks increased as the species moved into suburban and farm habitats. Ross (1914) noted a distinct increase around 1910 in Bennington County. According to recent U.S. Fish and Wildlife Service Breeding Bird survey data (Robbins 1982b) the species is increasing at a rate of 10% a year in Vermont and 5.2% on the continent.

WALTER G. ELLISON

Indigo Bunting

Passerina cyanea

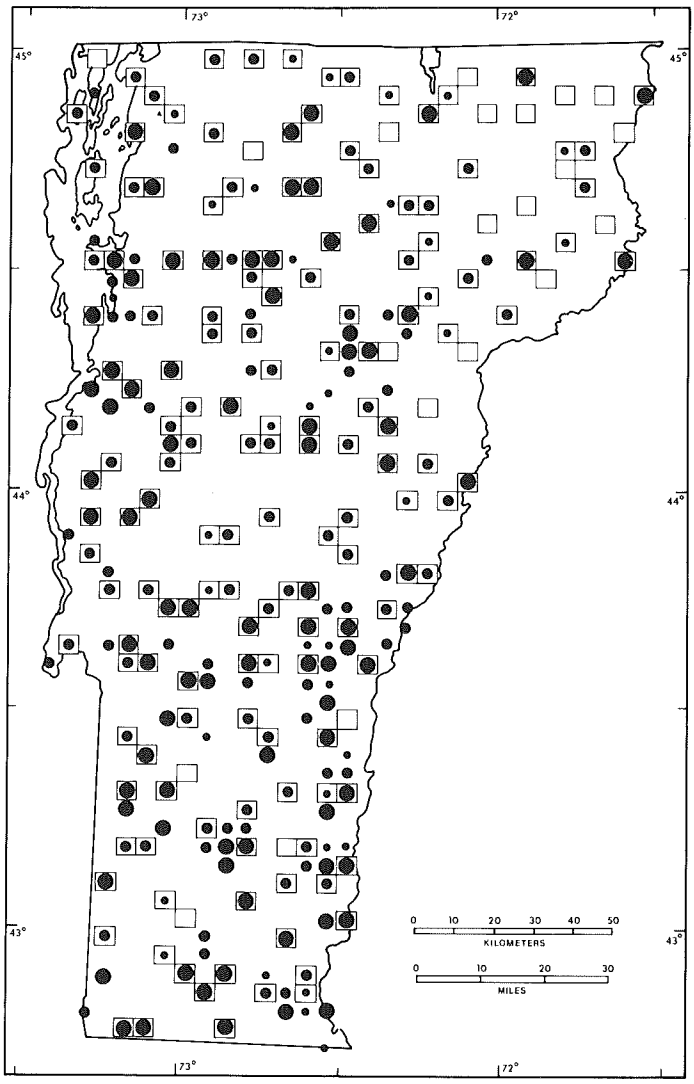
Indigo Buntings inhabit woodlands in early to middle successional stages of reforestation. Three factors seem to characterize the species' habitat selection: low, thick, often thorny shrubbery for nest sites; high song perches; and open areas for foraging. Common habitats include overgrown pastureland, edges of fields, hedgerows, clear cuts, burns, ski slopes, power line rights-of-way, and orchards. The species is apparently little affected by elevation, as it nests up to at least 1,067 m (3,500 ft) in the Taconic and Green mountains.

These birds are easily located. The brilliantly plumaged males sing incessantly from conspicuous high perches such as tall trees, shrubs, and roadside wires. Because of the species' song behavior and dependence on edge situations, the presence of breeding pairs can be detected from roadsides, and even from moving vehicles. Observation of distraction displays (DD) constituted 13% of Atlas Project confirmations for the species in Vermont; recently fledged young (FL), 24% of confirmations; and parents with food (FY), 45% of confirmations.

Indigo Buntings arrive in Vermont during the second and third weeks of May; an extreme early date exists for April 26. The cuplike nest is placed low, 0.6–3.7 m (2–12 ft) up in thick shrubbery, and is often well-protected by thorny vegetation such as briars (*Rubus* spp.), junipers, and hawthorns. It is constructed from grasses, rootlets, and other fibrous materials, sometimes even snake skins. Egg dates for 5 clutches range from June 8 to July 2. Clutch size in 4 Vermont nests ranged from 3 eggs (1 nest) to 4 eggs (3 nests). Nestlings were reported from June 25 to July 15 (four records). There are only two fledgling dates—June 25 and July 3. The species is considered double-brooded in New York State (Bull 1974), but data from Vermont and 30 clutches from Massachusetts (Bent 1968) seem to indicate that Indigo Buntings are single-brooded in New England.

Indigo Buntings depart from Vermont rather early; most of the autumn movement occurs in August, with a few individuals remaining to late September and, occasionally, into October. The species eats a variety of insects, seeds, and berries, and may visit feeding stations when weather is inclement.

The Indigo Bunting is common over much of Vermont. Earliest references for the state indicate that it was common during the first part of the twentieth century. Palmer (1949), however, cited a long-term decline in the Maine population from the late nineteenth century to the early 1930s; an increase in abandoned farmland reversed this trend midcentury. This assessment probably applies well to Vermont, with its similar history of clearing and reforestation. The Indigo Bunting becomes progressively scarcer in Vermont to the north and east. It was absent from 21% of Atlas Project priority blocks in the North Central region and 50% of the priority blocks in the Northeast Highlands. Its presence in the Northeast Highlands may be comparatively recent, as was its appearance within the central Adirondacks of New York, which occurred around 1947 (Bull 1974). The blocks in which the species occurs in the Northeast Highlands are in major stream valleys (Paul Stream and the Nulhegan River). The species may eventually expand into other areas of suitable habitat, such as maturing clear



No. of priority blocks in which recorded

TOTAL 158 (88%)

Possible breeding:	21 (13% of total)
Probable breeding:	71 (45% of total)
Confirmed breeding:	66 (42% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	30	97	19
Green Mountains	49	91	31
North Central	15	79	9
Northeast Highlands	8	50	5
East Central	17	89	11
Taconic Mountains	16	100	10
Eastern Foothills	23	96	15

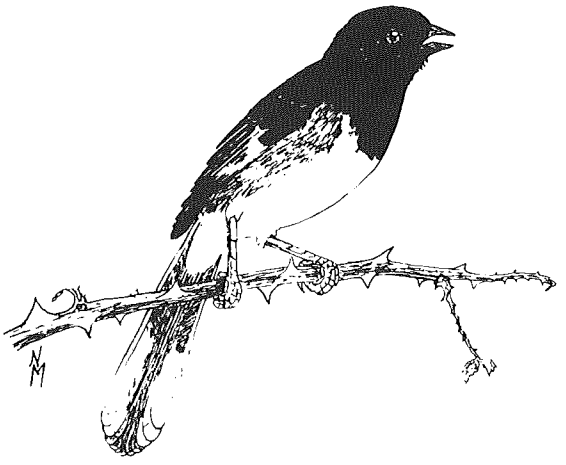
cuts, from its riparian strongholds in the region.

The indigo color so evident in the male's plumage is produced by the feathers' refraction of light rather than by pigment. During fall migration and winter these birds assume the same drab coloration as the females, belying their summer beauty.

WALTER G. ELLISON

Rufous-sided Towhee

Pipilo erythrophthalmus



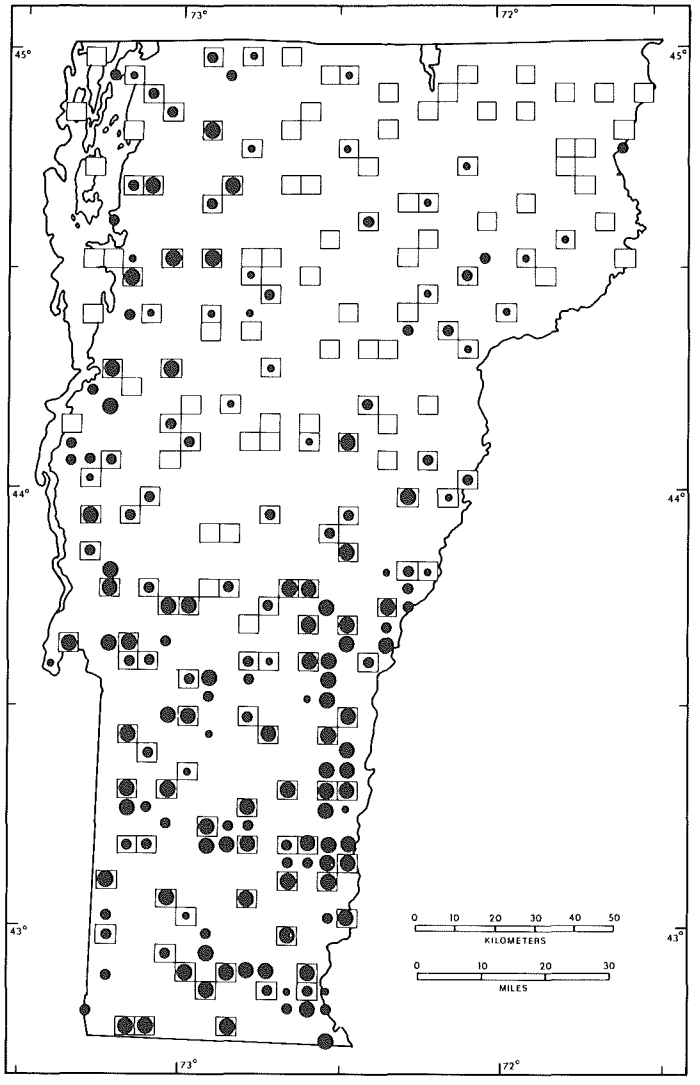
The Rufous-sided Towhee is a large, ground-foraging sparrow that inhabits the brushy ecotones associated with early forest regeneration, including an array of disturbed areas containing young woody plants. In Vermont, the species is most commonly encountered in overgrown pastureland, and also inhabits regenerating northern hardwoods in clear cuts, open selective cuts, burns, and caterpillar-damaged forest—wherever the dead crowns of trees allow a significant amount of sunlight to reach the forest floor, permitting raspberries and blackberries to grow up.

The Rufous-sided Towhee is usually first located by its voice. Both "towhee" and the vernacular name "chewink" are derived from its wheezy location call. Nests are usually built on the ground, and observers sometimes find them while trekking through brushy pastures. More than 15% of Atlas Project confirmations involved the discovery of a nest with eggs. Adults bearing food to their young accounted for 38% of the confirmed breedings, and recently fledged young provided 40%.

A few towhees return to Vermont in early to mid April, but most generally arrive around the fourth week of April or the first week of May. Nesting commences in mid to late May. The nest is usually built in a hollow in the ground under brush, an overhanging shrub, or herbaceous vegetation. Although large, it is a well-built structure of bark strips, leaves, weeds, and coarse grasses, lined with finer material including fine grass, conifer needles, or hair. On occasion, the nest is built in a shrub or small tree, usually at heights of less than 1.5 m (4.9 ft). Eggs have been reported from May 26 to June 19 (four records). Clutches range in size from 2 to 6 eggs; depending upon local conditions, clutches average from 3 to 4 eggs in size. There are no Vermont records for nests containing young; however, a nestling period from early June to the third week of July may be calculated from the species' 12- to 14-day incubation period and 10- to 12-day nestling period. There are nine reported records of dependent young ranging from June 19 to July 30. The late July date for fledged young implies that eggs may be laid into early July.

Over much of its range the Rufous-sided Towhee is double-brooded. Greenlaw (1978) found that in habitats where food was not abundant until late May second broods were rare. Since frosts often persist until late May in Vermont, it seems reasonable that only single broods are usually raised in Vermont. Towhees depart from Vermont in September; a few remain into October, and a rare few are encountered during the winter months, mostly at feeding stations.

The Rufous-sided Towhee is most frequently found in southern Vermont. The species is somewhat localized but common in suitable habitat at lower elevations in the Taconic Mountains and Eastern Foothills, where it was recorded in 100% of the two regions' priority blocks. It is uncommon in the southern Green Mountains, where it occurs in clear cuts and abandoned pastures, and where it is found up to 732 m (2,401 ft). The species has been reported at elevations up to 824 m (2,703 ft) in burns in the Adirondacks of New York (Carleton 1980). Towhees become progressively scarcer to the north and east in Vermont; they can be found throughout the Champlain Lowlands but are uncommon in the northern part of that region. They are apparently absent



No. of priority blocks in which recorded

TOTAL 115 (64%)

Possible breeding:	24 (21% of total)
Probable breeding:	39 (34% of total)
Confirmed breeding:	52 (45% of total)

Physiographic regions in which recorded

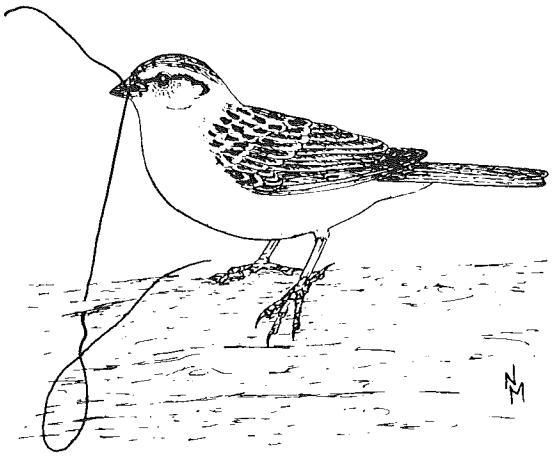
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	22	71	19
Green Mountains	32	59	28
North Central	5	26	4
Northeast Highlands	2	12	2
East Central	14	74	12
Taconic Mountains	16	100	14
Eastern Foothills	24	100	21

from Grand Isle County, and are very scarce in northeastern Vermont. There were no confirmations north of Orange County in eastern Vermont. Towhees were located in only 26% of the priority blocks in the North Central region and 12% of the priority blocks in the Northeast Highlands. The species' distribution was essentially similar in the early twentieth century (Allen 1909). U.S. Fish and Wildlife Service Breeding Bird survey data reveal a 5.1% annual rate of decline for the species in Vermont, and a slightly steeper rate of decline for the northeastern U.S. as a whole (Robbins 1982b). This decline appears to be related to loss of habitat as a result of urban development and reforestation. In Vermont, the latter trend is undoubtedly contributing to the species' decline.

WALTER G. ELLISON

Chipping Sparrow

Spizella passerina

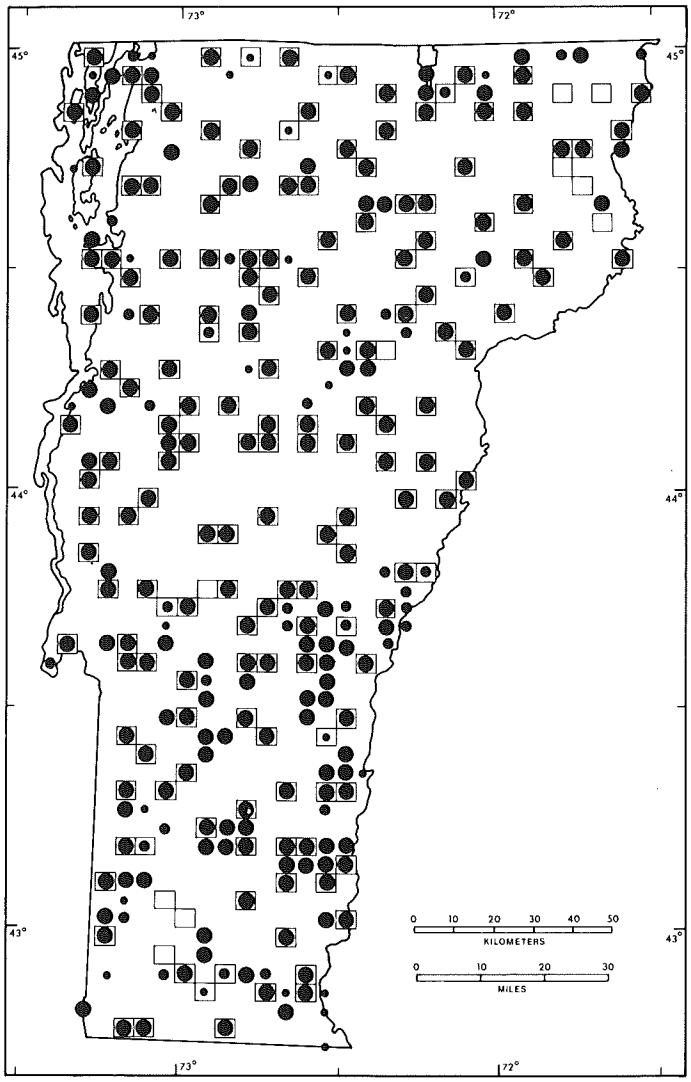


The Chipping Sparrow is one of the handful of native North American birds that has adjusted admirably to human alteration of the natural environment. This diminutive bird may be encountered in farmyards, orchards, the edges of fields, pastures, city parks, and suburban yards. In less settled areas these birds frequent burns, clear cuts, and the shores of lakes and streams. So well has the species fit into human settlements that it is far more common in these areas than in those that constituted its habitat before the Europeans' arrival. The Chipping Sparrow is common in summer from Canada and Alaska south through most of the U.S., and winters in the southern states from Maryland and Virginia south.

The Chipping Sparrow's close association with human dwellings makes it one of the easiest bird species to locate, as evidenced by its confirmation as a breeder in 92% of the Atlas Project priority blocks. During the breeding season its bright chestnut cap, white eyeline, and incessant song make the Chipping Sparrow one of Vermont's most readily identified sparrows. The song is a distinctive, monotonous, metallic trill, usually given from an elevated perch such as a tall tree, shrub, or wire. Most nests are placed rather low in shrubs and ornamental plantings; active nests (those containing eggs or nestlings) provided 24% of the confirmations in Vermont. Parents are often seen gathering prey for their young; food for young constituted 46% of the confirmed breedings. Fledgling "Chippies" are noisy and possess a distinctive streaked juvenile plumage; 23% of the confirmed breedings resulted from encounters with recently fledged young.

Chipping Sparrows arrive in Vermont in April, usually in the second and third weeks of the month. Nesting is under way by mid May. The placement of 21 Vermont nests was at an average height of 3.7 m (12 ft); nests built before June 15 were placed at an average height of 0.5 m (1.5 ft), and those built later at an average of 5 m (16 ft). Young conifers are preferred as nest sites, probably for the protection from wind and predation they often provide. The nest itself is constructed of grasses, stems, and rootlets, and is lined with hair. Before the automobile replaced the horse, the species preferred to line its nest with horsehair, but it has proved adaptable to the loss of this resource. The species appears to be double-brooded in Vermont; dates for 31 clutches range from May 19 to August 12. August clutches expose some bias in the data, as 7 nestling dates range from June 3 to August 6, and 29 dates for fledglings include reports from June 13 to only August 8, probably as a result of reduced observer coverage in late summer. Clutch sizes for 30 Vermont nests range from 2 eggs (one record) to 5 eggs (two records), with an average of 3.7 eggs. Chipping Sparrows begin their autumn departure in early September; autumn movement peaks in late September and October; a few individuals remain into November and, on occasion, into December (RVB, Winter 1973–83).

The Chipping Sparrow is a widespread and common bird in Vermont. It was located in 94% of the priority blocks, being missed in only 10 out of the total of 179. The only areas where this bird was markedly absent are those above 610 m (2,000 ft) and those that lack suitable forest clear-



No. of priority blocks in which recorded

TOTAL 169 (94%)

Possible breeding:	5 (3% of total)
Probable breeding:	8 (5% of total)
Confirmed breeding:	156 (92% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	18
Green Mountains	50	93	30
North Central	18	95	11
Northeast Highlands	11	69	7
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	14

ings. These two factors are characteristic of the 4 blocks in the Green Mountains and the 5 blocks in the Northeast Highlands in which the species was not recorded. Early distributional lists indicate that the species' status has changed little, although large areas of Vermont have been reforested over the last 50 years.

WALTER G. ELLISON

Field Sparrow

Spizella pusilla

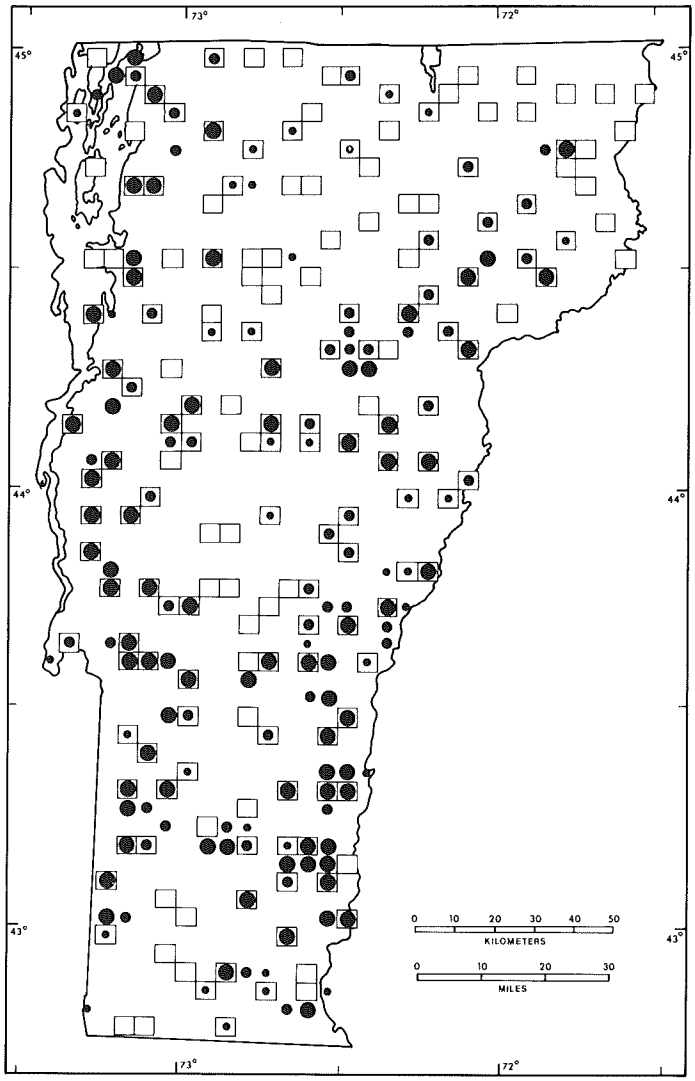
The Field Sparrow inhabits primarily overgrown and abandoned fields with scattered shrubs and saplings. Shrubs are used for foraging early in the nesting cycle and as late-season nest sites; open expanses of grass are used for early season nest sites and for foraging later in the summer (Best 1977). Old pastures with a large array of thorny plants are particularly well-suited to the Field Sparrow's nesting needs. Best (1977) postulated that nest sites are important in the selection of habitat. Evans's (1978) research supports this theory, as he found that when junipers were used as nesting substrates nesting success improved significantly.

The Field Sparrow is unobtrusive, the classic "little brown bird," and its far-carrying songs add to the background noise of a rural setting. Overgrown pastureland must be surveyed to locate nesting pairs. The song, one of the best clues to the bird's presence, is an accelerating series of mellow, whistled notes delivered in a descending cadence. Songs are usually given from a reasonably high perch. Singing tends to be most vigorous early in the breeding season; in late June, July, and August males sing only during the morning hours, and even then infrequently.

Pairs of Field Sparrows are generally double-brooded; for this reason, the breeding season is quite long, extending from mid May to early August. Early nests are placed on or near the ground, usually in a thick clump of dead grass stems and litter. Second nests are generally placed higher, sometimes as high as 1.2 m (4 ft) off the ground, in shrubs and saplings. The nest is constructed of grass and weed stems and lined with hair, fine grass, and rootlets. Because they are frequently placed in thorny vegetation and females sit tightly on them when brooding, nests are often difficult to find; nonetheless, 25% of the Atlas Project confirmations of breeding were records of active nests. More frequently, confirmation was obtained by locating adults carrying food for nestlings (41%) or locating recently fledged young (16%).

Field Sparrows are hardy birds, arriving in Vermont during the first week of April and, on occasion, in late March. Males arrive first and establish their territories; females return 1 to 3 weeks later. The birds commence nesting in May. Egg dates for five clutches in Vermont range from June 5 to July 14. Females with fully developed brood patches have been banded as early as May 20 (VINS banding data), evidencing an early May start to egg laying. Nestling data are lacking for Vermont. In New York State, young have been reported in the nest from late May to early August (Bull 1974). Dependent young have been reported in Vermont from June 18 to August 2. Field Sparrows depart for their southeastern U.S. wintering grounds in September, with autumnal movement peaking in October. The few individuals that attempt to overwinter rarely succeed.

Field Sparrows are often common in suitable brushy fields in southern and western Vermont. They have probably declined somewhat as young hardwood forests have invaded the farms abandoned 20 to 30 years ago. Vermont is at the northern periphery of the species' range. This distribution limit is apparent even in the warm and heavily agricultural Champlain Lowlands, where the species was found in just 55% of the 18



No. of priority blocks in which recorded

TOTAL 112 (63%)

Possible breeding:	24 (21.5% of total)
Probable breeding:	33 (29.5% of total)
Confirmed breeding:	55 (49.0% of total)

Physiographic regions in which recorded

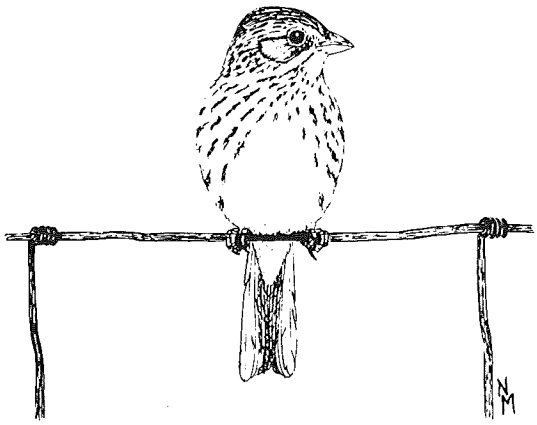
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	22	71	20
Green Mountains	23	43	21
North Central	9	47	8
Northeast Highlands	5	31	4
East Central	16	84	14
Taconic Mountains	16	100	14
Eastern Foothills	21	87	19

priority blocks from Burlington north; it was distributed in 92% of the 13 Atlas Project blocks south of that city. The species is less common in the Northeast Highlands and North Central region, where it was located in just 31% and 47% of the blocks, respectively, and in the Green Mountains, where it appeared in 43% of the priority blocks. The reasons for these distributional limits are unclear; they may have to do with climatic factors, although there appears to be no correlation between the species' distribution and regional parameters for temperature and precipitation.

WALTER G. ELLISON

Vesper Sparrow

Pooecetes gramineus

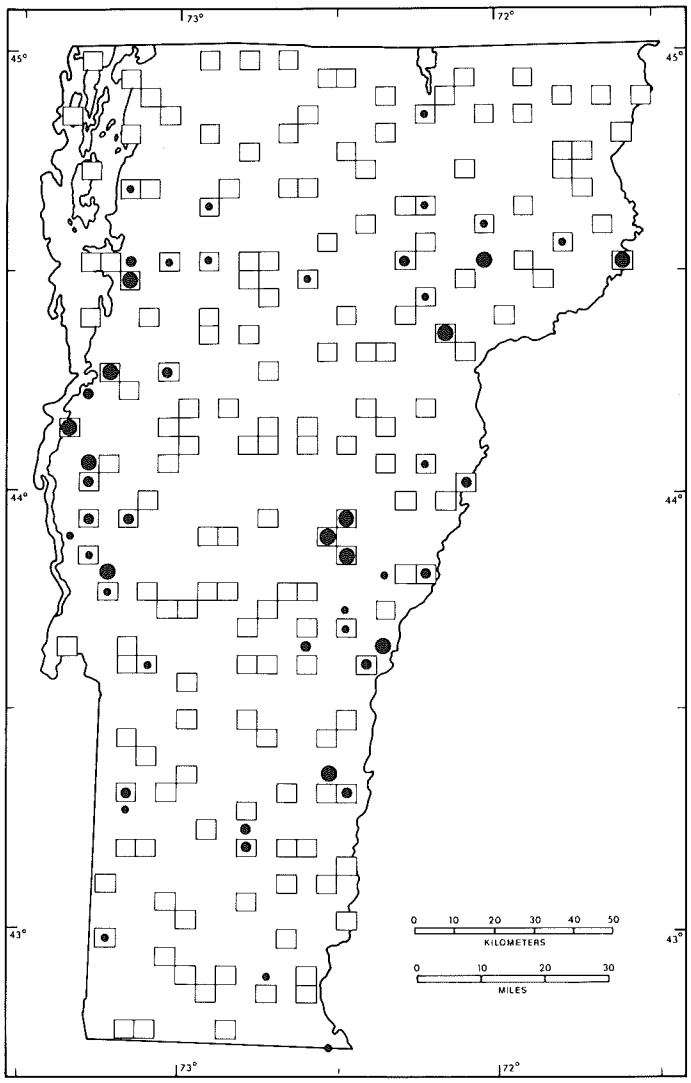


In Vermont the Vesper Sparrow inhabits overgrazed pastureland, gravel pits, and the edges of cultivated or dry hayfields. Wiens (1969) found in Wisconsin that the species showed a strong preference for dry, sparsely vegetated areas with fence posts for song perches. Song perches may also be provided by scattered saplings and shrubs (Wiens 1969). The Vesper Sparrow prefers dry areas and is found in upland localities; apparently it can do without a steady supply of water.

Vesper Sparrows return early to Vermont, usually in the first week and a half of April; the extreme date on record for a return is March 25. By mid April, males are on territory. Territories range up to 0.7 ha (1.8 a) (Bent 1968) or 0.9 ha (2.2 a) (Wiens 1969). Perched conspicuously, singing males are easily detected. The song consists of four slurred introductory notes, two low and two rising in pitch, which are followed by a complex, downward-spiraling series of trills that ends with a low rattle. In Vermont, the Vesper Sparrow is only sparsely distributed in suitable habitat, can be difficult to locate, and may have been overlooked in some Atlas Project priority blocks. Fewer than 30% of the Atlas Project records refer to confirmed breeding, but records of possible and probable breedings are more likely to represent unconfirmed breedings rather than transient birds. The well-concealed nest, placed in a hollow on the ground and usually protected by vegetation or other matter, may be found by systematically walking a territory until the sitting bird is flushed. Fledglings may be found in the same way, as they will explode rather like quail from under the searcher's feet. Forty-six percent of the confirmations were of fledged young.

Most Vesper Sparrows commence nesting in late April; eggs are laid in May. Egg dates from 13 Vermont records range from May 22 to June 29. Earlier and later dates probably occur, since records for other states indicate a more prolonged breeding period. The species is double-brooded; therefore the potential period for confirmation of breeding is lengthy, probably extending into August in some years. The size of the clutch is usually 4 eggs, but may range from 3 to 6. Thirteen Vermont clutches included 10 sets of 4 eggs each and 3 sets of 3 eggs each. Most autumn migration occurs during October; a few birds are found in November.

The Vesper Sparrow's status in Vermont and the Northeast has changed markedly over the last two decades. The species was considered common for much of the early twentieth century. Recent declines so alarmed northeastern observers that the species was given Blue List status in *American Birds* from 1976 to 1979; it remained a "local problem species" in the 1982 edition of the list. In their succinct review of the Vesper Sparrow's status in *American Birds*, Tate and Tate (1982) noted that a regional decline in the Northeast is confirmed by U.S. Fish and Wildlife Service Breeding Bird survey data, but that the species is not declining in western North America. It is well known from accounts of Vermont in the nineteenth and early twentieth centuries that the forests of Vermont covered only 20% of the area of the state at that time; sheep raising and dairy farming were then the most common agricultural enterprises. The Vesper Sparrow probably flourished in the overgrazed uplands of the state. When the wool industry declined and marginal farms were abandoned, forests returned to about 80% of the state's land area. As its



No. of priority blocks in which recorded

TOTAL 35 (20%)

Possible breeding:	16 (46% of total)
Probable breeding:	11 (31% of total)
Confirmed breeding:	8 (23% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	12	39	34
Green Mountains	2	4	6
North Central	6	31	17
Northeast Highlands	2	12	6
East Central	3	16	9
Taconic Mountains	4	25	11
Eastern Foothills	6	25	17

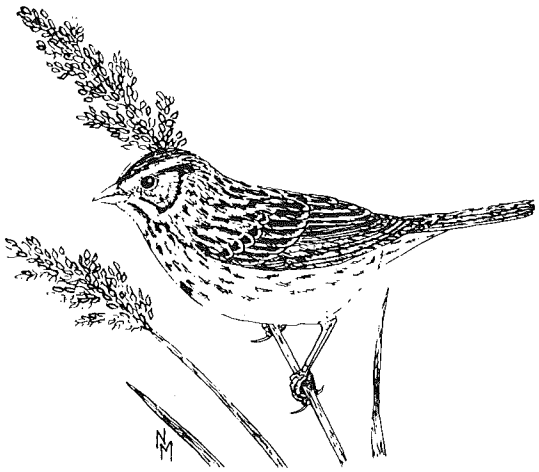
favored habitat declined, so did the Vesper Sparrow's numbers. If estimates of territory size are correct, areas of suitable habitat must be greater than 0.8 ha (2 a) to be capable of supporting even one pair.

Atlas Project records for the species revealed some interesting patterns in the Vesper Sparrow's Vermont distribution. Notably, 68% of the records may be ascribed to three physiographic regions of the state: the Champlain Lowlands (34% of the records), the Eastern Foothills (17%), and the North Central region (17%). These regions all possess extensively farmed areas. Despite its tendency to inhabit upland areas, the Vesper Sparrow is limited in some parts of the state to major river valleys, possibly because only the more successful farms located on the fertile bottomland soils have survived the decline in agriculture in recent years.

WALTER G. ELLISON

Savannah Sparrow

Passerculus sandwichensis

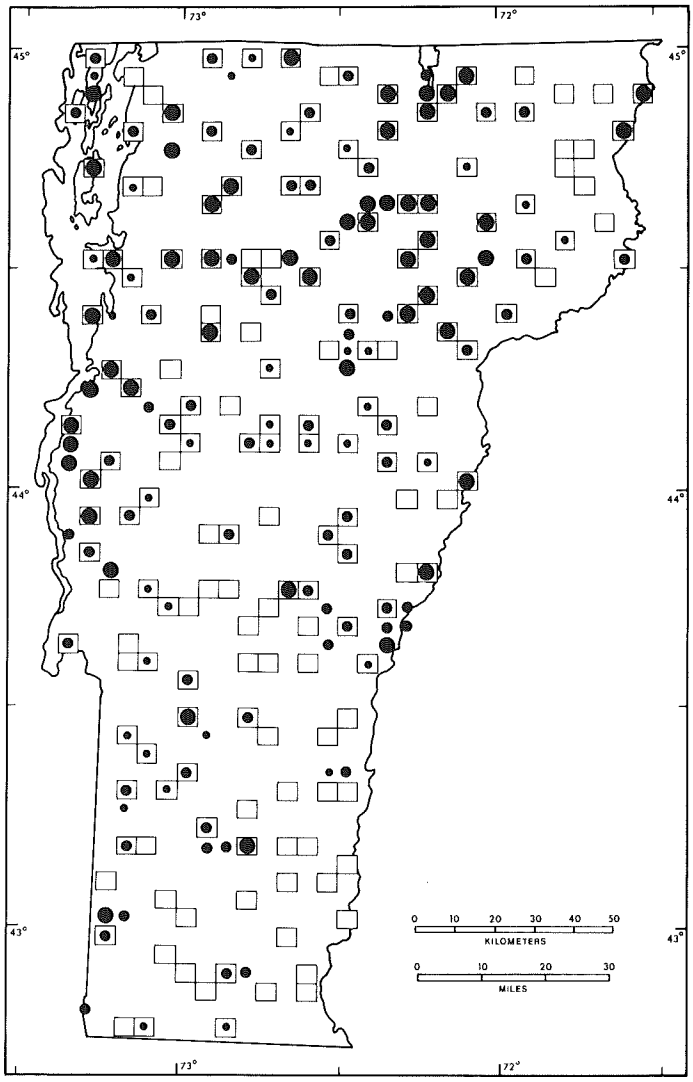


The Savannah Sparrow inhabits an array of open areas characterized by grassy vegetation, and ranging from upland tundra to temperate zone salt marshes. Within this broad variety of habitats and climates, Savannah Sparrows exhibit an equally broad array of morphological and plumage variations; as a result, 16 geographic races have been described by traditional taxonomists (AOU 1957). In Vermont, Savannah Sparrows occur in open, grassy areas, and favor hayfields and meadows in particular. The species avoids most areas having even a scattering of shrubs. Wiens (1969) found that Savannah Sparrows selected habitat similar to those of the Eastern Meadowlark and the Grasshopper Sparrow, preferring areas where cover and litter depth were of intermediate density. In later studies, Wiens (1973) found that Savannah Sparrows selected areas with greater litter depth, a higher percentage of grass cover, and lower densities of forbs than did Grasshopper Sparrows.

Savannah Sparrows are most easily detected by voice at dawn and dusk. The species tends to be a crepuscular singer, and the weak, insectlike song carries farther when there is less competition from other sounds. The pattern of the song is similar to that of the more familiar Song Sparrow: two high-pitched introductory notes, followed by a pair of descending trills. Once pairs are formed, the nest is hidden on the ground and is extremely difficult to find. During the Atlas Project, adults carrying food led to 52% of all confirmations of breeding in Vermont. Nestlings usually depart from the nest before they can fly, and are relatively easy to detect at that stage; recently fledged young accounted for 28% of Vermont nesting confirmations.

This species is among the earlier migrants returning to Vermont in the spring. Individuals may be seen during the first week of April, and some occasionally return during late March. Territories are established in late April and May. Occasionally, when favorable habitat is limited, the species nests in concentrations (Bent 1968). The first nests are probably constructed in early May. Nests are placed in a natural or artificial hollow under a protecting dome of vegetation, and are constructed of coarse grasses and mosses, with the central cup lined with hair, finer grasses, or rootlets (Harrison 1978). Egg dates are nonexistent for Vermont, but dates for surrounding states and provinces indicate a range from mid May to late July (Dixon 1978; Bull 1974). The eggs number from 3 to 6 per clutch; Dixon (1978) found an average of 4 eggs for 284 nests studied at Kent Island, New Brunswick. The Savannah Sparrow is double-brooded, and often will undertake a third nest if an earlier attempt is disrupted. The incubation period was reported by Dixon (1978) to average 12 days. The nestling period lasts 9 days (Welsh 1975; Dixon 1978). Five fledgling dates for Vermont range from June 27 to July 16. Savannah Sparrows are late fall migrants, generally not departing until mid to late October; in mild years, some may be seen into early winter. In the east, Savannah Sparrows winter along the Atlantic coast from central Nova Scotia south to Central America (AOU 1983).

Atlas Project workers found the Savannah Sparrow to be common in the North Central region and northwestern Vermont and



No. of priority blocks in which recorded

TOTAL 113 (63%)

Possible breeding:	28 (25% of total)
Probable breeding:	46 (41% of total)
Confirmed breeding:	39 (34% of total)

Physiographic regions in which recorded

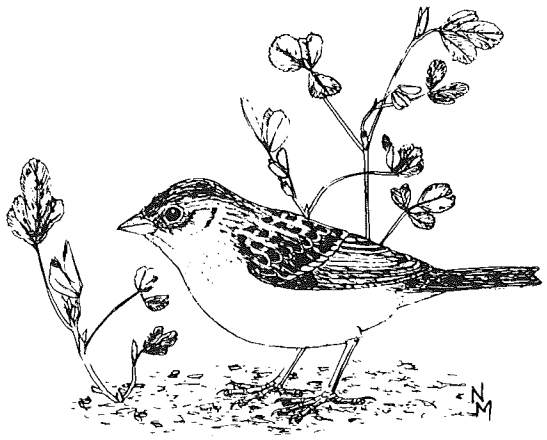
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	27	87	24
Green Mountains	30	55	27
North Central	18	95	16
Northeast Highlands	7	44	6
East Central	14	74	12
Taconic Mountains	11	69	10
Eastern Foothills	6	25	5

present locally in the Taconic Mountains, but apparently absent from much of south central and southeastern Vermont. In 1907, Davenport considered it common, "abundant in the hill country," in Windham and Bennington counties. The second obvious gap in the Savannah Sparrow's distribution is the central Northeast Highlands, where the species has been excluded by the lack of grassland habitat. In all probability, there has been a significant decrease in the species' abundance in much of Vermont since the 1800s.

WALTER G. ELLISON

Grasshopper Sparrow

Ammodramus savannarum



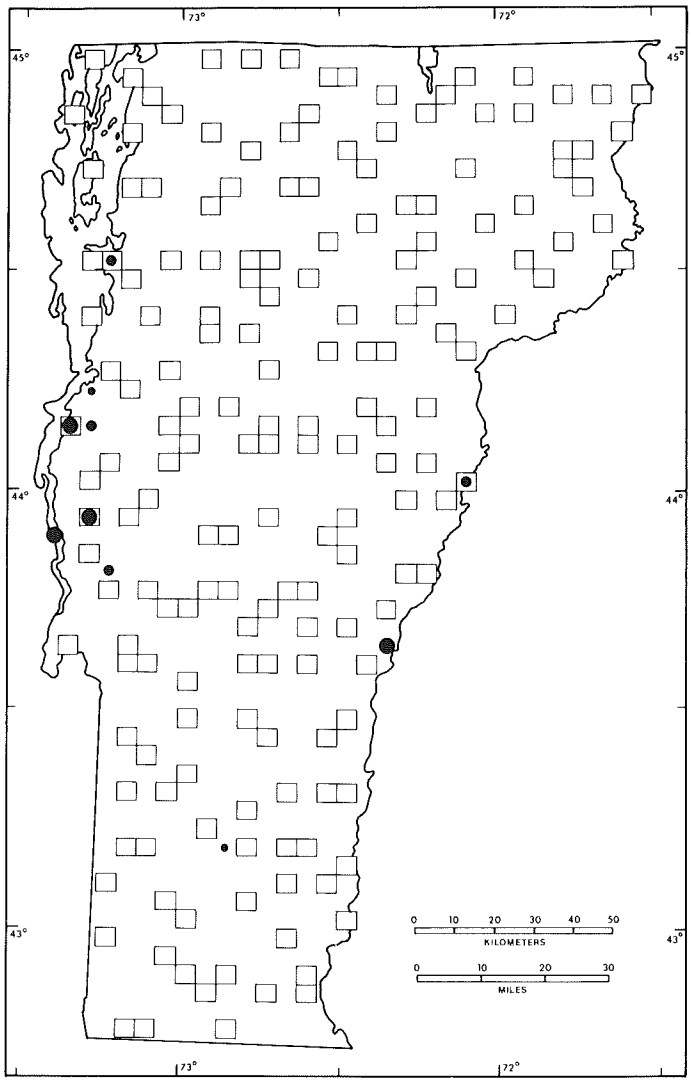
Grasshopper Sparrows are typically found in relatively sparse, open, dry grasslands whose key characteristics, according to Wiens (1969, 1973), include patchy and relatively thin plant litter and short, narrow-leaved grass cover with a good representation of forbs. Whitmore (1979) calculated optimal conditions for the species during a study of birds inhabiting reclaimed surface mines in West Virginia; these included 73% litter cover, 24% bare ground, and 28% grass cover. Patches of clover or alfalfa appear to be a constant in fields inhabited by Vermont Grasshopper Sparrows. Johnston and Odum (1956) noted that in Georgia the species was absent from fields with greater than 35% shrub cover. Another factor that probably influences habitat selection is the presence of song perches, as males prefer to defend their territories from a commanding position.

Grasshopper Sparrows are often difficult to detect. Their song is high-pitched and undistinguished, poorly differentiated from those of surrounding insects. The species tends to stay out of sight in the vegetation, venturing into the open only to sing. The most reliable method of locating these birds is to survey appropriate fields on foot. Confirmation of breeding is difficult, although nests may be detected when a sitting bird is flushed. Sometimes the parents may be seen carrying food, and the inconspicuous fledglings may occasionally be flushed by an observer. The song, which consists of two high, sharp *tics* followed by a dry-toned buzz, is one of the first to go unheard when an observer loses high-range hearing. Another, longer song consists of a burst of complex squeaky trills.

This species returns to Vermont somewhat later in the spring than other grassland sparrows, usually appearing during the first weeks of May; occasional individuals turn up in April. Although there are Vermont data on only three clutches, egg dates range from May 30 to August 6. The size of Vermont's three clutches ranged from 3 to 6 eggs; clutches usually number 4 or 5 eggs (Harrison 1978). There are no nestling dates for the species in Vermont. Fledglings have been reported from July 28 to August 8. Grasshopper Sparrows sing into August, but their departure from Vermont is poorly documented. Presumably most leave in September. There is a single December record for the species.

The Grasshopper Sparrow has the dubious distinction of being one of 30 continentwide species to appear on *American Birds*' Blue List for reasons of chronic, noncyclic decline. Tate and Tate (1982) reported a decline "from the Dakotas and Nebraska east to New York and Maryland," and Grasshopper Sparrow is proposed for Species of Special Concern status in Vermont. Smith (1963) noted that while the species is notorious for its population fluctuations, early cutting for silage causes this sparrow to abandon fields during nest building. Haying later in the season apparently does not have this effect, though it often exposes nests to predation and the elements and disrupts territorial boundaries.

Vermont has apparently always been at the northern periphery of the Grasshopper Sparrow's range. Early authors (Allen 1909; Forbush 1929; Fortner et al. 1933) indicated that the species was a rare to uncommon summer resident in southern and western Vermont; this remains an accurate assessment of the species' current status. Atlas Project records indicate that the Grass-



No. of priority blocks in which recorded

TOTAL 4 (2%)

Possible breeding:	0 (0% of total)
Probable breeding:	2 (50% of total)
Confirmed breeding:	2 (50% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	3	10	75
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	1	4	25

hopper Sparrow is largely limited to the Connecticut River valley and Champlain Lowlands, although it is very rare and sporadic in the former. The species is native to warm temperate climates largely south of Vermont; therefore it is interesting to note that its Vermont breeding distribution (probable and confirmed Atlas Project records) is entirely below the 20° C (68° F) isotherm for July.

WALTER G. ELLISON

Song Sparrow

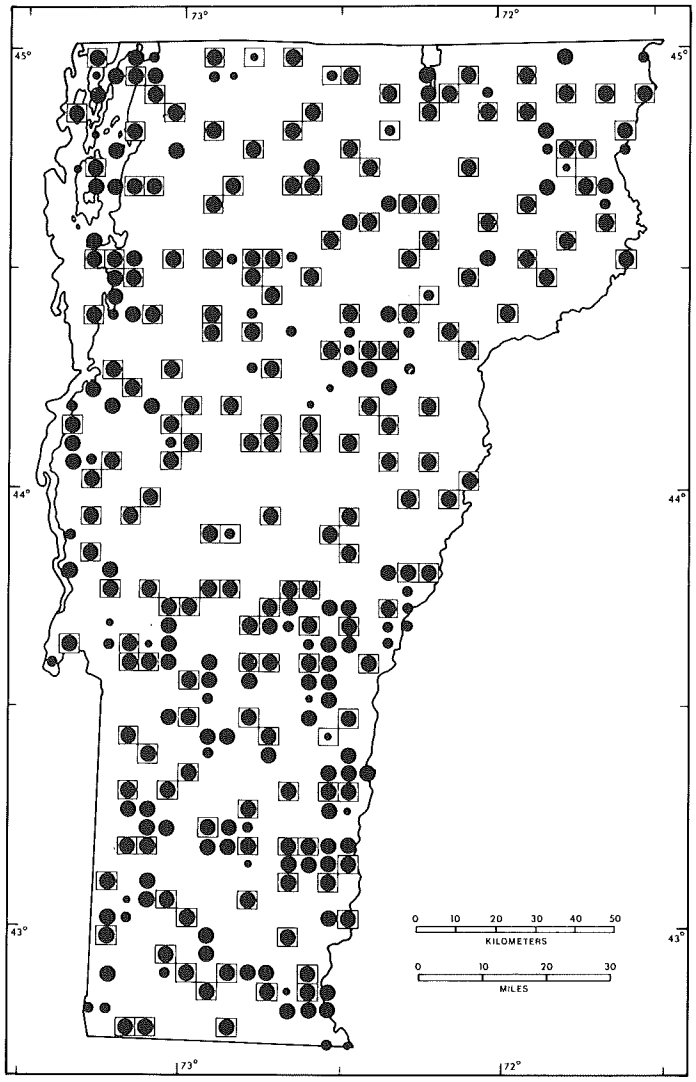
Melospiza melodia

"This is one of our most common and familiar sparrows," Zadock Thompson wrote in 1842 about the Song Sparrow, and his statement remains true in Vermont today. Indeed, the Song Sparrow is familiar and abundant across North America, with some races resident and some migrant (Nice 1937). Breeding habitat includes brushy areas with water nearby, overgrown fencerows, and shrubby areas bordering gardens and yards (Nice 1937). The diet consists of insects and weed seeds, with a higher proportion of insects in the summer (Nice 1937).

During the Atlas Project, the Song Sparrow occurred in 100% of the priority blocks and was confirmed as a breeder in 96%. Song Sparrows annually overwinter in Vermont in small numbers; for migrants, spring arrival dates are early to mid March, and fall departure is by the end of October (RVB 1972–83).

The males establish their territories through their tuneful, persistent, and variable song, and through fighting (Nice 1937), and are strongly territorial throughout the breeding season. As is usual in songbird courtship, the females are attracted to the male's territory. Nice's (1939) detailed studies of the Song Sparrow chronicle the life of a male who occupied the same geographic area for 8 years, had 11 mates through those years, and only once had the same mate 2 years in succession. The size of a pair's territory is usually less than 0.4 ha (1 a) (Bent 1968). One of the male's courtship activities is "pouncing" on the female: suddenly flying down and hitting her and then flying off while singing loudly (Nice 1937).

In Vermont, nest building has been observed as early as April 23 (1977, in Wallingford). The nest is constructed entirely by the female (Nice 1937), and takes from 5 to 10 days to build, depending on the weather (Bent 1968). The nest is relatively simple; it is built largely of dead grasses and weeds, with a few fine roots and pieces of grapevine bark, and is lined with fine grasses or hair. The nest is located either on the ground or at an elevation of 0.6–1.2 m (2–4 ft) in weeds or a small tree or bush. The diameter varies, depending on whether the nest is located on the ground or above it; the nests above ground are considerably larger. Usually, the nests earlier in the season are on the ground and those later in the season are above the ground (Nice 1937). Many nests are placed on the ground under a tuft of grass, a bush, or a brush pile (Bent 1968). The timing of egg laying correlates with spring temperatures, with April 25 being the average date in Ohio (Nice 1937). In Vermont, nests with eggs have been found between May 1 and August 19 (52 nests). Clutches average 4.1 eggs (Nice 1937) in a range of 3 to 6; the average Vermont clutch was 4.6 eggs in a range of 3 to 6 (42 clutches). Incubation of the reddish-speckled, pale green to greenish white eggs averages 12 to 13 days (Nice 1937); the male defends the territory and nest site while the female incubates. Nests with young have been located in Vermont between May 22 and August 4 (22 records). The young leave the nest at about 10 days of age, before they can fly (Nice 1937); they can fly at 17 to 20 days (Stokes 1979). Re-



No. of priority blocks in which recorded

TOTAL 179 (100%)

Possible breeding:	3 (2% of total)
Probable breeding:	4 (2% of total)
Confirmed breeding:	172 (96% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17
Green Mountains	54	100	30
North Central	19	100	11
Northeast Highlands	16	100	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	13

cently fledged young have been observed in Vermont between June 11 and July 31 (20 records). Song Sparrows regularly attempt three or four nestings a year, and some raise three broods (Nice 1937). The first egg of the second clutch may be laid as early as 6 days after the first brood fledges; the male feeds the first brood while the female incubates (Stokes 1979).

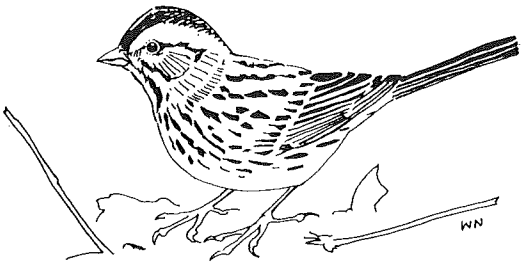
Nest parasitism by the Brown-headed Cowbird is a major factor in Song Sparrow nesting failure; the Song Sparrow's nest is a favorite site for cowbirds throughout the Song Sparrow's range. Nesting success is much lower in a parasitized nest (Nice 1937).

As might be expected, the Song Sparrow has apparently always been considered one of the more common species in Vermont (Allen 1909), and remains one of the most common and well-distributed species in the state.

GEORGE F. ELLISON

Lincoln's Sparrow

Melospiza lincolnii

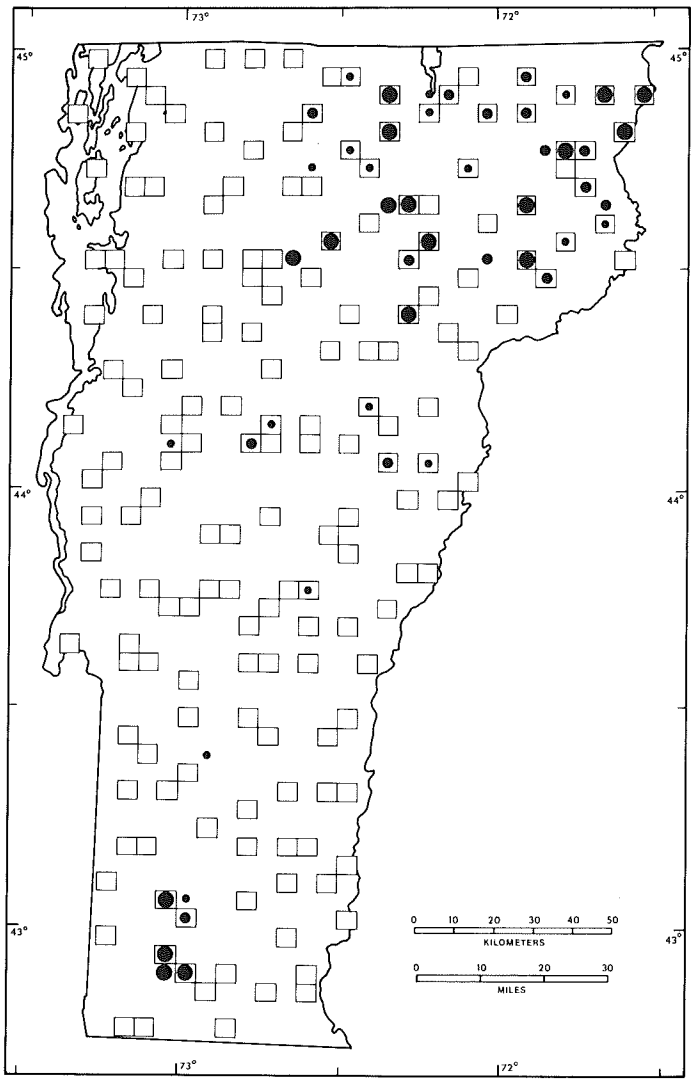


Lincoln's Sparrows are most familiar to birders from spring and fall migrations. This sparrow's shy and retiring nature causes it to appear less common in Vermont than it actually is. The Atlas Project has shown it to be a more widely distributed breeder than was previously suspected, for it is another one of those northern species whose presence in Vermont is frequently unmentioned (see Forbush 1928; AOU 1957; Bent 1968). Lincoln's Sparrows are fairly common nesters in the Northeast Kingdom and are local and rare in suitable habitat in other parts of the state. Breeding Lincoln's Sparrows in the southern Green Mountains are restricted to isolated patches at higher elevations. They prefer places that are often wet underfoot, and inhabit shrubby pastures, overgrown grassy meadows, open sphagnum bogs, beaver ponds, and scrub-grown power line rights-of-way, as well as brushy blowdowns, logging scars, and burnouts. Lincoln's Sparrows are primarily edge-dwelling birds, and are found in open areas interspersed with thick, low cover. Alder and willow, meadowsweet and steeple-bush, aspen and birch, and larch, spruce, and fir are frequently found in many sparrow territories.

Lincoln's Sparrows spend most of their time on or near the ground and seldom venture far into the open. At first alarm they disappear with the alacrity of a mouse, and they are exceedingly difficult to flush. Palmer (1949) related that four Lincoln's Sparrows were unintentionally captured in mouse traps near Mt. Katahdin; the trappers never saw a live bird during their 4-month visit. Spears and Spears (Bent 1968) stated that most of the literature about the Lincoln's Sparrow deals with its occurrence, migratory behavior, and song, and that much remains to be learned about its breeding biology. In part a result of the species' elusive behavior, this lack of information undoubtedly also results from the inaccessibility of much of its wide breeding range. These sparrows nest from Alaska and Canada south to California and northern New England. Lincoln's Sparrow was named after Thomas Lincoln from Dennysville, Maine, who collected the first specimen in Labrador while traveling with Audubon in 1833.

First spring arrivals of Lincoln's Sparrows in Vermont are usually recorded during the second week of May, and most of the migrants pass through by the third week. The birds are on territory soon thereafter. Males are rather conspicuous vocally at this time, and are often located by their bubbling House Wren-like songs. They sing from the ground or from hidden perches or, occasionally, in the open. As the breeding season progresses, the agitated behavior of adults makes them increasingly apparent. They respond well to squeaking sounds made by the observer. The easiest way to confirm breeding is by watching for parents with food.

The nest is difficult to find because it is built into the ground and is carefully concealed by surrounding vegetation. None were discovered in Vermont during the Atlas Project. The nest is a neat cup of dry grasses lined with finer grasses, and is often placed on a mound of sphagnum (Harrison 1975). The 4 to 5 pale green or buff eggs are thickly spotted with reddish brown and lavender. They hatch in 13 to 14 days, and are incubated only by the female (Harrison 1978). In Sunderland, fledglings were found as early as June 14. Both adults feed the young insect matter. The young leave the nest in 10 to 12 days (Bent 1968). Birds remain in the nesting vicinity until late August, and begin their southward movement by early Sep-



No. of priority blocks in which recorded

TOTAL 39 (22%)

Possible breeding:	12 (31% of total)
Probable breeding:	12 (31% of total)
Confirmed breeding:	15 (38% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	13	24	33
North Central	9	47	23
Northeast Highlands	14	87	36
East Central	3	16	8
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

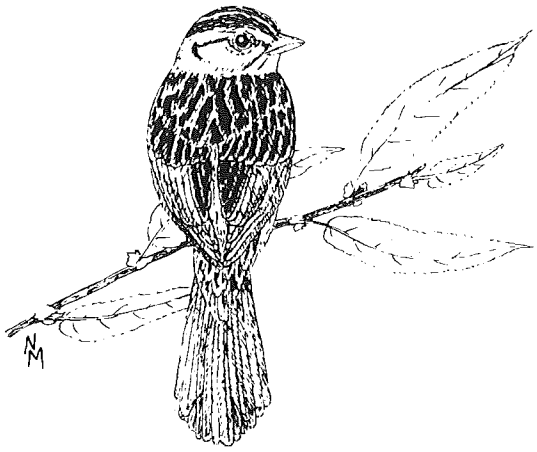
tember. At this season they are more common and are somewhat more easy to detect than at other times of the year. Lincoln's Sparrows winter from the Gulf Coast states and California south to Guatemala. Little is known about the Lincoln's diet; it probably consists of insects in summer and seeds for most of the rest of the year.

The Atlas Project documented a considerable southern range extension for the species by locating breeding populations in Somerset (ASR, D. P. Kibbe), Woodford (ASR, W. G. Ellison), and Glastonbury (ASR, D. P. Kibbe) in the southern Green Mountains. Probably Lincoln's Sparrows have nested in these areas for some time, and because of their elusiveness have gone unnoticed. Utilization of man-made edge such as powerline cuts is a relatively recent phenomenon and may have contributed to this sparrow's southern range extension.

WHITNEY D. NICHOLS

Swamp Sparrow

Melospiza georgiana



The Swamp Sparrow inhabits freshwater marshes, swamps, bogs, wet meadows, and the low swampy shores of lakes, slow-moving streams, and rivers. It nests across eastern North America to the Great Plains. This reticent bird is not easily seen except when singing (Bent 1968; Reinert and Golet 1979). Except when migrating, it rarely flies more than a few dozen yards at a time, or more than a few feet above the tops of grasses.

Swamp Sparrows first arrive in Vermont about mid April; their migration peaks in mid May. The males appear first. Their territorial songs are given from a conspicuous position on an alder, willow, or cattail (Bent 1968). The principal habitat requirements seem to be shallow standing water, low dense cover, and elevated songposts (Reinert and Golet 1979).

The female Swamp Sparrow usually builds the nest alone. At least 50% of the species' nests are placed directly over standing water (Reinert and Golet 1979); nests are almost never built on the ground. They are usually built between cattail stalks, or upon clumps of stalks and leaves, and are frequently hidden from above by broad, dead leaf blades. Nests may also be built in green sedge tussocks. The nest is generally entered from the side. The foundation and the thick outer cup are built entirely of tightly woven coarse, dead marsh grasses, sedges, and cattails. The lining is made of fine round stems of grass and similar vegetation (Bent 1968).

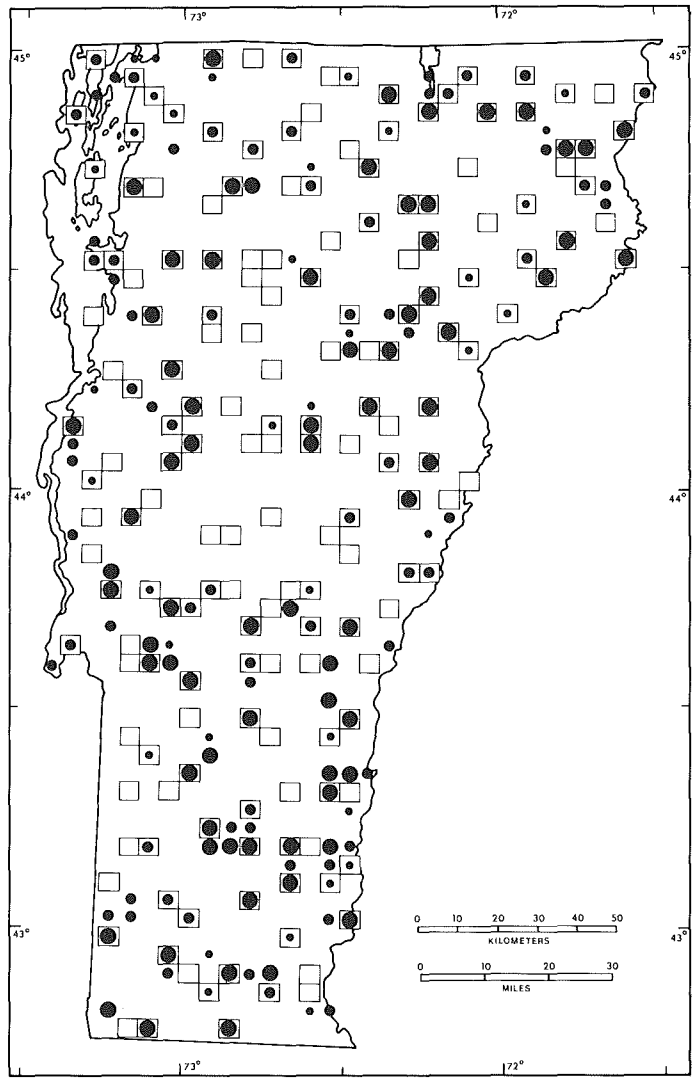
Swamp Sparrows lay from 3 to 6 (usually 4 or 5) ovate, slightly glossy eggs (Bent 1968); six records in Vermont indicate egg dates from May 28 to June 11. Egg color is usually a pale green that fades to greenish white upon exposure (Bent 1968); eggs are spotted and blotched with red-brown. Swamp Sparrow eggs are practically indistinguishable from those of the Song Sparrow. One clutch per season is usual, although sometimes two are laid (Harrison 1975).

Incubation is performed by the female and usually lasts 12 to 13 days (Harrison 1978). The male feeds the female on the nest while she broods. Once hatched, the young ordinarily remain in the nest about 7 to 11 days. A nest with young was observed on June 22 in Vermont; fledglings have been seen between June 18 and July 13 (six records).

The Swamp Sparrow is one of the most highly insectivorous species of the genus *Melospiza* (Bent 1968). In winter, 55% of its diet consists of insects; in spring and early summer, 88% of the diet is insects. In late summer and fall the diet becomes 84% to 97% granivorous. Much of the feeding is done by wading in shallow water and picking insects and seeds from the surface.

Fall migration in Vermont occurs between the last week of September and the last week of October. At this time the Swamp Sparrow may be observed in all types of habitat except deep woodlands, but is most frequently found among weed-grown fields and hedges. The species occurs rarely in Vermont in winter.

The Swamp Sparrow was observed breeding in all seven physiographic regions of the state. It was least well represented in the northern half of the Green Mountains, where topography is most severe and marshes are scarce. Swamp Sparrows were located in 64% of the Atlas Project priority blocks, confirmed in 51% of those blocks, and found to be probable in another 31% of the



No. of priority blocks in which recorded

TOTAL 114 (64%)

Possible breeding:	21 (18% of total)
Probable breeding:	35 (31% of total)
Confirmed breeding:	58 (51% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	22	71	19.3
Green Mountains	33	61	29.0
North Central	14	74	12.3
Northeast Highlands	13	81	11.4
East Central	11	58	9.6
Taconic Mountains	8	50	7.0
Eastern Foothills	13	54	11.4

blocks. Feeding young (FY) was the code most frequently used for confirmation of nesting. Swamp Sparrows should maintain their status in Vermont, as long as the wetlands they depend upon for nesting habitat continue to exist.

GEORGE F. ELLISON

White-throated Sparrow

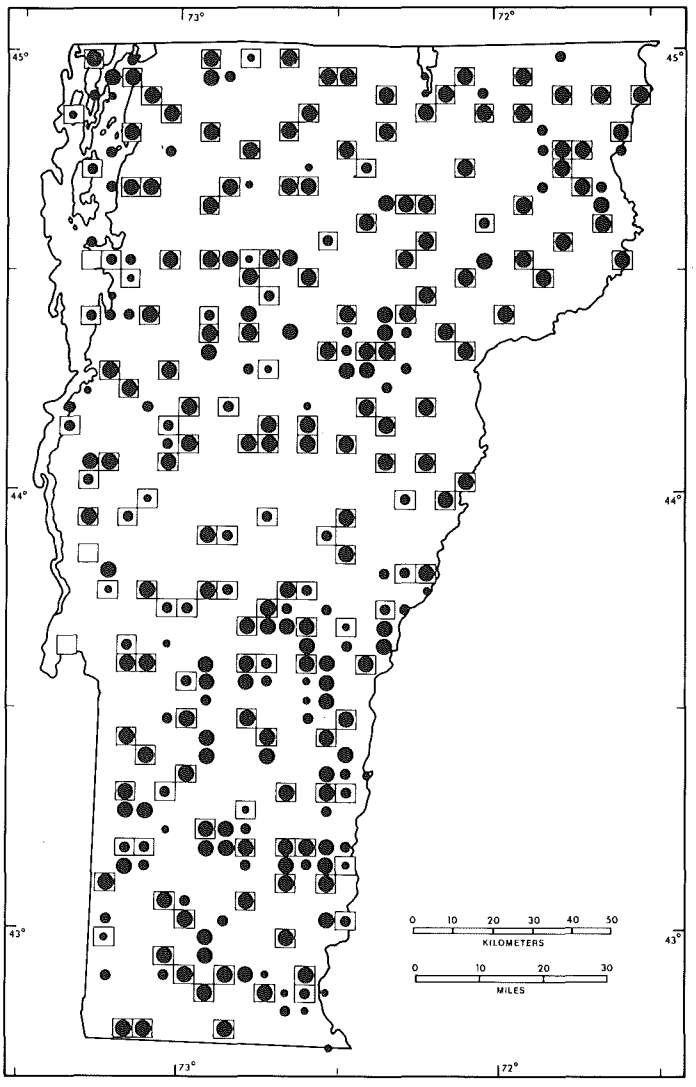
Zonotrichia albicollis

The White-throated Sparrow inhabits brush and thickets at the edges of coniferous and mixed woodlands. The species exhibits a broad environmental tolerance, and can be found at elevations from about 1,220 m (3,990 ft) to the shores of Lake Champlain (28 m [92 ft]). Some representative habitats are subalpine scrub at tree line; the edges of bogs; clear cuts and open, selective cuts; and brushy, abandoned pastureland. The species is polymorphic, and individuals may possess either tan- or white-striped crowns (Lowther 1961). Knapton and Falls (1982) found that males with tan-striped crowns tend to occur in relatively higher numbers in densely vegetated, less open habitats than do males with white-striped crowns.

The distinctive voice of this species is usually the first indication of its presence. The clear, plaintive, whistled song, *Poor Sam Peabody, Peabody, Peabody*, is a familiar sound in Vermont. The song consists of a series of low-pitched, sweet whistles—the first often lower in pitch than those following—that ends in two or three slurred triplets. The advertising song is delivered from a high perch, often the top of a conifer; whisper songs are given on the ground (Wasserman 1980). Nests are well-hidden, and are most often placed on the ground, usually beneath low shrubbery or slash having a canopy of dead herbaceous vegetation. However, a prominent sentinel perch is often near the nest (Lowther and Falls 1968), and when an observer is in the vicinity of the nest the female usually slips off of it and begins scolding loudly; this generally attracts the male, who quickly joins in. Parents carrying food accounted for 39% of the Atlas Project confirmations for the species. Fledglings are noisy and relatively easy to track down; recently fledged young constituted 34% of the confirmations. Largely because of parental wariness, active nests provided fewer than 20% of the breeding confirmations.

A handful of White-throated Sparrows overwinter in Vermont, but most depart from the state for winter quarters in the southeastern U.S. Most return in early to mid April, although at high elevations return is usually delayed until May. Egg dates for 18 clutches range from May 27 to August 1. Clutch size may range from 3 to 5 eggs, with 4 the average. According to Lowther and Falls (1968), late clutches are usually the result of failed first nests rather than examples of second broods. Dates for nestlings are from June 13 to August 11 (4 records), and dependent young are known from June 19 to July 24 (19 records). The early cutoff in nestling and fledgling dates may reflect a lack of late summer fieldwork by observers. White-throated Sparrows commence autumn migration in late September; the autumn flight peaks in October. Many White-throats linger into November and early December.

The White-throated Sparrow was recorded in 98% of the Atlas Project's 179 priority blocks. It is common over much of the state, and is very common in the Green Mountains, North Central region, and Northeast Highlands. The species is less common in the Champlain Lowlands, especially on the western fringe of the region. All three of the priority blocks from which the species was absent were in this area. The warm, dry climate and open landscape near Lake Champlain are not well suited to the species' habitat preferences. Forbush (1929)



No. of priority blocks in which recorded

TOTAL 176 (98%)

Possible breeding:	11 (6% of total)
Probable breeding:	32 (18% of total)
Confirmed breeding:	133 (76% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	28	90	16
Green Mountains	54	100	31
North Central	19	100	11
Northeast Highlands	16	100	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	13

and others indicated that the White-throated Sparrow was unknown at elevations below 305 m (1,000 ft) early in this century. Bull (1974) found that since 1950 White-throated Sparrows have expanded into lowland sites in upstate New York from their montane strongholds. Considering the present distribution of the species in Vermont, the same trend may have occurred in this state as well.

WALTER G. ELLISON

Dark-eyed Junco

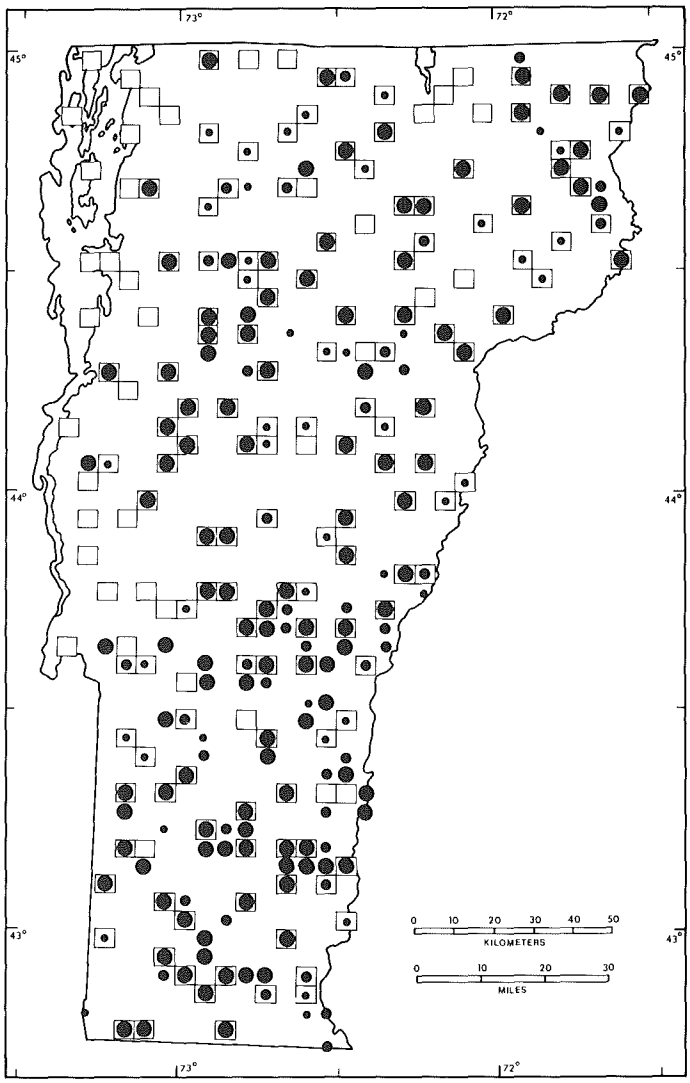
Junco hyemalis

The Dark-eyed Junco that occurs in Vermont belongs to the "slate-colored" subspecies, and inhabits edge and small openings in coniferous and mixed woodlands. The species prefers areas with strongly sloping land and forest floors that are cluttered with boulders, fallen trees, or brush. A suitable nest site appears important to habitat selection. The junco is a ground nester, placing its nest in a hollow either in a bank or cliff face, or under fallen timber, brush, or thick herbaceous or shrubby vegetation (Bent 1968). For the most part, juncos forage on or near the ground (Sabo 1980), but they require conspicuous song perches. Males are often seen singing on the highest spire of a conifer. The climatic tolerance of this species at Vermont's latitude is quite broad; it ranges from elevations of 150 m to more than 1,220 m (500–4,000 ft) in the Green Mountains. The species appears to be best adapted to cool, moist climates, and is most numerous at high elevations where there are fewer competitors (Able and Noon 1976; Sabo 1980).

Because the males habitually use high singing perches, song presents the best way to detect these birds. The song is generally a slow, musical trill. Variations occur, ranging from a harsh buzz to a rapid, metallic trill not unlike that of the related Chipping Sparrow. Juncos often place their nests along trails and logging roads. When an observer passes close to a nest or young birds, the parents become quite agitated, give a sharp smacking call, and put on various display postures such as tail flicking and bill cleaning. Females will sit tightly on the nest until nearly trod upon. Because nests are frequently by trails, some 32% of the species' total confirmations by the Atlas Project were from nests. Parents carrying food (38%) and recently fledged young (26%) also provided means of confirmation.

A few Dark-eyed Juncos are seen during the winter in Vermont, mostly in southeastern and southwestern parts of the state. Migrants do not return to nesting territory until March or April. The species is double-brooded; sometimes a third clutch is laid if one of the first two is unsuccessful (Smith 1934a). Eggs have been found in Vermont from May 5 to August 7. The eggs are bluish white with thick red-brown spotting at the large end. Eggs number from 3 to 5 per clutch; 68% of 19 Vermont clutches contained 4 eggs. The incubation period lasts 12 to 13 days (Bent 1968). Young have been noted in the nest from May 30 to August 17, and fledged young have been located from June 14 to September 4. The nestling period ranges from 10 to 13 days; dependent young remain with parents for about 3 weeks (Bent 1968). Most juncos depart from Vermont from late October to mid December.

The Dark-eyed Junco is common over most of its Vermont range. Atlas Project data reveal that juncos are most widespread in the Green Mountains (96% of the priority blocks) and the Northeast Highlands (100% of the priority blocks). Juncos have essentially the same distribution and numerical status today as was reported during the first half of this century (Ross 1906a), although they may now be more frequent at elevations below 305 m (1,000 ft) with the recent reforestation of farmlands. This species is found largely in the regions of coolest climate and highest average elevation in the state, probably because of its habitat re-



No. of priority blocks in which recorded

TOTAL 138 (77%)

Possible breeding:	34 (25% of total)
Probable breeding:	17 (12% of total)
Confirmed breeding:	87 (63% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	10	32	7
Green Mountains	52	96	38
North Central	11	58	8
Northeast Highlands	16	100	12
East Central	17	89	12
Taconic Mountains	10	62	7
Eastern Foothills	22	92	16

quirements: the distribution of favored coniferous forests and woodlots is largely limited to areas of high relief and low average temperature. Significantly, the species' distribution in the Champlain Lowlands is limited to such prominent hills as Snake Mountain, Mt. Philo, and Arrowhead Mountain.

WALTER G. ELLISON

Bobolink

Dolichonyx oryzivorus

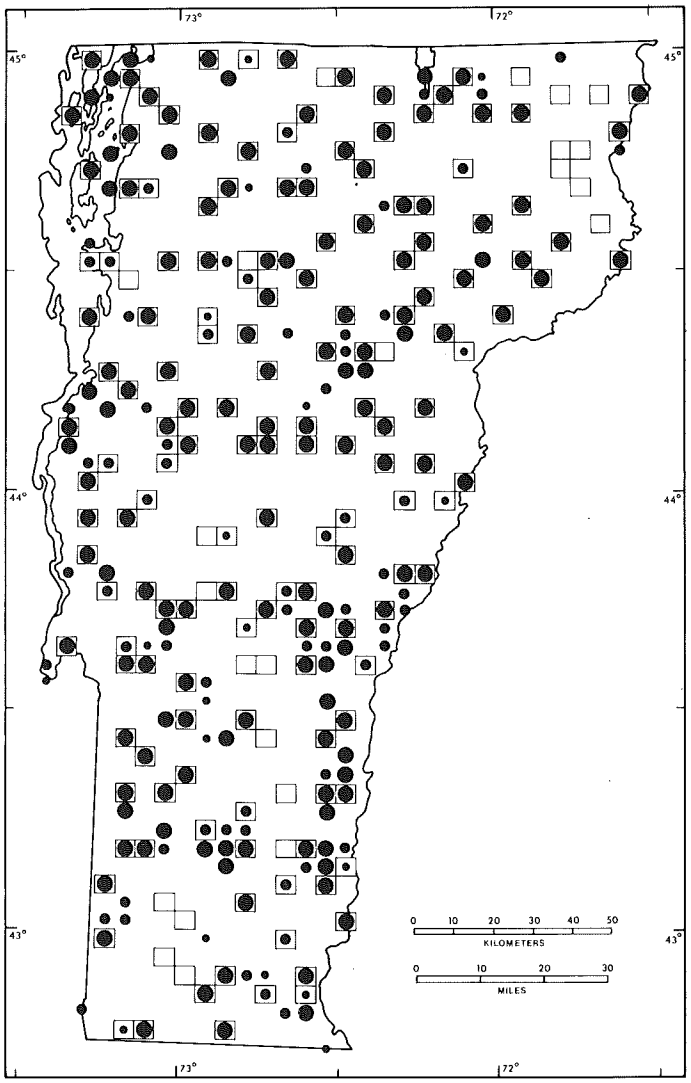
The Bobolink inhabits extensive fields with dense herbaceous cover. The species is most commonly encountered in hayfields, but it will also inhabit grain and alfalfa plantings and weedy, fallow fields. Bobolinks avoid extensive shrubby growth, and areas having large amounts of willow, alder, or spiraea are generally not used. Sufficient ground cover to protect the carefully hidden nest and the young, which apparently depart the nest before they can fly well, is vital.

The Bobolink is a long-distance migrant, wintering from southwestern Brazil south to northern Argentina. It returns to Vermont in early May; an extreme early arrival date is April 26. Males on territory are easily detected by their exuberant, bubbly songs, often given in flight, and by their constant pursuit of other males and of the rather drab, sparrowlike females that arrive later. Bobolinks are loosely colonial; polygynous males usually mate with two or more females. Territories, like those of the related Red-winged Blackbird, appear to be centered around the nest site. Foraging takes place away from the site in surrounding fields. The nest is built in late May on the ground, in a hollow under thick vegetation. Locating a nest is very difficult, as the inconspicuous female will land some distance away and walk to it. Consequently, data have been collected on only six clutches in Vermont; their dates range over a 3½-week period from June 6 to July 1. The species is easily confirmed when young are in the nest and directly after fledging by watching for parent birds carrying food. During the Atlas Project the species was frequently confirmed. The species has potential high productivity, commonly laying clutches of 5 or 6 eggs. Such productivity may in part allay the typically high losses common to ground-nesting species. Fledgling dates from Atlas Project data range from June 26 to July 23 (five records).

After the young have been raised in mid to late July, Bobolinks gather in flocks as the males molt out of their conspicuous buff, black, and white plumage into the female-like winter plumage. The autumn migration commences in late July and peaks in late August; flocks often frequent cornfields, marshes, and fields of reed canary grass. The Bobolink is generally gone by late September, although there are a few October records, including an extreme late date of October 24.

In Vermont, where the dairy industry persists, the Bobolink is a common bird. Few hayfields in the state are without at least one pair of these entertaining birds. There has been considerable concern for the species over the last 50 years as a result of changes in the harvesting practices of dairy farmers, who now cut hay and "green feed" two to three times in a summer, sometimes starting as early as late May. Although these practices might be expected to effect a population decline in the Bobolink, there has been no decline in Vermont, where the species seems to return each year in undiminished numbers. Nest losses resulting from early haying are apparently compensated for by renesting efforts.

In coastal New York, the species has become uncommon or rare as a result of the increasing encroachment of development



No. of priority blocks in which recorded

TOTAL 156 (87%)

Possible breeding:	9 (6% of total)
Probable breeding:	22 (14% of total)
Confirmed breeding:	125 (80% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	30	97	19
Green Mountains	43	80	28
North Central	18	95	12
Northeast Highlands	8	50	5
East Central	19	100	12
Taconic Mountains	16	100	10
Eastern Foothills	22	92	14

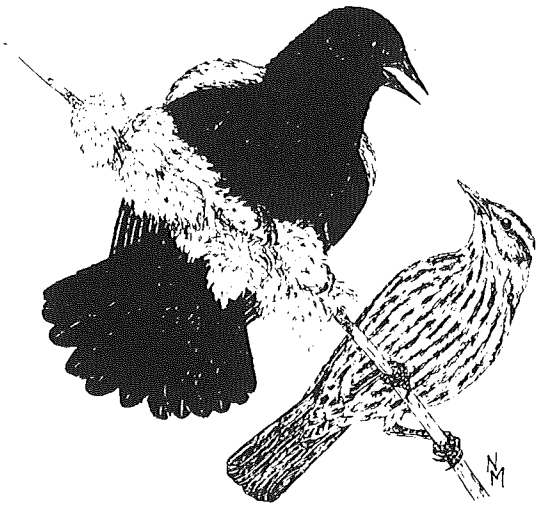
on suitable habitat and of changes in farming (Bull 1974). The Bobolink should be carefully monitored in Vermont, as such changes may eventually alter much of this state as well.

Although the Bobolink occurred in 87% of the priority blocks, it was generally absent from elevations above 765 m (2,500 ft) and from heavily forested regions, such as the broad southern portion of the Green Mountain range and the Northeast Highlands; there it was present only on the western periphery and in the Connecticut River valley.

WALTER G. ELLISON

Red-winged Blackbird

Agelaius phoeniceus



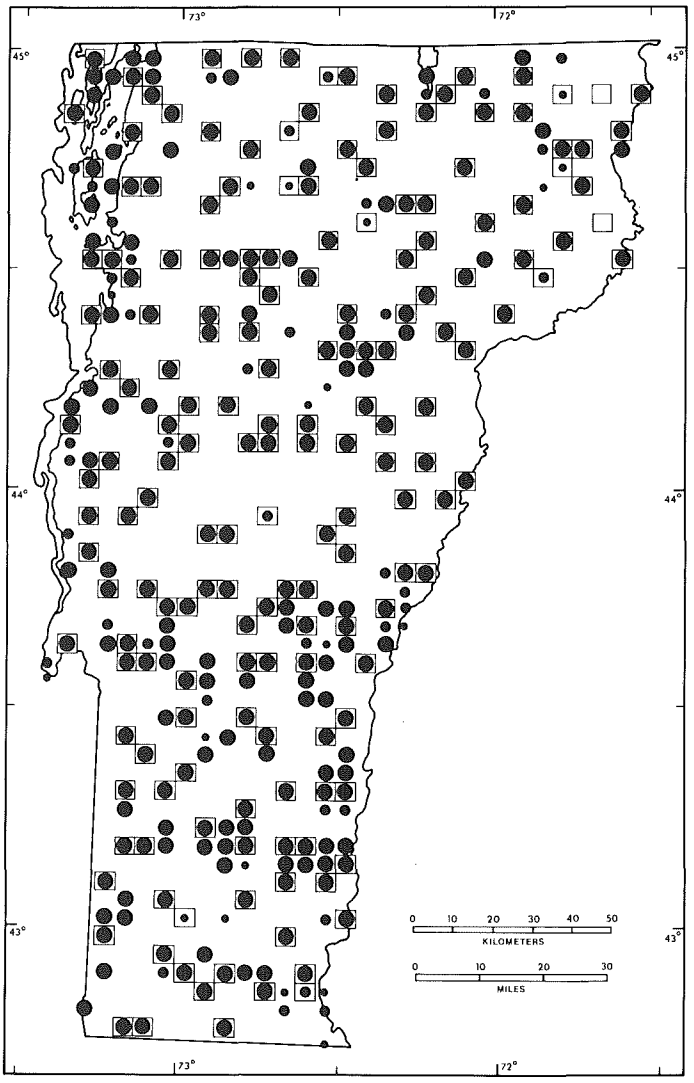
The Red-winged Blackbird is one of the most recognizable and conspicuous of Vermont's breeding birds. Red-wings were located in 99% of the 179 Atlas Project priority blocks. The species was only absent from 2 priority blocks, in the wilds of Essex County. The Red-wing has apparently been common as far back as there are avian records for the state. Thompson (1853) alluded to crop damage by Red-wings, implying a troublesomely abundant species.

The Red-winged Blackbird inhabits open areas with tall, dense, grassy vegetation and, often, scattered shrubs. Abundant food resources in areas surrounding the territory are prerequisite (Orians 1961). The Red-wing has traditionally been considered a bird of marshes and other open wetlands. In the 1930s and 1940s observers noted that Red-wings were beginning to breed in drier habitats in uplands, such as hayfields, abandoned pastureland, and fallow fields. The species still occurs in higher densities in wetlands, where its territories are smaller, ratios of females to males are higher, and breeding productivity is apparently higher than in upland situations (Case and Hewitt 1963; Robertson 1972, 1973a, and 1973b). Albers (1978) found that consistent characteristics of Red-wing territories include tall, dense vegetation, the presence of habitat edge, and trees or tall shrubs for song perches.

Territorial male Red-wings usually appear in Vermont during mid March. Territorial behavior is limited to the early morning and evening in late March and April; during midday, Red-wings gather in wide-ranging foraging flocks. Conspicuous territorial displays include song spread—spreading the wings and tail and exposing the vermilion lesser coverts while emitting a characteristic, harsh, trisyllabic song; song flight—a fluttering flight with the coverts exposed, often ending with a short glide that is usually accompanied by the primary song; and bill tilting—a behavior typical of the Icterinae in which birds elevate their bills while facing each other (Nero 1956).

Females return to breeding territories in early April. Females apparently select breeding locations according to habitat quality rather than the behavior of males (Orians 1980). Nest building commences in early May. Dates for 89 nests with eggs in Vermont range from May 14 to July 3, with a peak in nesting activity indicated for the fourth week in May. The eggs are pale blue with dark scrawling usually concentrated at the large end; sets number from 1 to 6 eggs. The average number of eggs in 83 Vermont clutches was 3.9; most studies have found averages from 3.5 to 4.0 eggs (Orians 1980). Incubation normally takes 11 days. A small proportion of the females have second broods; many late clutches probably result from renesting, which is frequent (Nero 1956; Case and Hewitt 1963).

Red-winged Blackbirds are polygynous; ratios of females to males in marshes range from 1.9 to 7.6 (Orians 1980). Nests with young have been reported in Vermont from May 30 to July 2 (16 nests). Active nests provided 37% of the breeding confirmations in Vermont. The young fledge most often at 10 or 11 days. Dependent young have been reported on 11 dates from June 12 to July 28 in Vermont. Fledglings accounted for 16% of the confirmations. Females, and males when the young have fledged, are



No. of priority blocks in which recorded

TOTAL 177 (99%)

Possible breeding:	5 (3% of total)
Probable breeding:	5 (3% of total)
Confirmed breeding:	167 (94% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17
Green Mountains	54	100	30
North Central	19	100	11
Northeast Highlands	14	87	8
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	14

often encountered with food for their young; parents with food for young accounted for 39% of the confirmations.

The Red-winged Blackbird's nest is a deep structure of sedge, grasses, cattails, and rootlets twined around supporting vegetation. The nest is built in tall, sturdy vegetation, and early nests are placed in dead emergent or woody vegetation. Red-wings also utilize a wide variety of weeds, trees, and shrubs for nest sites. The nest is strengthened with mosses and lined with fine grasses and sedges. Thirty-nine Vermont nests were placed at an average height of 38 cm (15 in).

In late July and early August Red-wings gather in large roosts in preparation for the autumn migration. Migration peaks in October. Most Red-wings winter in the southeastern U.S., but a few remain in Vermont for winter, especially in the Champlain Lowlands.

WALTER G. ELLISON

Eastern Meadowlark

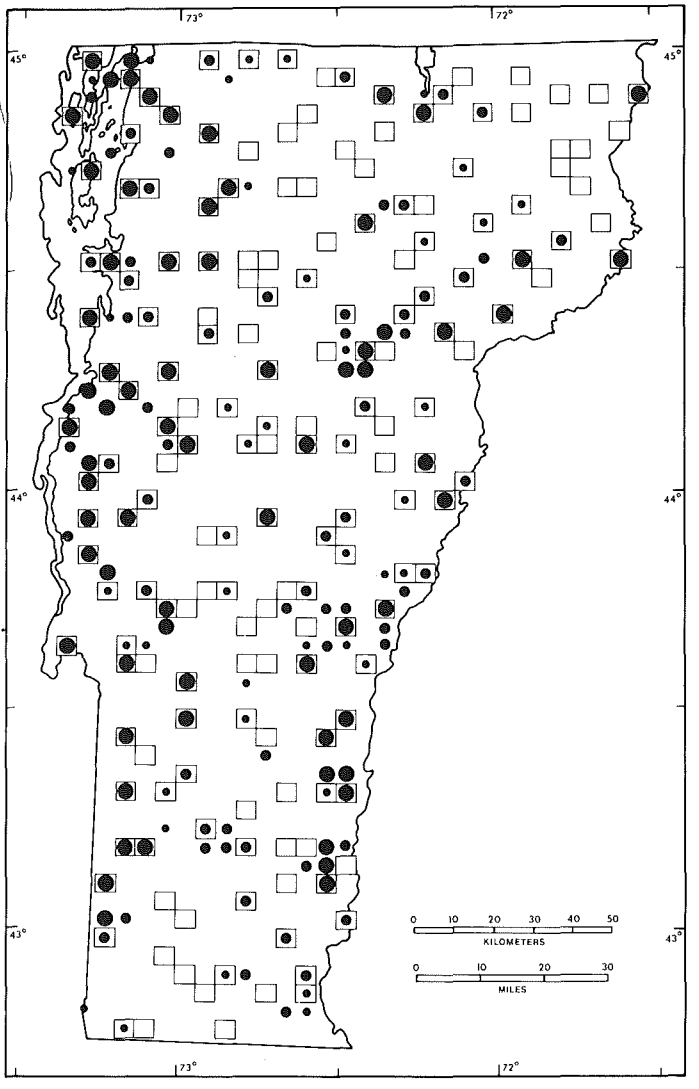
Sturnella magna

The Eastern Meadowlark inhabits extensive tracts of grassland. Wiens (1969) found that territories of Eastern Meadowlarks were characterized by a high proportion of narrow-leaved grasses, relatively low numbers of short, broad-leaved forbs, and the presence of fences or isolated trees for song perches. Territory size is large, 1.2–6 ha (3–15 a) in area (Lanyon 1957); Wisconsin territories were found to average 2.3 ha (5.8 a) (Wiens 1969). For this reason, the species is probably limited to large fields. Meadowlarks avoid very sparse or very dense growth and prefer vegetation of intermediate height and density, and plant-litter of intermediate depth (Wiens 1969). Fields that might be appropriate for another grassland-inhabiting Icterine species—the Bobolink—would be too lush for the meadowlark. A characteristic associated species of the meadowlark would be the Savannah Sparrow, which prefers similar conditions.

Meadowlarks arrive in Vermont very early in the spring, usually in mid March. Some attempt to overwinter, and in mild winters a few probably succeed. During March and April, before the growth of grass, returning males are relatively easy to locate. Song provides the best clue to the presence of nesting pairs. The song, though of a thin quality that is easily lost under noisy conditions, carries far; it consists of four to five clear, whistled notes. Adults are often seen perched on roadside trees, wires, and fences. A walking survey of appropriate grassy fields after the first of June may reveal isolated pairs that have ceased singing. The nest, placed on the ground in dense cover, is difficult to find. An observer may usually obtain evidence of breeding by finding parents carrying food (45% of Atlas Project confirmations were obtained in this way), or by locating the recently fledged young (which accounted for 32% of Atlas Project confirmations).

Meadowlarks establish their territories in mid April; nests are built in early to mid May. The species is double-brooded, and dates for confirmation cover at least a 3-month period. Egg dates for Vermont determined from 6 clutches, extend from May 5 to July 6. Clutch size for 4 Vermont nests ranged from 3 to 5 eggs (1 clutch of 2 eggs was probably collected before completion). Nestling and fledgling data are fragmentary for Vermont; data from New York State range from late May to mid August for nestlings and from early June to late August for fledglings (Bull 1974). Most meadowlarks depart Vermont in late October and November.

Meadowlarks are widely though rather thinly distributed in grasslands over much of the state. The species is most common in the extensively farmed Champlain Lowlands of northwestern Vermont. Most large fields in the region are inhabited by at least one pair, often more. The species is also well represented in the broad river valleys of the Taconic Mountains. In the more heavily forested eastern part of the state, the meadowlark's distribution is patchy. There the largest populations are in the Connecticut River valley and the dairy farmland of Caledonia and Orleans counties. Meadowlarks were found in fewer than half of the priority blocks in the Green Mountains and North-



No. of priority blocks in which recorded

TOTAL 115 (64%)

Possible breeding:	26 (22% of total)
Probable breeding:	34 (29% of total)
Confirmed breeding:	55 (49% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	27.0
Green Mountains	22	41	19.0
North Central	13	58	11.3
Northeast Highlands	5	31	4.3
East Central	13	68	11.3
Taconic Mountains	14	87	12.1
Eastern Foothills	17	71	15

east Highlands, apparently because of the high elevations and heavily forested landscapes of these regions. Early references (Howe 1913; Fortner et al. 1933) indicate that meadowlarks first arrived in northeastern Vermont (e.g., St. Johnsbury) as a breeding species around 1910. At this time the Eastern Meadowlark may be declining because of reforestation in the state.

WALTER G. ELLISON

Rusty Blackbird

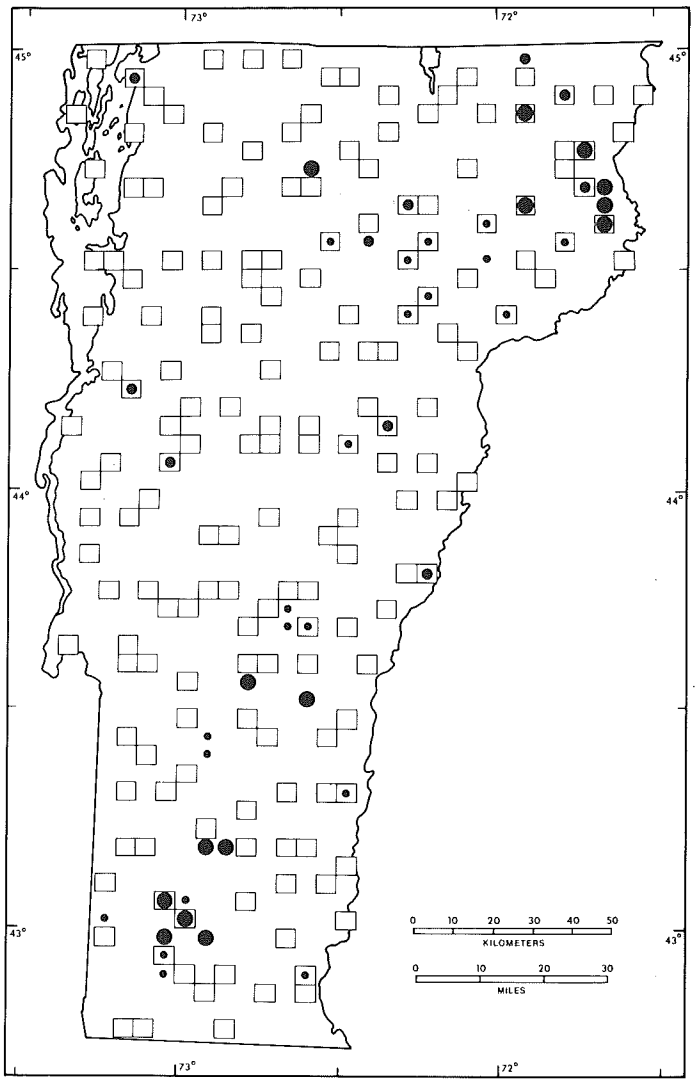
Euphagus carolinus

Breeding Rusty Blackbirds are invariably found near water: bogs, beaver ponds, lake shores, and swampy woodlands. They are summer inhabitants of boreal coniferous forests from Alaska through Canada, north to the tree line. In the lower forty-eight states, they breed only in northern New England and New York. Vermont Rusty Blackbirds are local and uncommon summer residents in the Northeast Highlands, the North Central region, and the Green Mountains. Most references state that in Vermont Rusty Blackbirds nest only in the north (Forbush 1925; AOU 1957; Bent 1958). The Atlas Project expanded the known Vermont nesting range of the Rusty Blackbird to near the southern border of the state, demonstrating that these birds will breed wherever pockets of suitable high boreal forest are found. The species' distribution seems to depend on the availability of suitable habitat.

Rusty Blackbirds return to Vermont as early as mid March, or as soon as the ice begins to melt on shallow woodland pools. Migration occurs primarily during the first two weeks of April, when birds pass through the state rather quickly. At this time they may frequent cultivated fields as well as wet woods, and are sometimes seen in large numbers. They are made conspicuous by their squeaks and whistles as they walk and feed. When flushed, they fly in unison to nearby leafless treetops, calling noisily. Rusties often associate with Red-winged Blackbirds, Common Grackles, and Brown-headed Cowbirds. Breeding territories are established by early to mid May, when pairs become solitary. Rusties are among the earliest spring migrants to reach their breeding grounds. The same birds return to the same nesting locations year after year (Harrison 1975).

The nest is frequently placed in a thick growth of spruce or balsam, often over water, at a height of 0.6–3.0 m (2–10 ft)—occasionally higher. Sometimes the nest is located in deciduous shrubs such as sweetgale, willows, alders, or buttonbush. It is a bulky but tight nest of twigs, dried grasses, *Usnea* lichens, dead leaves, and mud. The well-made inner cup is composed of fine twigs, and invariably contains green grasses that soon rot and then harden (Kennard 1920). Nests are so well constructed that they frequently last for years, but they are used only once (Harrison 1975). The 4 to 5 smooth, oval eggs are a pale bluish green, blotched with grays and browns. One brood is produced annually. Incubation begins with the first egg, is performed solely by the female, and takes about 14 days (Kennard 1920). The male feeds the female until the eggs hatch, at which time both sexes feed the young. When disturbed the adults are conspicuous, and nesting birds may easily be located by their harsh *chack* calls. The young are ready to leave the nest in 13 days and are soon able to care for themselves. Bull (1974) recorded egg dates from the Adirondacks from May 7 to June 15, nestlings from May 30 to July 8, and fledglings from July 2 to 24. There are four egg dates from Vermont: April 28, May 5, May 25, and June 9. For Vermont there are also two nest-with-young dates, May 29 and June 8, and three dates for fledged young, from June 28 to July 10.

By midsummer Rusty Blackbird families begin to move about in small feeding flocks.



No. of priority blocks in which recorded

TOTAL 27 (15%)

Possible breeding:	13 (48% of total)
Probable breeding:	8 (30% of total)
Confirmed breeding:	6 (22% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	2	6	7
Green Mountains	4	7	15
North Central	7	37	26
Northeast Highlands	7	44	26
East Central	3	16	11
Taconic Mountains	0	0	0
Eastern Foothills	4	3	15

As the season advances, they wander to more open situations and form increasingly large gatherings. Migration in Vermont begins in September and continues to late October. In the fall Rusty Blackbirds are not as confined to water and will often frequent farmlands. At that time of year Rusty Blackbirds are in their rusty and buff plumage; this phase lasts until the following spring, by which time the brown feather edges have become worn and the males have assumed their glossy blue-black plumage and the females their dull slate coloration.

Rusty Blackbirds winter south to Texas and Florida, occasionally as far north as southern New England and, rarely, Vermont. Rusty Blackbird populations in Vermont appear to have changed little in the last 50 to 75 years.

WHITNEY D. NICHOLS

Common Grackle

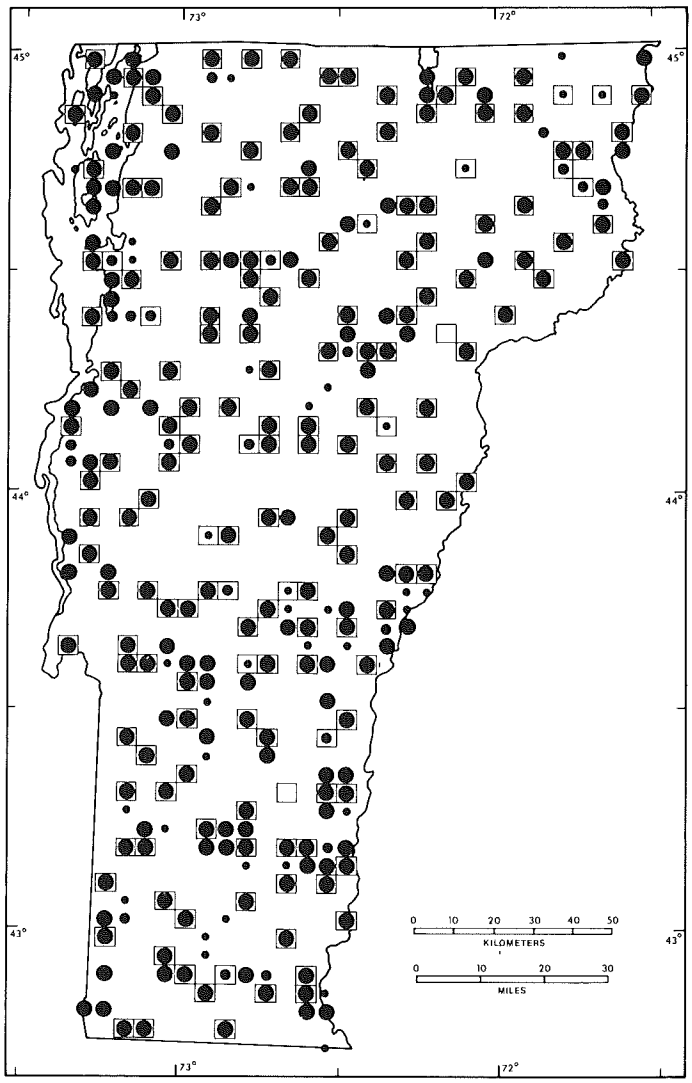
Quiscalus quiscula

The highly successful and adaptable Common Grackle is one of the more abundant and familiar of Vermont's breeding birds. The species' only habitat requirements appear to be open areas for foraging and open water in the form of a large stream, swamp, pond, or lake. Grackles are most abundant in open or semi-open farming country, somewhat less common in urban and suburban habitats, and least common in wild areas (where they resort to beaver ponds and meadows, natural lakes, marshes, and open bogs).

The Common Grackle is a large, noisy, and conspicuous bird. For these reasons it is usually easy to detect. Grackles are not territorial; they defend only the nest site, and away from the nest site they forage with other grackles. The species is often loosely colonial, which helps to locate breeding pairs. Behavioral clues to breeding include displays in which the males ruff out the feathers of their upper backs, necks, and breasts while emitting a grating squeak, or elevate the bill in what appears to be a gesture of snobbery. Both of these behaviors are thought to constitute competitive displays within courting groups consisting of four to five males and only a single female (Stokes 1979). Although occupied nests accounted for more than 24% of the Atlas Project confirmations of breeding grackles, confirmation was more easily obtained by locating large, squawking fledglings (21% of confirmations), or by seeing parents flying with food for their young (48% of confirmed breeding).

In Vermont the Common Grackle is one of the five or six earliest-returning passerines, appearing early in March or even in late February. Courting groups are formed and commonly seen during April, and nest building begins during the middle of April. The nest is a large, somewhat unkempt structure of grass and weed stems, the walls of which are usually reinforced with mud and lined with soft fibrous matter. There are eight reports of nests with eggs for Vermont, with dates ranging from April 30 to July 6. Grackles appear to be single-brooded; late nests probably represent renesting attempts. The number of greenish-blue eggs, which may be either spotted or blotched with dark marks, ranges from 3 to 7 per clutch; clutches of 4 and 5 eggs are equally common. Nestlings have been reported on nine dates from May 14 to July 13; 18 reports of recently fledged young date from June 5 to July 30. The greater part of the Common Grackle population departs for wintering areas in the south central states in October and early November. The few hardy individuals that attempt to overwinter are occasionally successful.

This species will nest almost anywhere. The outer branches of conifers provide preferred sites. In their analysis of 2,601 North American Nest Record Program cards at the Cornell Laboratory of Ornithology, Maxwell et al. (1976) found that more than 60% of reported grackle nests were located in conifers. In Vermont the species shows a distinct preference for stands of pine and ornamental spruce. Many nests are also located in deciduous trees and shrubs, especially willow and alder. More exceptional sites include cattails, buildings, bridges, cavities in trees and snags, and stumps sur-



No. of priority blocks in which recorded

TOTAL 177 (99%)

Possible breeding:	8 (5% of total)
Probable breeding:	9 (5% of total)
Confirmed breeding:	160 (90% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17.5
Green Mountains	54	100	30.5
North Central	18	95	10.0
Northeast Highlands	16	100	9.0
East Central	19	100	11.0
Taconic Mountains	16	100	9.0
Eastern Foothills	23	96	13.0

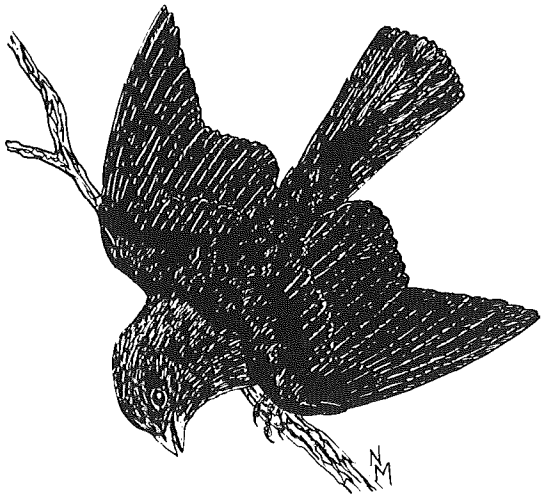
rounded by water; in Tinmouth, Vermont, a nest was found in a mailbox. Nest placements range from within 0.3 m (1 ft) of the ground to a height of 18.3 m (59 ft) (Harrison 1978; Atlas Project data).

The Common Grackle is distributed throughout the state; it was found in 99% of the Atlas Project priority blocks. These birds are probably most abundant in the Champlain Lowlands, but they occur in large numbers in almost every other settled sector of the state. Grackles are scarce in remote portions of the Green Mountains and northeastern Vermont, but a few can usually be found in swampy or marshy openings even in largely roadless areas. Historical data (Thompson 1842) indicate that the Common Grackle's status has not changed substantially for at least 130 years.

WALTER G. ELLISON

Brown-headed Cowbird

Molothrus ater

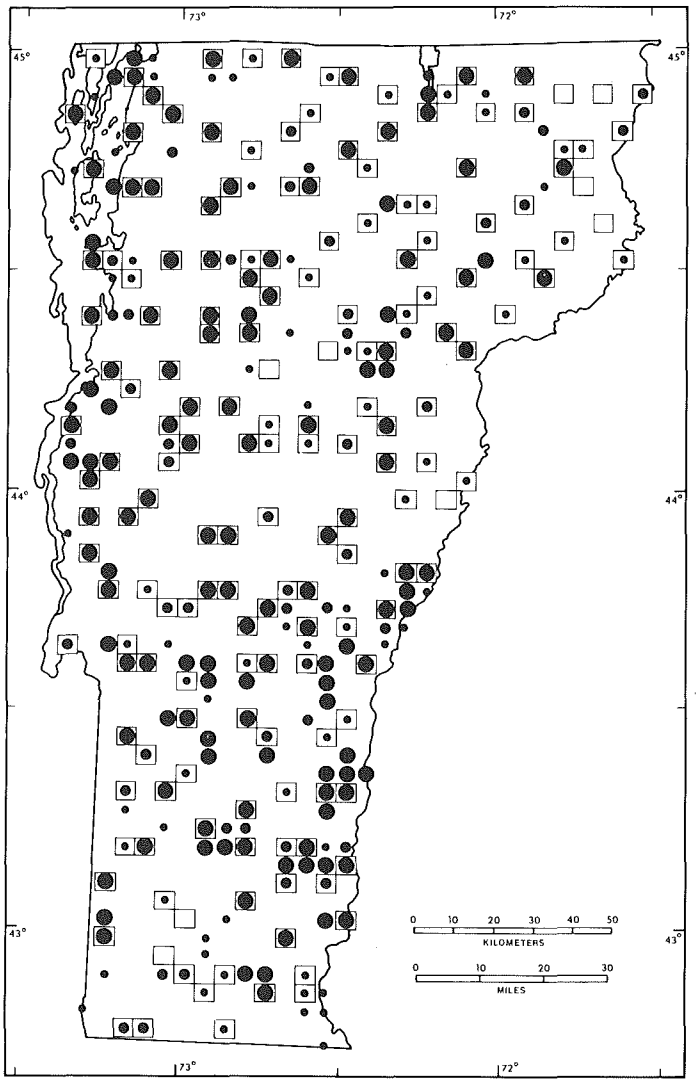


The Brown-headed Cowbird is most well known for its practice of laying eggs in the nests of other species of birds, thereby abdicating its parental chores. Cowbirds are relatively common and are most often encountered in open fields, active pastureland, and residential areas—wherever open areas with short grass suitable for ground foraging abound. The Brown-headed Cowbird was recorded in 95% of the 179 Atlas Project priority blocks in Vermont, evidencing its tolerance of a wide array of environmental conditions. Although elevation does not appear to be a major factor in the cowbird's distribution, the species does not occur in heavily forested areas (W. G. Ellison, pers. observ.), and therefore is rare in portions of the Green Mountains; it was absent from 25% of the priority blocks in the Northeast Highlands.

Cowbirds are usually easy to detect. The species arrives in breeding areas during late March and April. The song spread, a conspicuous breeding display performed by males, involves spreading the wings in a bowed form, ruffing up the body and neck feathers, and spreading the tail; the bird then bows forward while emitting its bubbling song. Fledgling cowbirds are very noisy and differ noticeably in appearance from their foster parents, often outsizing them considerably; nearly 55% of Atlas Project confirmations for the species involved young cowbirds attended by their adoptive parents.

The Brown-headed Cowbird has evolved a variety of mating systems to fit different environments. Studies by Elliot (1980) in Kansas indicate that the species is promiscuous in its mating habits and defends no territory. Darley (1968) and Dufty (1982), however, found that the species does hold a form of territory in northeastern North America. These so-called home ranges are large, averaging 20 ha (50 a), and are only defended by females against other females. Males mate monogamously with the holders of home ranges and defend them from the advances of other males. Eggs are laid from mid May to early July; 16 Vermont egg dates extend from May 9 to July 6. Females apparently lay in discrete clutches that average 4 eggs each (Payne 1965), depositing a single egg just before dawn in each host nest. According to estimates by Payne (1976) and Scott and Ankney (1980), a female may lay 24 eggs over a single breeding season. Cowbirds commonly observe the activities of the prospective hosts during nest construction and the early stages of egg laying, then slip in to add their egg to the clutch, often removing 1 or more of the host's eggs. Eight nestling dates for Vermont cowbirds range from June 17 to July 24; 23 fledgling dates range from June 3 to July 22. The Brown-headed Cowbird is partly nonmigratory in Vermont. Flocks winter around both farms and residential areas.

Cowbirds do not show the fine-tuned adaptation to host species typical of the Common Cuckoo (*Cuculus canorus*) of Eurasia. Cowbirds seem to parasitize at random, and inappropriate hosts are selected with surprising frequency (Rothstein 1976; Scott 1977). Friedmann (1963, 1971) listed more than 210 species parasitized by the Brown-headed Cowbird. The five most heavily parasitized hosts cited for New York State by Bull (1974) were (in descending order): the Yellow Warbler, Red-eyed Vireo, Song Spar-



No. of priority blocks in which recorded

TOTAL 170 (95%)

Possible breeding:	48 (28% of total)
Probable breeding:	30 (18% of total)
Confirmed breeding:	92 (54% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	18.0
Green Mountains	52	96	31.0
North Central	19	100	11.0
Northeast Highlands	12	75	7.0
East Central	16	84	9.5
Taconic Mountains	16	100	9.5
Eastern Foothills	24	100	14.0

row, American Redstart, and Chipping Sparrow. Among 44 records of cowbird parasitism in Vermont, 22 species have been identified as hosts, with the Red-eyed Vireo being most heavily victimized.

Mayfield (1965) contended that the Brown-headed Cowbird is a recent colonist in eastern North America. Early in the 1800s, the cowbird nested as far north as Burlington (Thompson 1853). The species was not considered common at the turn of the century, and remained uncommon into the 1920s. In 1933, Fortner et al. (1933) found it "uncommon to tolerably common." At present the cowbird is common in most parts of Vermont. U.S. Fish and Wildlife Service Breeding Bird Survey data for the Northeast show an annual 3.5% decline in the cowbird population from 1966 to 1979, perhaps in response to reforestation (BBS 1966–79).

WALTER G. ELLISON

Orchard Oriole

Icterus spurius

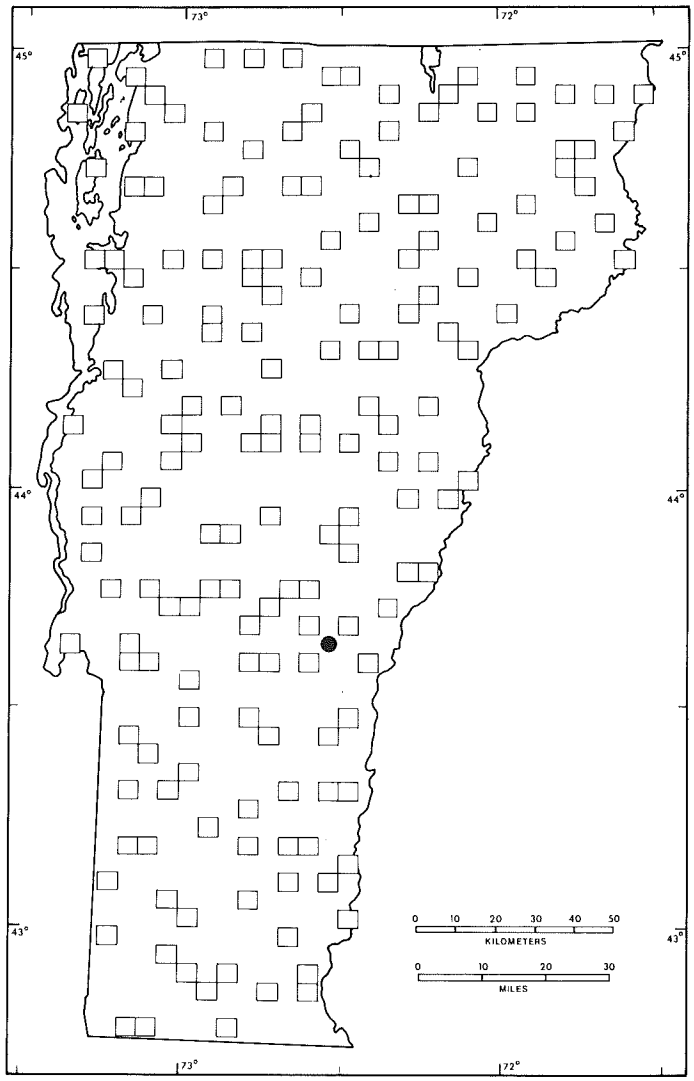
Vermont is at the northern periphery of the Orchard Oriole's breeding distribution. The species is rare in the Green Mountain State: only 18 records exist for it, dating back to the initial record made in 1883 (Knowlton 1884; RVB 1973–83; GMAS records). Only one reference to breeding was made before the Atlas Project: "Found once with young in Brattleboro, but careful search in all vicinity after trees were bare failed to reveal the nest" (Davenport 1907). One breeding confirmation was documented during the Atlas Project, and that from a non-priority block. Two more breeding records were documented in 1982.

The Orchard Oriole inhabits edge and disturbed sites, and occurs in agricultural regions and residential areas, and around bodies of water and wetlands. In the Northeast, the species inhabits stands of shade trees, overgrown farmlands, orchards, and tree nurseries. Much of Vermont is poor Orchard Oriole habitat, as the species tends to shun extensive closed-canopy woodlands and high elevations. All Vermont records are restricted to the Champlain Lowlands, the Valley of Vermont (just east of the Taconic Mountains), and the valleys of the Connecticut River and its tributaries.

Summering Orchard Orioles in Vermont have most often been located by their song, a rich, varied warble that is higher-pitched and more complex than that of the Northern Oriole. The basketlike nest is relatively easy to locate; the Atlas Project breeding record involved the location of an active nest.

Spring arrival dates for the Orchard Oriole in Vermont tend to be during the second or third week of May. The earliest date on record is April 27, 1979, at Cornwall (RVB, Spring 1981). The two Vermont nests were both found during June. One nest was located in 1977 near Woodstock, about 6 m (20 ft) up in a maple sapling in an open field near a house and stream. It contained eggs from June 7 to 21; young were detected in the nest on June 22; and the nest was apparently deserted on June 26 (ASR, C. Powell). The second nest was located on an island in Lake Champlain, about 7.6 m (25 ft) up in a large white birch on a lawn, on June 27, 1982, at which time it contained nestlings; young successfully fledged the next week (BVR, S. B. Laughlin, D. Hazelett). Both males of these nesting pairs were second-year birds, in greenish yellow plumage with a black bib. Sealy (1980) pointed out the importance of young birds in range extension. The third recent record involved the sighting of an adult male feeding a juvenile at Addison on June 26, 1982.

The nest of the Orchard Oriole is a well-woven purse of fine grasses, lined with plant down. The nest is slung in a trunk fork, or on a fork near the tip of a branch. The eggs are white with dark brown blotches, scrawls, and spots concentrated at the large end. Clutch size may range from 3 to 7 eggs; the average clutch has about 4 eggs (Dennis 1948; Bull 1974). The incubation period lasts from 12 to 15 days; the average is 14 (Dennis 1948). The nestling period lasts about 13 days (Dennis 1948), and the young may remain within 20–30 m (65–100 ft) of the nest for another week, after which they wander about with their parents until they depart for winter quarters (Sealy 1980). Orchard Orioles migrate early, usually leaving breeding territories by late July. The latest date on record for Vermont is July 30, 1983 (RVB, Summer 1983).



No. of priority blocks in which recorded

TOTAL 0 (0%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

Sealy (1980) speculated that the Orchard Oriole is subject to numerical and range-front fluctuations at the northwestern edge of its range in Manitoba. Similar fluctuations appear to have occurred in northeastern North America as well. Early in the twentieth century the species was widespread in New York State and common as far north as Albany (Eaton 1914). The species was documented nesting as close to Vermont as Granville, Washington County, New York in 1890 (Bull 1974). From 1883 to 1908 there were five reports of the species for Vermont. After 1920 the species declined in New York; it became much less common by the late 1960s and early 1970s (Bull 1974). The recent history of the species in Vermont suggests that its population is increasing. The Orchard Oriole reappeared in Vermont reports during the 1970s after being absent for more than 60 years; there were 14 records of its occurrence from 1970 to 1983 in Vermont.

WALTER G. ELLISON

Northern Oriole

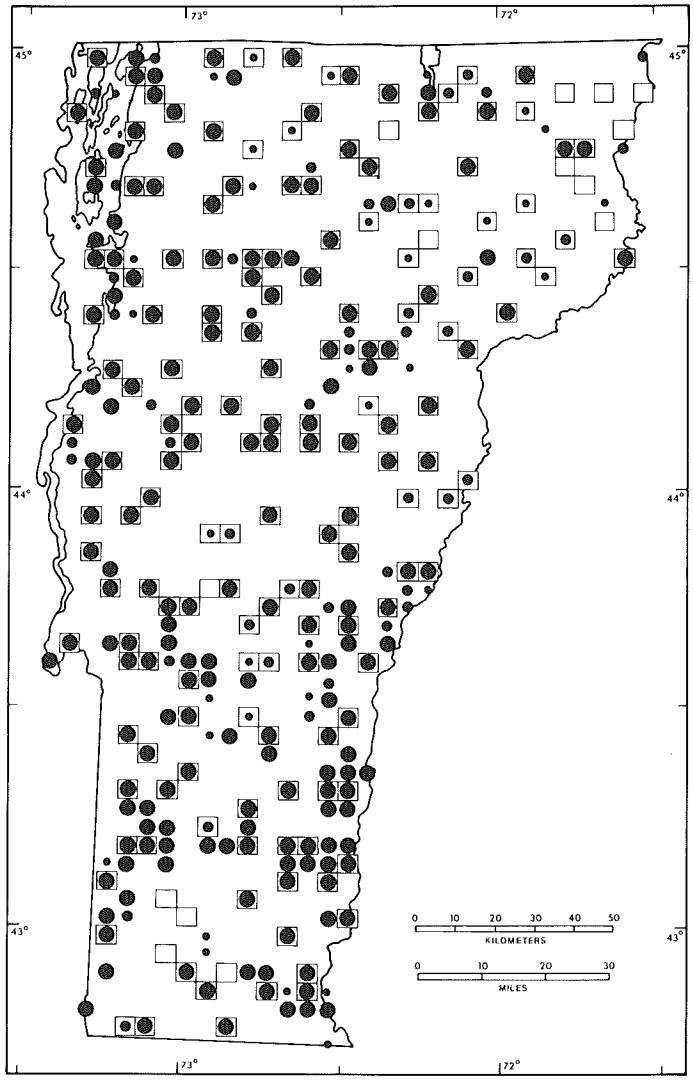
Icterus galbula

The Northern Oriole occurs in two well-marked geographic forms in the U.S. and Canada; until 1973 these were considered separate species: the "Baltimore" Oriole, which occurs east of the Great Plains, and the "Bullock's" Oriole of western North America. Northern Orioles live in open and semi-open areas, principally in riparian situations, at the edge of groves of tall trees or in shade trees in residential areas. The nest is placed at the tip of a branch of the nest tree, often over a lawn, a road, or water. Orioles favor elm trees for nesting, probably because of their pendulous branches. Graf and Greeley (1976) located 66% of 149 Northern Oriole nests around Amherst, Massachusetts in elms. Other trees utilized include cottonwood, aspen, willow, black cherry, birch, and various maples. This species is excluded only from dense forests and elevations above 760 m (about 2,500 ft).

Northern Orioles may be hard to see as they forage in the canopy, but their bright plumage and song call attention to them. The simple, mellow, whistled song generally locates these birds. The species' tendency to nest in residential areas and along roadways simplifies surveying efforts. The characteristic hanging nest is often found during the breeding season; 45% of the Atlas Project confirmations in Vermont were of active nests. Parents carrying food to their offspring provided 20% of the confirmations. Just before and after fledging, the loud begging calls of the young facilitate breeding confirmation; an additional 20% of the confirmations resulted from observers detecting fledglings. The nest is so well made that it usually survives at least one winter; for this reason the Northern Oriole offers the classic used-nest confirmation.

Northern Orioles return to Vermont during the first week of May. Males often appear almost simultaneously all over the state at the middle or end of the week; females return after their mates. Nest building is under way by the middle of May, when orioles are frequently seen on the ground gathering material to weave into their nests. These intricate, saclike structures are woven from plant fibers and lined with plant down. The eggs are grayish to pinkish white, irregularly scrawled with black or dark brown; the clutch numbers from 4 to 6 eggs. The average number of eggs in eight Vermont clutches was 4.5. Nests are placed 2–18 m (7–60 ft) above ground (Bull 1974). The average height of 7 Vermont nests was 6.5 m (21 ft). Egg dates for 11 Vermont nests range from May 29 to June 17; a date of July 3 from Winhall appears to be exceptional. The incubation period lasts 12 to 14 days (Bent 1958). Nestling dates for 12 Vermont nests range from June 12 to July 2. The nestling period lasts from 11 to 14 days (Bent 1958). Fledglings have been reported from June 19 to July 23 in Vermont (14 dates). Orioles are single-brooded. Singing drops off in July and migration begins later that month. The autumn migration peaks in mid August and is over by early September. A handful of Vermont winter records exist, all involving immatures at feeding stations.

The Northern Oriole is plentiful and widespread in Vermont. Historical references also list the species as common in Vermont. Nicholson (1978) recorded 19 pairs



No. of priority blocks in which recorded

TOTAL 165 (92%)

Possible breeding:	15 (9% of total)
Probable breeding:	17 (10% of total)
Confirmed breeding:	133 (81% of total)

Physiographic regions in which recorded

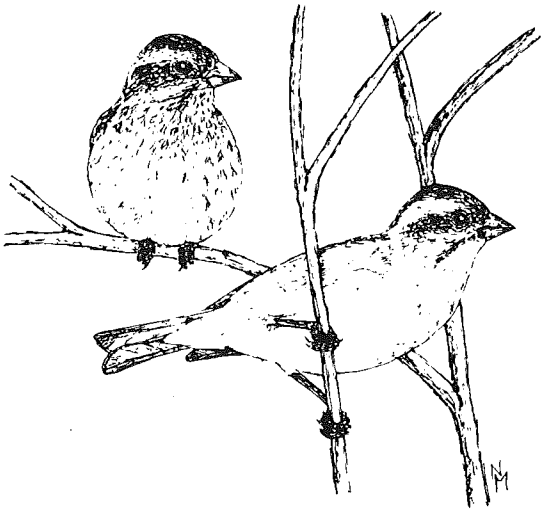
	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	19
Green Mountains	48	89	29
North Central	18	95	11
Northeast Highlands	9	56	5
East Central	19	100	11
Taconic Mountains	16	100	10
Eastern Foothills	24	100	15

per 40.5 ha (100 a). Some observers have expressed concern over the toll Dutch elm disease has taken on the favorite nest trees of these birds. Although elms continue to die, orioles remain common. Apparently Northern Orioles are not as dependent on the species of tree in which they build as they are on pendulous branches that protect the nest from entry by most predators (Schaefer 1976). The only areas from which the Northern Oriole was notably absent during the Vermont Atlas Project were the Green Mountains (missing from 11% of the priority blocks) and the Northeast Highlands (absent from 44% of the priority blocks). The dense forest and high elevations of these regions exclude orioles from some blocks. In the Northeast Highlands, the species was limited to major stream valleys.

WALTER G. ELLISON

Purple Finch

Carpodacus purpureus



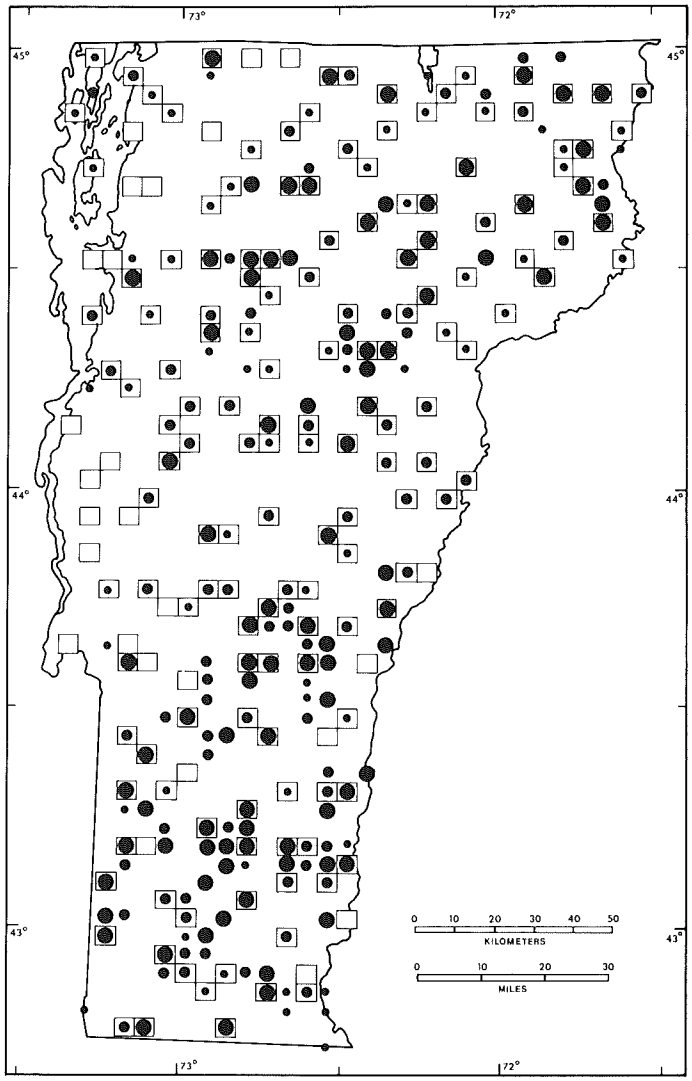
The Purple Finch ranges through much of northern North America and south along the West Coast to northwestern Baja California. In eastern North America it nests south to southeastern New York, northwestern New Jersey, and central Pennsylvania, and in the Appalachians south to West Virginia and Virginia (AOU 1983). During the winter the species may occur anywhere in its breeding range and south to the Gulf Coast, but its numbers vary dramatically from place to place. Purple Finches are readily attracted to feeding stations, where they may be observed close up.

In some years Purple Finches appear in great abundance in Vermont, and in other years few are seen. The Purple Finch may be found in open coniferous and mixed woodlands. The species tends to frequent edge situations, and is frequently seen around blowdowns and clear cuts, in well-planted residential areas, and along back roads picking up gravel from the shoulders.

Although the Purple Finch may be heard in whisper song in late autumn and may occasionally burst into full song in late winter, it sings most frequently during the spring and early summer. The song is a brightly rendered, sweet, rapidly uttered warble consisting of paired notes and triplets with occasional mimetic notes (Remsen 1983). An observer familiar with its voice may locate this species by touring back roads with the car window rolled down. The nest can be located through a careful search of young conifers in areas inhabited by the species. About 15% of Atlas Project breeding confirmations in Vermont were of active nests. Dependent young accounted for 35% of the Vermont confirmations, and a further 36% were of parents observed feeding young. When begging for food, the young utter a plaintive two-note whistle; they are often brought to summer feeding trays by their parents.

Purple Finches may winter locally in large numbers when a sufficient quantity of birch seeds or evergreen cones exist. Nonetheless, the species does not return to breeding areas until late March or early April in most years. The nest is a loosely woven cup of twigs, weed stems, bark strips, and grasses, lined with plant down, hair, or moss. The nest is placed in a trunk fork of a coniferous tree—most frequently spruce, although cedar, pine, and fir may also be utilized. Nests are placed 1.5–18.3 m (5 to 60 ft) above ground (Harrison 1975). The pale greenish blue eggs are lightly spotted with dark brown and black, with most of the wreathing on the large end. Clutch size ranges from 3 to 6 eggs; the average size of 28 New York State sets was 3.7 eggs (Bull 1974). Incubation is performed by the female, and lasts about 13 days (Forbush 1929). There are only three dates for nests with eggs for Vermont ranging from June 2 to July 3; records from neighboring states suggest that dates should extend back into May. A nest with 3 eggs was located on June 8, 1982 at a height of only 0.9 m (3 ft) in a cedar tree; the female was incubating. The young leave the nest at about 14 days (Bent 1968). The two Vermont nestling dates are June 8 and June 14. Dependent young have been reported on seven dates in Vermont, from June 18 to July 30. Family groups depart from nesting areas in September and October.

Over much of Vermont the Purple Finch is fairly common during the breeding season. During winter and migration seasons the



No. of priority blocks in which recorded

TOTAL 153 (85%)

Possible breeding:	43 (28% of total)
Probable breeding:	51 (33% of total)
Confirmed breeding:	59 (39% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	17	55	11.1
Green Mountains	52	96	34.0
North Central	19	100	12.4
Northeast Highlands	16	100	10.5
East Central	19	100	12.4
Taconic Mountains	11	69	7.2
Eastern Foothills	19	79	12.4

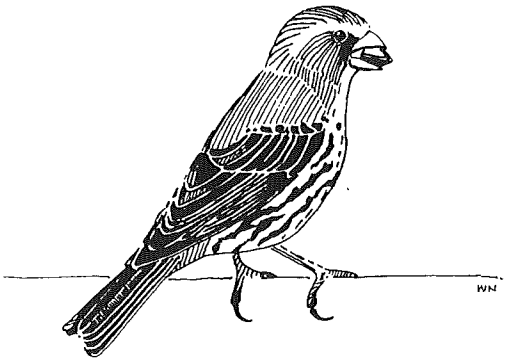
species may be uncommon to abundant depending on regional food availability. At two central Vermont banding stations more than 5,000 Purple Finches have been banded during 24 years of operation (M. F. Metcalf, pers. observ.).

Perkins and Howe (1901) considered the Purple Finch a very common summer resident; its status has changed little over the last 80 years. Atlas Project information indicates that the species is less common as a breeder in the Champlain Lowlands, the Valley of Vermont (east of the Taconics), and the lower Connecticut River valley.

MARION F. METCALF

House Finch

Carpodacus mexicanus

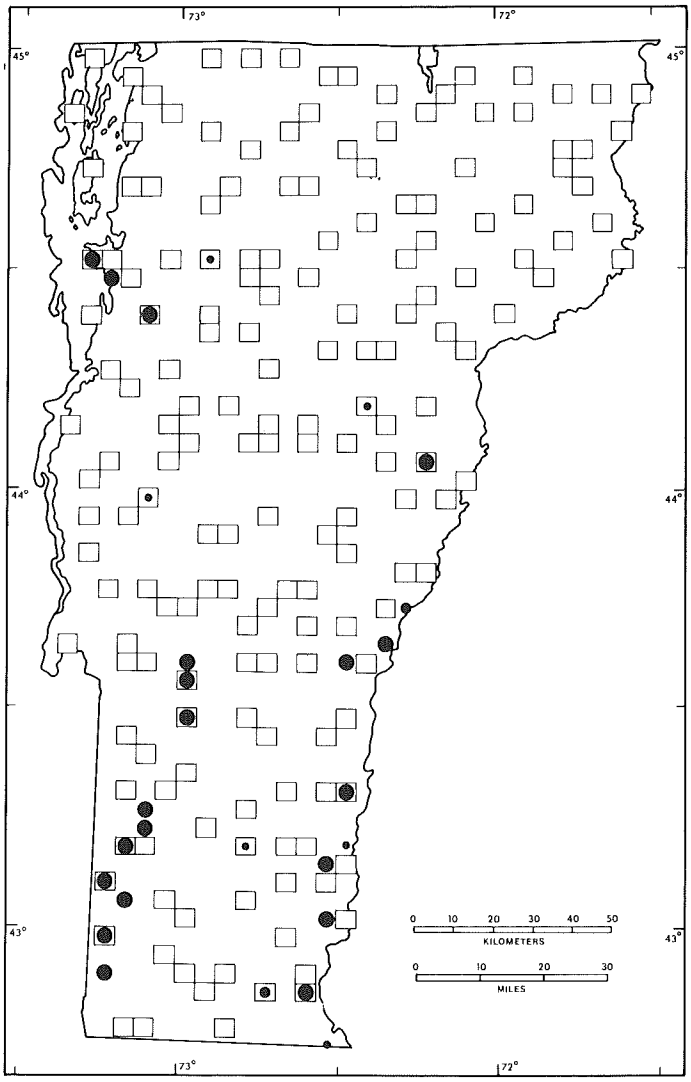


The establishment of a population of House Finches in eastern North America 40 years ago was one of the ornithological events of the century. The species' original range included most of the western U.S. and extreme southwestern Canada south through Mexico. In 1940, an undetermined number of caged birds from California were released in the New York City area by bird dealers who were illegally selling "Hollywood Finches" (Elliott and Arbib 1953). Small breeding colonies and overwintering groups were reported during the next 20 years, primarily around New York City, Long Island, adjacent New Jersey, and coastal Connecticut. A rapid expansion occurred in the mid to late 1960s, which produced an especially strong spread toward the south and west and northward along coastal New England. House Finches also spread along major river valleys, particularly those of the Hudson and the Connecticut. By 1982 the eastern population of House Finches was found as far north as Nova Scotia and Ontario, as far south as Tennessee and Georgia, and as far west as Michigan, Illinois, and Iowa (Mundinger and Hope 1982). It is only a matter of time before the eastern and western ranges meet, as both populations continue to expand. Mundinger and Hope (1982) described in some detail the process and pattern of the growth phenomenon, using Christmas Bird Count data.

Vermont's first sighting occurred in Marlboro in November 1968, and was followed by two records in the spring of 1972 in Wallingford and Marlboro (RVB, Spring 1978). House Finches appeared on a Christmas Bird Count in 1975 in Ferrisburg. The first state breeding record is from 1976 in Bennington, where adults brought three young to a feeder in early July (ASR, M. Vince). The Vermont population of House Finches probably entered the state along the Hudson and Connecticut river valleys. The species is now well established in the state, and is locally common in low-lying areas with villages or towns. It continues to be rare to very rare in the Green Mountains, North Central region, and Northeast Highlands. Although House Finches are essentially sedentary, during the seasonal movements that occur primarily in spring and fall the species may appear almost anywhere. As House Finches continue to spread to higher elevations and to more northern latitudes, observers can expect to find them wherever suitable habitat exists.

In the West, House Finches are found in a variety of habitats. In the East they are usually found near human habitation and are less common in rural districts. They frequent landscaped residential areas where open lawns scattered with ornamental plantings of trees and shrubs abound. They can also be found in the centers of cities and towns.

The species is gregarious year-round, and is a semicolonial nester. Adults defend a small but variable territory. The nest is placed in a variety of situations, 1.5–2.7 m (5–9 ft) above the ground. It is usually well concealed in the center of dense, often coniferous, foliage. House Finches may also nest in tree cavities, and they often use nooks and crannies on man-made structures. In Vermont, nests have been found in ivy and in ornamental conifers, above porch blinds, in hanging plants, and in forgotten Christmas wreaths. The nest is a well-made cup of whatever debris is available. Grasses and forbs, twigs and leaves, rootlets, feathers, and string are used. The interior is lined with similar but finer material. Nests are often reused for second broods and in sub-



No. of priority blocks in which recorded

TOTAL 15 (8%)

Possible breeding:	4 (26.6% of total)
Probable breeding:	1 (6.6% of total)
Confirmed breeding:	10 (66.6% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	3	10	20.0
Green Mountains	2	4	13.3
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	2	10	13.3
Taconic Mountains	5	31	13.3
Eastern Foothills	3	12	20.0

sequent years (Bent 1968). One record for nest building in Vermont is from Burlington on May 9. From 2 to 6 eggs, usually 4 to 5, are laid. Incubation is performed solely by the female, and lasts 14 to 16 days. During incubation the male feeds the female by regurgitation. There are four records of nests with eggs, from Rutland and Shaftsbury, from May 13 to 21. The young remain in the nest for 14 to 16 days, and are cared for by both parents (Evenden 1957). Fledgling young were found in Rutland, Clarendon, Bennington, and Wallingford on June 21 and 29 and July 12 and 16, respectively.

House Finches eat vegetable matter, mainly seeds, supplemented with buds and fruits from trees and shrubs. Birdfeeding stations have undoubtedly contributed to the species' prodigious spread. Since House Finches share many habitat preferences with the House Sparrow, some have speculated that the rapid increase of the finch in the Northeast has contributed to a recent decline in the number of House Sparrows (Kricher 1983).

WHITNEY NICHOLS

White-winged Crossbill

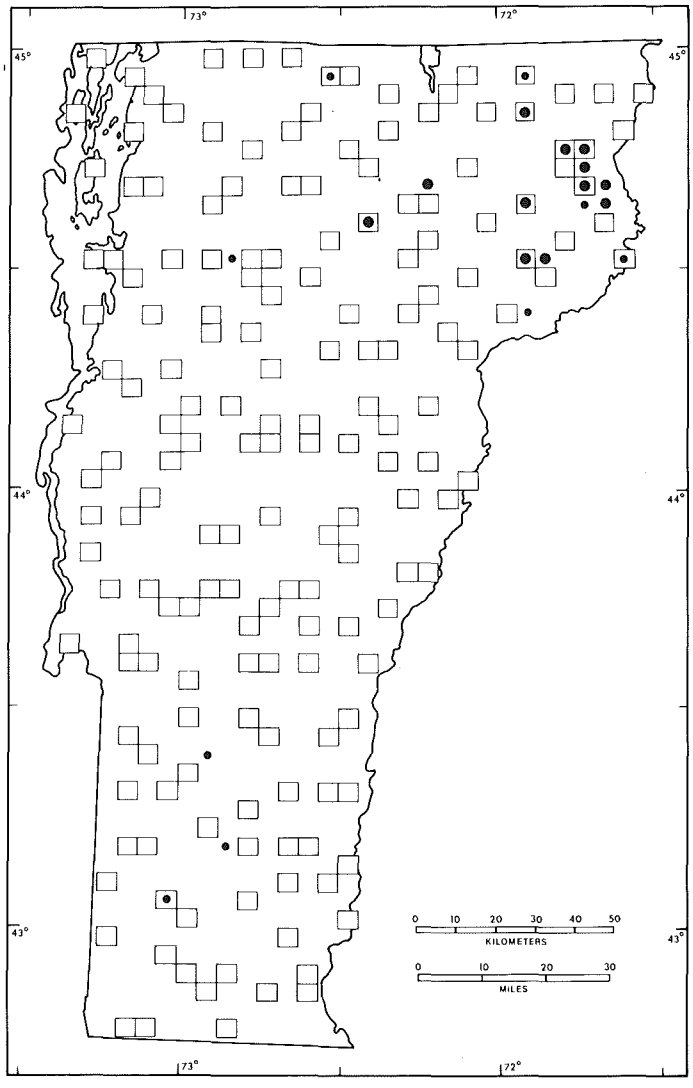
Loxia leucoptera

Crossbills are exceptionally specialized birds; the four members of the genus *Loxia* share the striking parrotlike crossed bill that results from the lateral displacement of the mandibles. The bill is used to extract seeds from evergreen cones, the principal food of these birds. Bill depth and length are adapted to the respective food trees of the four species. The White-wing possesses the slightest bill among the crossbills; it feeds principally on the smaller-coned spruces and larches, and, outside of the boreal forest, the small cones of the eastern hemlock and cedar.

The availability of food dictates the White-winged Crossbill's annual cycle. Crossbills nest in areas with good cone crops and move once annually to new locations that are usually no more than several hundred km (300–400 mi) away (Newton 1973). When the boreal cone crop is unsuccessful, this species and the closely related Red Crossbill may venture well south of the north woods; this phenomenon is usually referred to as an irruption or invasion (Newton 1973; Bock and Lepthien 1976). To compensate for the nomadic behavior involved in following successive cone crops, North America's two species of crossbill have evolved a capacity for breeding year-round (Newton 1973). The mechanism controlling the onset of breeding in these birds is currently unknown.

Vermont appears to be at the southern limit of the breeding range for the White-winged Crossbill. There are two historical references to breeding for the state. W. E. Balch collected two nests with young in Lunenburg on March 22, 1878 (Howe 1902), and Potter (1944) noted a female feeding two juveniles at Clarendon on May 5, 1943. The species was not confirmed as a breeder in Vermont during the Atlas Project, but because of the number of possible and probable reports received and because of the historical breeding records, the atlas includes the species among the confirmed breeders. The most intensive fieldwork on these birds was done from December 1979 to February 1980. Although positive evidence for breeding was lacking, the birds displayed actively and behaved territorially throughout this period. The species may have bred during late summer or early autumn, when little fieldwork was done in the principal areas of occurrence. In the winter of 1985, White-winged Crossbills bred in Reading, Vermont: A pair was observed gathering nesting material on February 23, and a male was observed feeding a juvenile on March 3 (*ASR*, F. Hunt).

Very little is known about the breeding biology of the White-winged Crossbill. The incubation and nestling periods of the species are unknown. A nest recorded by Tufts and cited by Taber (1968) was half built on April 2 and contained a half-incubated clutch on April 19, suggesting a 13- to 16-day incubation period. Taber (1968) cited records of nests from January to August, with seven records from February to April. The nest is a well-built cup of twigs, grass, and lichens, and is often lined with black rootlets or fungal filaments and, occasionally, hair or feathers (Taber 1968). The nest is placed in a conifer, 1–12 m (3–40 ft) above ground (Taber 1968). The eggs are bluish with brown and purplish spotting, and normally number 3 or 4 per clutch (Harrison 1975). The male feeds the female



No. of priority blocks in which recorded

TOTAL 11 (6%)

Possible breeding: 4 (36.4% of total)
Probable breeding: 7 (63.6% of total)
Confirmed breeding: 0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	2	4	18
North Central	1	5	9
Northeast Highlands	8	50	73
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

on the nest; the most reliable method for locating nests is to watch males return to the nest (Harrison 1975).

Records of the White-winged Crossbill in Vermont during the Atlas Project were confined to three regions: the Northeast Highlands, the North Central region, and the Green Mountains. All of the probable breeding records of 1979–80 were confined to the Northeast Kingdom. Voous (1960) indicated that the breeding distribution of the White-winged Crossbill in the Palaearctic apparently lies within the 12.8°–20° C (55°–68° F) isotherms; almost all Vermont Atlas Project records are in areas with an average temperature of 20° C (68° F) or less in July. It is interesting to note that during 1979–80 the White-winged Crossbill did not irrupt south of the northern U.S. (Able 1980); this implies that the birds recorded during those years inhabited the southern edge of their normal boreal distribution.

WALTER G. ELLISON

Pine Siskin

Carduelis pinus

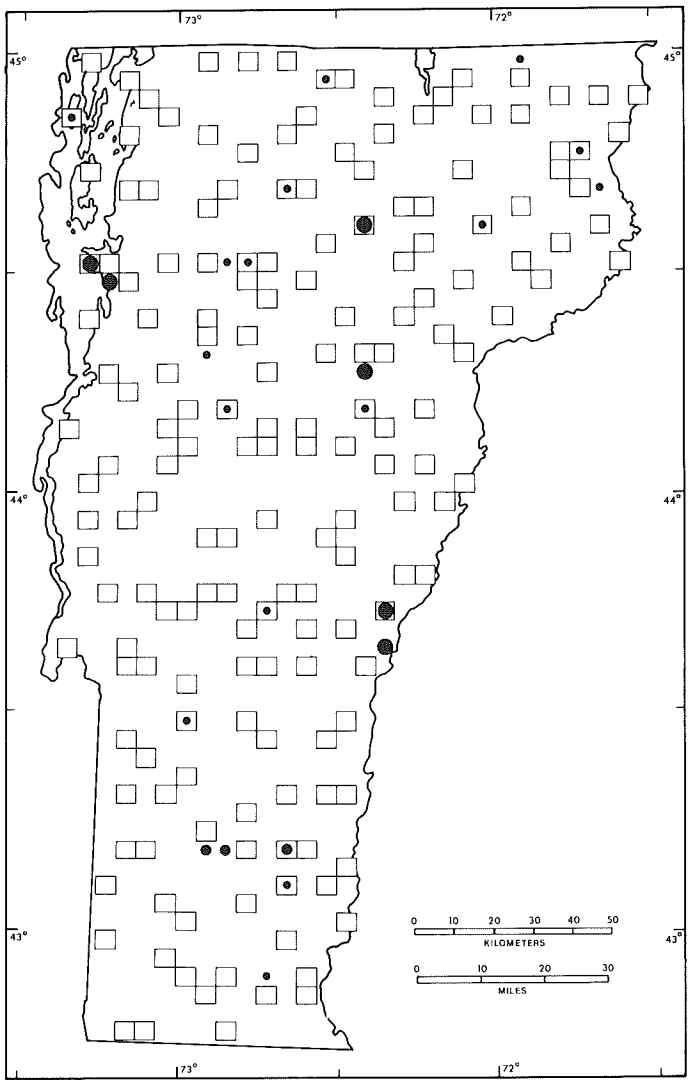
Like many of the true finches or Carduelinae, the Pine Siskin is a nomad. Its numbers vary greatly from year to year, their distribution governed by the abundance of food. Yunick (1981), citing his own banding data, presented evidence for a nearly biennial rhythm in the occurrence of invasions of this species. Yunick also noted two distinct populations during invasions, one composed of locally wintering birds and the other of migrants, especially those returning north to breeding grounds in April and May. Most Vermont nest records are for invasion years (e.g., 1925, 1981). The Pine Siskin occurs annually in Vermont, but in "off" years it is uncommon.

The Pine Siskin favors breeding habitat having two characteristics: an ample supply of food, and suitable nest sites, both of which are supplied by conifers. The presence of coniferous trees is the common denominator in Atlas Project descriptions of the Pine Siskin's habitat.

These small brown finches may travel in flocks of fewer than 20 or in huge, chattering throngs of 500 or more birds. Pine Siskins often associate with other finches. Although detection of siskins is often very easy during flight years, transients are separated from breeding birds only with difficulty. Yunick (1981) suggested that, as preparation for nesting at suitable locales, Pine Siskins travel from place to place in breeding condition. The flight and location calls, not as sweet as those of other finches, are grating and raspy. The song is an involved, warbling medley with long, buzzing trills that run up the scale.

Vermont has records of Pine Siskins for every month of the year. The largest numbers of siskins, particularly during invasions, are seen during spring and autumn, peaking from late March to mid May and from late September to early November. Pine Siskins are rarely common during summer; they are seldom seen at that time outside of the Green Mountains, the North Central region, and the Northeast Highlands. Nest building has been observed as early as April in Burlington. Dates for nests with eggs include April 18 (1981) at Burlington and mid April (1895) at East Wallingford (Kent 1916). Dates for nests with young include April 25 (1915) at Rutland (Kent 1916), May 15 (1879) at Rutland (Herrick 1884), and May 3 (1977) at Plainfield (RVB, Spring 1977). Records of dependent young include a nearly tailless juvenile at Norwich on May 3 (1980) and juveniles being fed by their parents at a Wallingford feeding station on July 12 (1974) (RVB, Summer 1974). Palmer (1968) believed that Pine Siskins are double-brooded.

The Pine Siskin's nest is a compactly built, rather flat cup of twigs, grasses, rootlets, and bark strips, lined with hair, feathers, or other soft materials. It is placed well out from the trunk on a conifer branch. Used nests are rimmed with a buildup of excreta, a typical feature of Cardueline nests. Nest heights average 4.9–6.1 m (16–20 ft) above ground, but may be placed 0.9–15.2 m (3–50 ft) up (Bent 1968); 3 Vermont nests averaged 4.9 m (16 ft) above ground. Nest trees utilized in the East include red and white cedar, white pine, Norway spruce, balsam fir, and native spruces. The eggs are bluish with brown and black spotting concentrated at the large end; the clutch



No. of priority blocks in which recorded

TOTAL 15 (8%)

Possible breeding:	11 (73% of total)
Probable breeding:	1 (7% of total)
Confirmed breeding:	3 (20% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	3	10	20
Green Mountains	6	11	40
North Central	2	10	13
Northeast Highlands	1	6	7
East Central	0	0	0
Taconic Mountains	1	6	7
Eastern Foothills	2	8	13

numbers from 3 to 6 eggs, usually 3 or 4 (Weaver and West 1943; Perry 1965; Bent 1968).

The Pine Siskin was located in a total of 26 blocks during the Atlas Project, including 15 priority blocks. More than half of the priority blocks in which the species was recorded were in the Green Mountains, the North Central region, and the Northeast Highlands. However, all six Atlas Project confirmations were made outside of the Green Mountains and Northeast Highlands, which were covered largely by block-busting between mid June to early July, after the presumed peak of breeding activity for Pine Siskins. The extensiveness and inaccessibility of suitable habitat for Pine Siskins made it difficult to locate the few possible breeding pairs in these regions.

WALTER G. ELLISON

American Goldfinch

Carduelis tristis

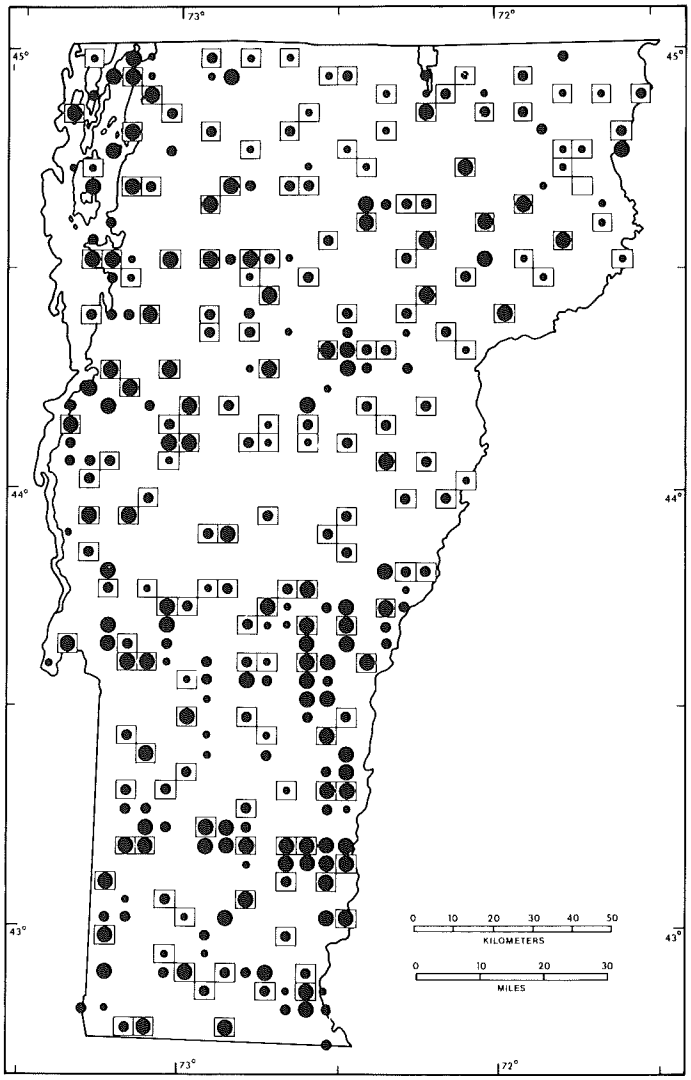
The American Goldfinch is a bird of edge and brush, preferring naturally open swamp and marsh vegetation, man-made clearings, road edges, orchards and pastures, forest fringes, and open uplands with their scattered shrubs and saplings (Nickell 1951).

The American Goldfinch, though considered a permanent resident in Vermont, varies greatly in numbers from season to season. Some individuals summer in Vermont for breeding only and in winter move to more southern areas (VINS bird-banding data). Those goldfinches that remain in Vermont in winter or arrive here from farther north may be seen wandering erratically in flocks or alone near feeders. Spring and fall migrations peak between April 15 and May 15 and between August 15 and September 15 (Woods 1981), with some movement occurring into mid November. Christmas Bird Count records indicate the greatest average winter concentrations of goldfinches in the Champlain Lowlands and the least in the Green Mountains and the North Central region (CBC 1978–82).

In contrast to most songbirds, the American Goldfinch may delay establishing territory up to 2 months following pair formation in May or early June (Drum 1939; Stokes 1950). Two distinctive courtship behaviors of the American Goldfinch are the extended, canarylike warbling given by the male from prominent perches and the prolonged pursuit of a single female by several males. The approximate boundaries of the breeding territory are defined by song-flights of the male, who may defend it from other goldfinch males (Drum 1939). While defending his territory, the male may be heard singing a shorter, warbling song from prominent perches around the territory (Stokes 1979). Females defend the immediate nest area from other female goldfinches. Territorial delineation and defense wane when nest building is completed.

The timing of nest building activity, from the last week in June well into late summer, coincides with the ripening of thistle seeds and other composites (Nickell 1951). Nest material includes fibrous matter from the bark of vines and the stems of milkweed that the female gathers and forms into a supporting basket, which is cradled in the crotch of three or four upright slender branches of a tree, shrub, or herbaceous plant. The bowl is neatly and compactly lined with thistle and cattail down (Nickell 1951). Nest height above the ground varies according to the chosen habitat; 0.9–1.8 m (3–6 ft) in shrubs and forbs, 2.4–4.6 m (8–15 ft) in bushes and saplings (Stokes 1950), and up to 13.8 m (45 ft) in mature trees (Nickell 1951). Whereas nest building in July may average 13 days, it requires less than half this time by late August (Stokes 1950).

Incubation, by the female, of the 4 to 6 smooth-shelled, pale bluish white eggs lasts from 12 to 14 days (Stokes 1979). Dates for 6 Vermont clutches range from June 30 to August 17. During incubation, the male is most attentive, feeding the begging female a regurgitated supply of white, milky seed cereal (Bent 1968). By the 8th day after hatching the nestlings are very active, calling loudly and standing upright in anticipation of the parent's arrival. At this time the young begin defecating on the nest edge, where their excreta may cling and harden; earlier,



No. of priority blocks in which recorded

TOTAL 178 (99%)

Possible breeding:	37 (21% of total)
Probable breeding:	74 (41% of total)
Confirmed breeding:	67 (38% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	17
Green Mountains	54	100	30
North Central	19	100	11
Northeast Highlands	15	94	9
East Central	19	100	11
Taconic Mountains	16	100	9
Eastern Foothills	24	100	13

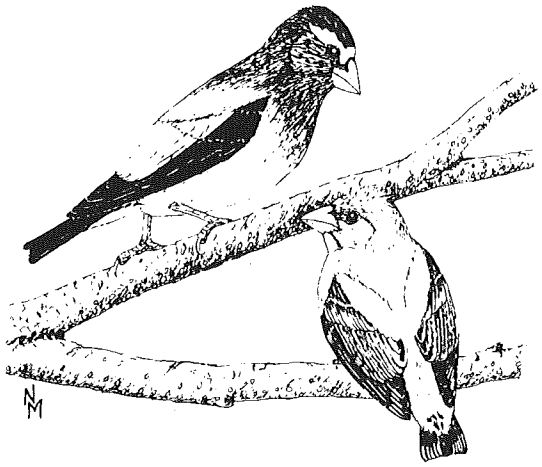
the parents removed the fecal sacs (Stokes 1950). Nine nestling dates from Vermont range from July 15 to September 19. Fledging occurs after 10 to 16 days, and fledglings are able to fend for themselves after another 2 weeks (Stokes 1950). Eight Vermont fledgling dates range from July 26 to October 2.

The American Goldfinch was considered a common bird in Vermont by early authors (Thompson 1853; Fortner et al. 1933). It is still common today, as Atlas Project workers found goldfinches in all but one of the 179 priority blocks. Goldfinches were confirmed as breeders in only 38% of the priority blocks; nest building, performed by the female, constitute 35% of the breeding records. Both figures reflect Atlas Project fieldwork before most breeding activity for this late nesting species occurred.

ROY W. PILCHER

Evening Grosbeak

Coccothraustes vespertinus

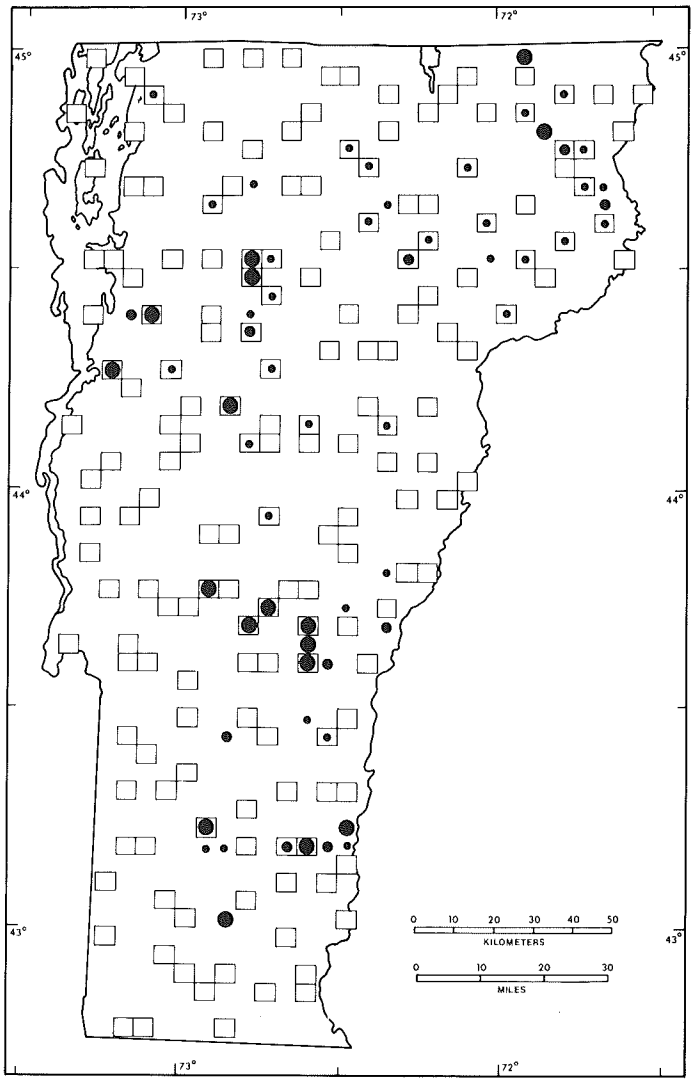


This familiar—in winter even common—species is a relatively recent arrival in New England, which it colonized from the West. None of the nineteenth-century bird lists for New England and Vermont mention the Evening Grosbeak. Forbush (1927) stated that the first report of the Evening Grosbeak east of the Great Lakes was made in 1854 in Toronto; small flocks reached Ohio by 1860 and New York State by 1887. Bagg and Elliot (1937) reported that a single grosbeak was seen "during the winter of 1875" at Elizabethtown, New York, on the shores of Lake Champlain. The winter of 1889–90 saw the first large Evening Grosbeak invasion of New England: birds were seen or collected in Vermont (apparently the first record), New Hampshire, Maine, Massachusetts, and Connecticut. Winter visitations in most of those areas were also reported for six winter seasons between 1908 and 1922. Observers at St. Johnsbury first recorded Evening Grosbeaks in August 1893 (a pair was seen), which suggests that the species could have been breeding in Vermont by that early date. No more were seen at St. Johnsbury until 1913, after which they also appeared in 1916, 1917, 1921, 1928, 1930, 1936, and 1949, according to bird records kept at the Fairbanks Museum in St. Johnsbury, Vermont. Evening Grosbeaks have been reported at a feeder in Plainfield each winter since 1950 (M. F. Metcalf, pers. comm.). The first Evening Grosbeaks to appear in the East were winter visitors and usually appeared between October and January.

Apparently the planting (and later self-seeding to the wild) of the box elder across what were once prairie stretches provided a "baited highway" along which the grosbeaks were able to pass eastward (Bent 1968). The seeds of the box elder hang on the trees all winter, and several observers report that Evening Grosbeaks prefer them to almost anything else—with the possible exception of sunflower seeds, which they devour with relish at feeding trays. Salted gravel also attracts them, as it does many northern finches.

The Evening Grosbeak was slow to develop the habit of lingering beyond the winter season in Vermont. The earliest breeding record in Vermont dates from 1926 in Woodstock, when a pair with four young, very short-tailed and downy-headed, was observed at a feeding station on July 12–14 (Marble 1926). This nesting report was incorrectly dated by Fortner et al. (1933) as 1923. The second recorded breeding confirmation in Vermont was in Londonderry, where the arrival of the first young of the year at a feeder occurred on June 26, 1953; first young also appeared on the same date in 1954 and 1955 (Bent 1968). Since the 1950s the species seems to have become increasingly regular in summer in Vermont, though breeding pairs are still uncommon and rather widely scattered. Most confirmations during the Atlas Project came from the Green Mountains; the Northeast Highlands had the highest percentage of priority block reports. Only in the Taconic Mountains were no Evening Grosbeaks found.

The presence of spruces, firs, and other conifers seems essential for nesting pairs, though mixed woodlands and even residential shade trees are acceptable. The nest is a loosely made, shallow cup of twigs lined with rootlets and bark shreds, placed 1.8–21.3 m (6–70 ft) above the ground, often in a dense leaf cluster near the end of a branch



No. of priority blocks in which recorded

TOTAL 41 (23%)

Possible breeding:	25 (61% of total)
Probable breeding:	4 (10% of total)
Confirmed breeding:	12 (29% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	5	16	12
Green Mountains	14	26	34
North Central	5	26	12
Northeast Highlands	8	50	20
East Central	5	26	12
Taconic Mountains	0	0	0
Eastern Foothills	4	17	10

(Godfrey 1966; Terres 1980). The 3 to 5 eggs, bluish green marked with browns and grays, are incubated by the female alone. The incubation period seems to last 12 to 14 days; young leave the nest 13 to 14 days after hatching (Bent 1968; Terres 1980). There are no egg dates for Vermont; copulation has been observed on June 1, and fledglings have been seen from June 17 to July 19.

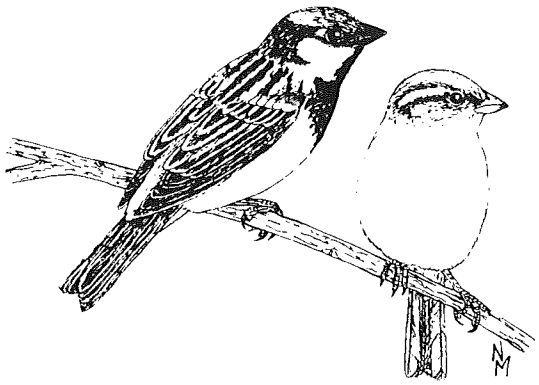
Evening Grosbeaks are highly gregarious and are often seen in small groups even when nesting. Fall and winter flocks may number more than 100 birds that travel and feed together, often visiting feeding stations and favored seed trees at regular intervals. A variety of seeds are eaten; those of spruces, firs, and maples are favored.

Precise arrival and departure dates of migrating Evening Grosbeaks are difficult to establish. Migratory grosbeaks are easily confused with birds already in residence. Southward and eastward flights can be more extensive in some winters than others; Evening Grosbeaks may travel as far south as South Carolina and Alabama in irruption years.

G. FRANK OATMAN

House Sparrow

Passer domesticus



House Sparrows, also known as English Sparrows, were introduced in North America in the mid-1800s, beginning in 1851 and 1853; subsequently they were introduced at selected locations throughout the U.S. and contiguous Canadian and Mexican sites (Bent 1958). They were first released in Vermont at St. Johnsbury between 1874 and 1876. Following that introduction, the species rapidly spread throughout the state (Merriam and Barrows 1889).

The name "English Sparrow" is a misnomer, as the species is widely distributed throughout Europe, Asia, and North Africa. The species was called the English Sparrow in the U.S. before 1957 because most of its kind had been imported from England; the correct name now is the House Sparrow. Primarily a granivorous bird, the House Sparrow was first imported because of its exaggerated reputation as an insectivore. To some extent, the bird was introduced by new European immigrants to satisfy their longing for home, which its familiar chirp recalled.

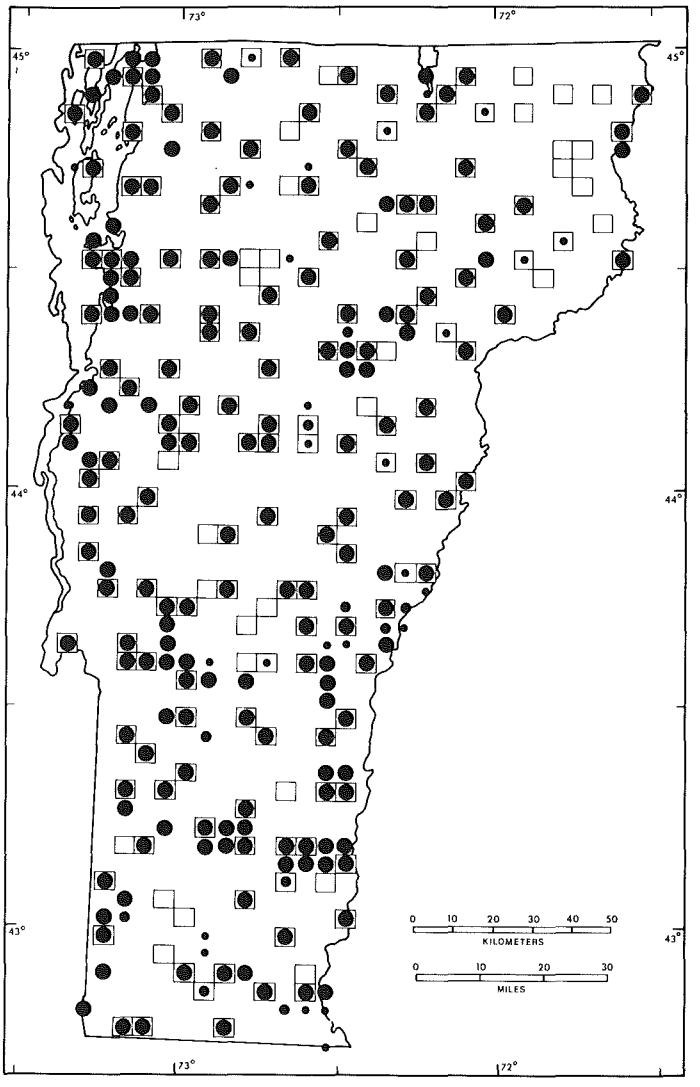
The House Sparrow's population peaked between 1910 and 1920 and thereafter began to decline. When automobiles replaced horses, especially in the cities, available grain (digested and undigested), which was the House Sparrow's chief food supply, diminished (Bent 1958). It has also been hypothesized that as the starling population increased it competed with House Sparrows for nesting sites, thereby contributing to the sparrows' population decline (Ross 1927).

The House Sparrow is most easily seen around the buildings of working farms or near grain supply establishments, and roosting in the thick ivy attached to buildings and in thick shrubbery (Bent 1958; Stokes 1979). The House Sparrow's favored nesting site appears to be a cavity in a tree or building, or a nest box. The species prefers well-hidden natural sites in and about buildings to nest boxes. It will nest in dense growths of ivy or similar vines. Pairs may even use the nests of Cliff and Barn swallows (Bent 1958). The House Sparrow has a prolonged breeding season, usually raising two and sometimes three broods a year. Earliest recorded nest building in Vermont was for March 8 (Ross 1927).

The nest is bulky, 15–20 cm (8–10 in) in outside diameter (Stokes 1979). It is unkempt and loosely constructed, with the outer part made up chiefly of long, coarse grass stems, some of which retain their heads and may point in every direction; leaves; a few small feathers; string; cloth and pieces of paper. The lining is made of finer materials, usually whatever is at hand, such as feathers, cord, hair, and frayed rope. The cup of the nest is shaped by the female as she turns round and round in the center. Entrance to the nest is usually from the side (Bent 1958).

The easiest way to confirm the House Sparrow is to look for the ragtag nest in or on a building. Atlas Project confirmations were most frequently obtained by seeing the nest and eggs or a bird sitting on the nest (NE), and by seeing adults entering and leaving nest sites (ON).

Eggs laid by the House Sparrow are ovate to elliptical and vary in number from 3 to 7 per clutch, with 4 to 5 being most common. The base color is almost pure white, sometimes greenish or bluish. Eggs are marked by a few gray or brown dots. Seven Vermont egg dates range from April 21 to June 24. Incubation, usually a 12-day period, is per-



No. of priority blocks in which recorded

TOTAL 146 (86%)

Possible breeding:	10 (7% of total)
Probable breeding:	3 (2% of total)
Confirmed breeding:	133 (91% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	31	100	21.2
Green Mountains	39	72	26.7
North Central	16	84	11.0
Northeast Highlands	6	37	4.1
East Central	18	95	12.3
Taconic Mountains	15	94	10.3
Eastern Foothills	21	87	14.4

formed by the female. After hatching, males and females share the feeding of the young at the nest. Feeding at first is by regurgitation. Fifteen Vermont records reveal nests with young dating from March 25 to July 8. House Sparrow young leave the nest at about 15 to 17 days after hatching, at which time they can fly rather well. The young are fed for 2 weeks or more after leaving the nest. Adults eat about 3% animal and 97% vegetable matter, of which 74% is grain; nestlings consume about 68% animal and 32% vegetable matter (Bent 1958).

The House Sparrow is noisy, boisterous, opportunistic, and adaptable. This non-migratory species chirps and chatters cheerfully, if aggressively, and adds a little joy to the winter landscape.

GEORGE F. ELLISON

Species Recorded as Possible or Probable Breeders in Vermont

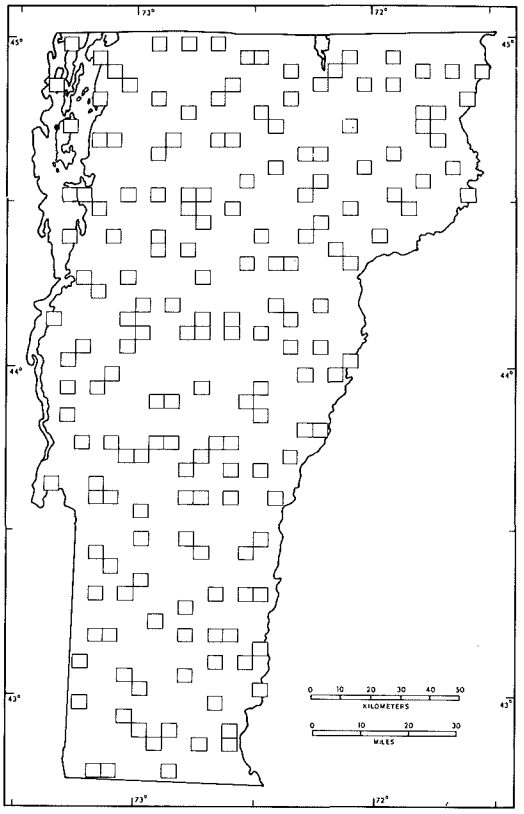
Double-crested Cormorant

Phalacrocorax auritus

The Double-crested Cormorant's breeding population in the early 1900s consisted of four distinct groups. Three primarily coastal populations bred in eastern Canada and Maine; from North Carolina through Florida to Louisiana; and in the West from Oregon to Mexico. The fourth population nested from Utah and Alberta across the northern Mississippi River drainage to the western Great Lakes (Bent 1922). By the 1930s, there were three specimens and one sight record listed for Vermont by Fortner et al. (1933). Cormorant populations have increased dramatically since that time; mid-continent breeders reached the eastern end of Lake Ontario in 1945 (Bull 1974). Northern coastal colonies are now found as far south as Long Island Sound. During the Atlas Project survey, observers documented increasingly frequent June and July occurrences of the Double-crested Cormorant on Lake Champlain, particularly around Young Island (RVB 1976–81). Despite careful monitoring, only possible breeding status for the species was recorded during the Atlas Project, although 35 Double-crested Cormorants were observed on Young Island on June 27, 1981 (BVR, S. B. Laughlin).

The year after the Atlas Project ended (1982), the first known breeding of the Double-crested Cormorant in Vermont occurred, in a stick nest in a dead tree near the water on Young Island; while 1 bird incubated, 27 looked on (RVB, Summer 1982). In 1983, the breeding colony had exploded to 34 nests on trees fringing the island, and adults numbered 108. Further population increases and colonization of other Lake Champlain islands are likely, given the number of nonbreeding birds currently present.

The Vermont cormorant nests are constructed of sticks and placed in dead or dying trees. In coastal regions, Double-crested Cormorants often nest on cliffs or rocky islands (Bent 1922). Parents share incubation of the 2 to 7 (usually 3 to 4) chalky, pale blue eggs for 24 to 25 days. The al-



No. of priority blocks in which recorded

TOTAL 0 (0%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

tricial young are unable to fly until they are 5 to 6 weeks old. Full independence from the parents may take 10 weeks to achieve (Palmer 1962). Strong fliers when airborne, Double-crested Cormorants usually depart from Vermont in October; they winter from the mid-Atlantic states south to the Gulf Coast.

DOUGLAS P. KIBBE
SARAH B. LAUGHLIN

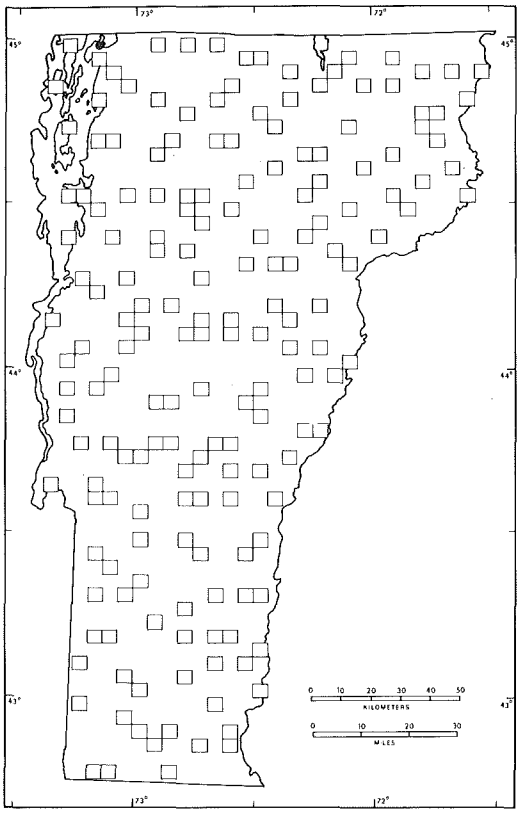
Great Egret

Casmerodius albus

Great Egrets breed on all continents but Antarctica. In North America they breed north into parts of southern Canada (AOU 1983). Most Vermont sightings fall between mid April and late May, and from early August to mid November (RVB 1973–83). The species is known to disperse widely in late summer before fall migration (Palmer 1962). Great Egrets winter in North America, primarily along the southern coasts, and south through South America (AOU 1983).

During the Atlas Project, the Great Egret was recorded as a probable breeder (for a pair present during the breeding season) at the Missisquoi National Wildlife Refuge. Two egrets were observed on the Missisquoi River on June 15, 1977, and were seen almost daily until July 1. Thereafter, occasional single egrets were observed. On July 28 on Missisquoi Bay three Great Egrets were observed, including an adult-sized, dark-billed bird suspected of being an immature. The birds were carefully identified as Great Egrets; there was also an albino Great Blue Heron present during the same summer at the refuge. George O'Shea, the refuge manager, believed that the egrets could have nested in the Great Blue Heron rookery.

The earliest record of Great Egrets in Vermont was of two birds collected in New Haven, in the Champlain Lowlands, during August 1882 (Howe 1902). Forbush (1925) alluded to their occurrence in Vermont and stated that they are "rare or occasional summer visitors." Apparent "invasions" occurred in 1936 and 1948 (Smith 1950b). More than 50 Great Egrets were seen in August 1936 at the mouth of the Black River



No. of priority blocks in which recorded

TOTAL 0 (0%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

in Springfield. In 1948, 350 Great Egrets at 42 localities were reported; the first reported date was July 14. Most localities were in the Champlain Lowlands.

Aside from the 1948 summer record, there are 9 records for either June or July. Of all 10 records, 5 are from Dead Creek Wildlife Management Area, 2 from Missisquoi Bay, and 1 each from Norwich, Waterbury, and Shelburne Bay. Most of these records were for late July, a strong indication that the birds were post-breeding-season wanderers.

Nesting habitats include swamps of cypress or mangrove in the South or of willow in the North, and forests on dry ground or on islands adjacent to marshes, swamps, or estuaries (Palmer 1962). Great Egrets nest singly or colonially, often in mixed colonies with other Ardeids. The stick nests are generally placed in tall trees. The breeding season in the northern part of the range is mid-April, but the dates vary from year to year and are perhaps influenced by the weather (Harrison 1978). In Michigan, one nest building date exists for April 17, and one egg date for April 24 (Palmer 1962). Clutch size is 3 to 4 eggs.

Foraging Great Egrets are usually found in open areas; they are known to feed on fish, amphibians, snakes, crustaceans, small mammals, and even insects (Palmer 1962). Great Egrets, like Cattle Egrets, are known to feed in fields where cattle are grazing (Palmer 1962).

CHRISTOPHER FICHTEL

Northern Shoveler

Anas clypeata

The Northern Shoveler is a prairie-nesting dabbling duck. Before 1976 it had one nesting record in Vermont, and during the Atlas Project it was recorded once. The species reaches its greatest nesting densities in the mixed prairie regions of south central Canada and the northern Great Plains (Bellrose 1980). Though widely distributed, the Northern Shoveler is a local breeder on the Great Plains and east of Manitoba (Bellrose 1980). Historically, shovelers have always been rare in Vermont, although occurring occasionally as migrants on Lake Champlain (Perkins and Howe 1901; Fortner et al. 1933).

The Northern Shoveler has been confirmed as nesting in Vermont only once. On May 31, 1962 a shoveler nest was discovered in North Hero in a meadow, where on May 9 a pair had been seen (Fuller and King 1964). The nest, located quite a distance from water, contained 11 eggs. This nest was subsequently destroyed by a mammalian predator (Fuller and King 1964). In 1977, in the Missisquoi National Wildlife Refuge, a pair of Northern Shovelers was observed mating (D)—a probable nesting occurrence (ASR, G. O'Shea).

Normal breeding habitat for shovelers in the Great Plains includes tall-grass and mixed prairies, and open marshy areas with "surrounding dry meadows for nesting" (Palmer 1976). The clutch is generally initiated between the end of April and mid June. The clutch of 10 to 11 eggs is incubated for 22 to 24 days; young can fly in 52 to 60 days (Palmer 1976).

Records of migrating Northern Shovelers indicate that the species is found most frequently in marshes of the Champlain Lowlands. Peak counts during either spring or fall migrations are fewer than 10 birds per sighting. Spring migrants occur from the first week in April through the third week in May, and autumn migrant shovelers can be found between mid August and early November. This species winters in scattered locations along the middle and southern Atlantic Coast, and is abundant in coastal Louisiana, Texas, California, and Mexico (Bellrose 1980).

Probably the most interesting facet of the

Northern Shoveler's biology is its spatulate bill, for which the shoveler was formerly known by the genus name *Spatula*.

CHRISTOPHER FICHTEL

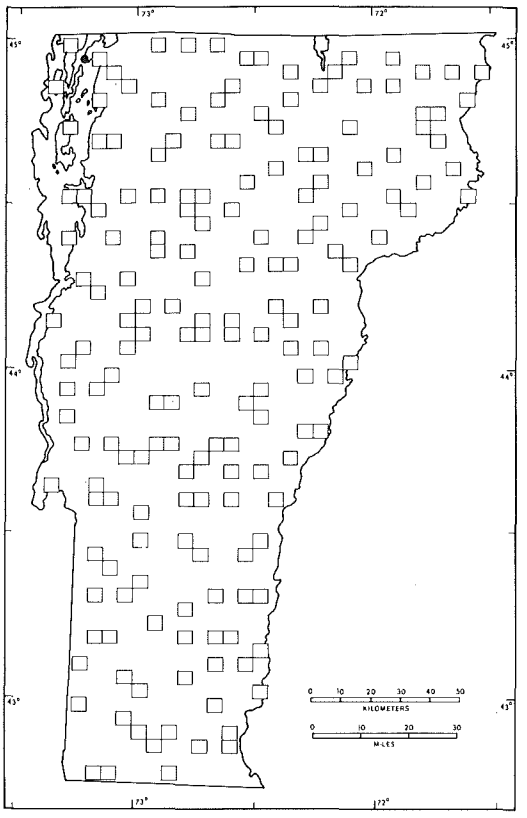
No. of priority blocks in which recorded

TOTAL 0 (0%)

Possible breeding: 0 (0% of total)
Probable breeding: 0 (0% of total)
Confirmed breeding: 0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0



American Wigeon

Anas americana

Expansion of the American Wigeon's breeding range southeastward from Manitoba and western Ontario appears to be responsible for irregular nesting in eastern Canada, New York, and Vermont. Major concentrations of breeding wigeons occur from Alaska and northwestern and north central Canada south to the northern Great Plains.

Most of the American Wigeon migration misses Vermont. Central Canadian breeders generally move southeastward through central New York (Bellrose 1980). An early fall migrant, this species is observed in Vermont from late August through late October. It returns to Vermont early in the spring, typically showing up about the second or third week of March. Few American Wigeons remain inland during the winter, instead preferring coastal marshes and estuaries.

Historically, the breeding of American Wigeons has been confirmed only once in Vermont—at Dead Creek Wildlife Management Area on July 17, 1962. A hen and nine ducklings were discovered in a meadow of mixed grasses and forbs with scattered dogwoods and red cedars (Fuller and King 1964).

The sole Atlas Project record is a probable report (P for pair in suitable habitat) from Young Island, where on June 27, 1981 three widely scattered pairs of adults were discovered swimming just off the island in Lake Champlain. Young Island is uninhabited and overgrown with nettles and scrub (ASR, S. B. Laughlin and A. L. Gosnell).

Favored breeding habitats appear to include meadows near water, prairie potholes, large river deltas, and islands in lakes (For-

bush 1925; Munro 1949; Johnsgard 1975; Bellrose 1980). American Wigeons are less prone to nest in small, shallow-water marshes than other dabblers (Phillips 1923; Palmer 1976). Egg-laying dates range from mid May to mid June; a typical clutch consists of 8 to 10 eggs, which are incubated for 23 to 25 days (Munro 1949; Bellrose 1980). Nests are generally located on dry ground.

While feeding, American Wigeons are often found in the company of diving ducks and coots, from whom they pirate succulent aquatic plant stems and foliage. Rather then steal from these birds, wigeons may simply scavenge the plants they have dislodged as the plants float to the water's surface.

CHRISTOPHER FICHTEL

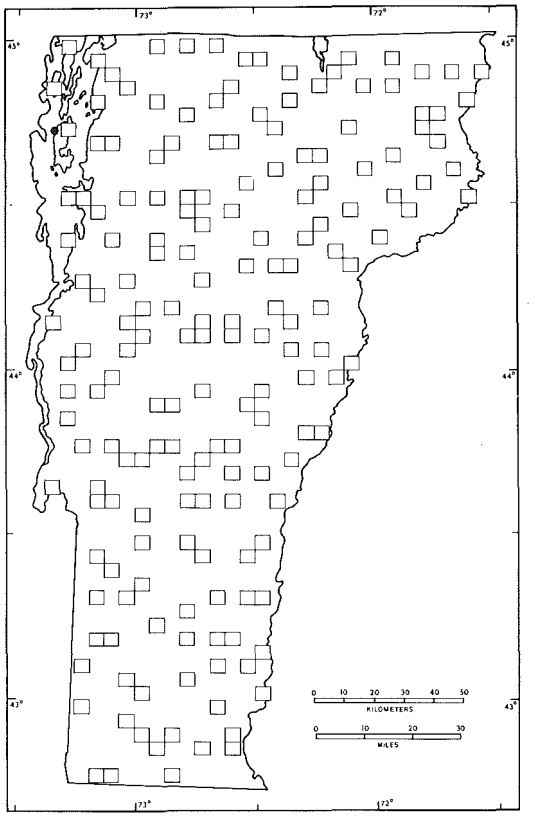
No. of priority blocks in which recorded

TOTAL 0 (0%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0



Ring-necked Duck

Aythya collaris

Since the early 1930s, the number of breeding Ring-necked Ducks has been increasing in the Northeast. This increase has not followed the unidirectional, incremental pattern exhibited by other species at the edge of their range; instead, these ducks have been recorded breeding at scattered locations (Mendall 1958). The greatest number of Ring-necked Ducks occurs in the closed boreal forest zones of north central and northwestern Canada (Bellrose 1980).

Historical records for the Ring-neck's presence in Vermont suggest that it has been a widely scattered breeder in the state since the late 1940s. The possibility of nesting pairs was first documented in 1949—a pair on Stiles Pond in Waterford on May 5, and a pair on South Bay, Lake Memphremagog on June 24 (Smith 1950a). Additional records from Coventry, presumably at South Bay or in the marshes of the Barton River, include two females with six young, July 25, 1965; a pair, May 28, 1966; and a pair with one duckling, August 28, 1966 (Eldred 1965;

Eldred 1966). Elsewhere in Vermont, a pair was observed on May 15, 1960 at Shaftsbury in the Valley of Vermont (Kosche 1960); and a pair without young was seen at Dead Creek on June 28, 1964 (Eldred 1964). A hen with four young was discovered at the north end of Gale Meadows Pond in early July 1969 (W. J. Norse, pers. comm.). This boglike area is characterized by numerous small, hummocky islands of leatherleaf and tamarack, and snags. A female incubating nine eggs at Fairfield Swamp Wildlife Management Area was discovered on June 11, 1969 (T. R. Myers, pers. comm.).

During the Atlas Project period one probable nesting occurrence was recorded. In suitable habitat at Moose Bog, Ferdinand, a pair was seen on May 10, 1980 (ASR, W. G. Ellison). Four days later a drake was observed there, acting nervously (ASR, G. F. Oatman). This is a sedge-heath bog containing a large pond, and is similar to habitats reported elsewhere as preferred by Ring-necks. Bull (1974) mentioned boggy ponds with leatherleaf and other ericaceous plants as typical breeding habitat. Mendall (1958) found sedge meadows, bogs, and abandoned beaver flowages to be favored nesting areas among Ring-necks.

Ring-necks may be easily observed during migration periods in Vermont, particularly in the extensive marshes of Missisquoi National Wildlife Refuge. The refuge manager reported that counts from late September to early October 1982 recorded 8,500 Ring-necks, making this species second in abundance only to the Mallard (T. Mountain, pers. comm.). The Ring-neck reaches its greatest fall migration populations and stays in the Champlain Lowlands longest when the water levels are high and marshes flooded (T. R. Myers, pers. comm.). During spring, Ring-necks are present from mid March to mid May, with peak numbers around the third week of April.

In Vermont, the Ring-neck is currently benefiting from the high-quality marshes of the Lake Champlain basin for resting and feeding during fall migration. Documented as nesting only four times in Vermont, the Ring-neck is probably a sporadic breeder in the state.

CHRISTOPHER FICHTEL

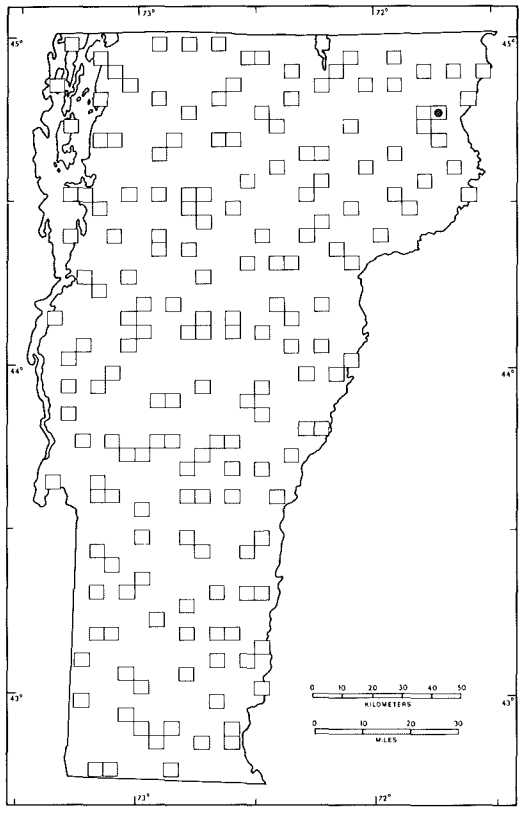
No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	0 (0% of total)
Probable breeding:	1 (100% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	1	6	100
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0



Lesser Scaup

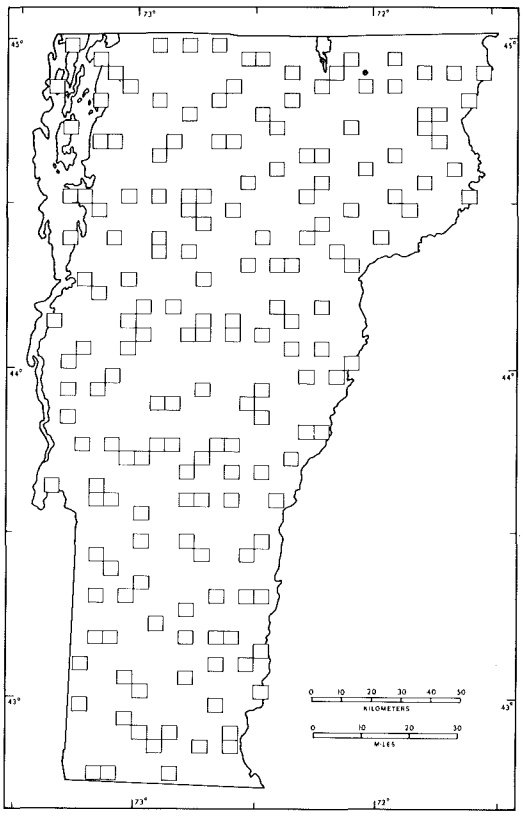
Aythya affinis

During the Atlas Project, the Lesser Scaup was recorded as a possible breeder twice in Vermont. There are no earlier breeding records for the state, although the species is a fairly common migrant and occasional small flocks will linger into winter on Lake Champlain. Concentrations may go undocumented because this species is difficult to distinguish from the Greater Scaup. Migrations of Lesser Scaup through Vermont are generally restricted to Lakes Champlain and Memphremagog and the backwaters of the Connecticut River. Lesser Scaup arrive between the third week of March and the first week of May, with peaks in mid April. They depart between mid September and early December. Lesser Scaup migration is centered in the Mississippi Flyway; those passing through Vermont apparently originate in Manitoba (Bellrose 1980). Lesser Scaup tend to winter farther south than Greater Scaup, concentrating in Florida, coastal Louisiana, and Mexico (Bellrose 1980).

The two possible Vermont nesting occurrences were in Orleans County. On July 3, 1978 a male was seen on a pond near West Charleston (ASR, D. P. Kibbe and A. L. Gosnell). There was no indication of breeding. In early July 1979, a male was discovered on Lake Memphremagog, but again there was no evidence of nesting (ASR, G. F. Ellison and W. G. Ellison). Both lone males might have been lingering nonbreeders or drakes that had already abandoned their hens. The documented nestings nearest to Vermont have occurred in southeastern Ontario and along the St. Lawrence River (Bull 1974).

Lesser Scaup may not breed successfully until their second year (Munro 1941). Nests are built on islands, in open dry locations near water (Munro 1941), or on sedge mats (Townsend 1966). Scaup are known to nest in gull or tern colonies (Vermeer 1968), where predation of juvenile scaup can be quite high. A clutch of nine eggs is incubated by the hen for an average of 24 days (Vermeer 1968).

CHRISTOPHER FICHTEL



No. of priority blocks in which recorded

TOTAL 0 (0%)

Possible breeding:	0 (0% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

Osprey

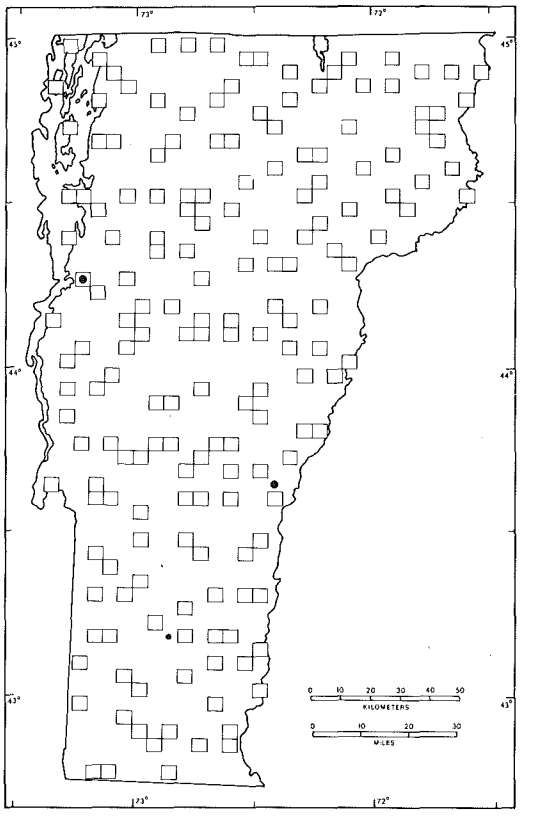
Pandion haliaetus

The Osprey is listed as Threatened in New York and New Hampshire and as Endangered in Vermont. After 10 years on *American Birds*' Blue List (Tate 1981), the Osprey, also known as the "fish hawk," was removed in 1982, in recognition of its apparent recovery as a result of increased control of the pesticide DDT (Tate and Tate 1982).

Although Cutting (1884) stated that he had never seen an Osprey nest in Vermont, Perkins and Howe (1901), Fortner et al. (1933), and Smith (1934) listed the species as an uncommon to rare summer resident and a common migrant.

The historical records yield only three confirmed nesting sites: Shelburne in 1962, South Bay of Lake Memphremagog in 1965, and Barton in 1975. A pair was observed at their nest at the north end of Shelburne Pond in 1963, having returned in the spring soon after the ice melted to a site that had apparently been used for some years (GMAS records, P. Upton; Spear, Field notes). No young were raised in 1963; in 1964, the nest fell and one of the Ospreys was reportedly shot (Spear, Field notes). A nest with an attending adult was located on August 25, 1965 at South Bay in Newport by an observer who considered the species a summer resident there (Eldred, Field notes). A nest in a live, large white pine was observed and photographed in Barton in 1975; it had reportedly been active since 1973. No Osprey were observed in 1976 or 1977, and in 1977 the nest fell (J. D. Stewart, R. Candy, pers. comm.).

During the Atlas Project three probable nesting reports were obtained. A pair was observed on May 30, 1977 at a nest in a large pine on a river in the Champlain Lowlands (its location is being kept confidential by request); the site was not visited in 1978, and no Osprey were in evidence in 1979 (ASR, W. Shedd). Elsewhere, a pair was present in 1977 throughout the breeding season (May through August) along the Ottau-



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	0 (0% of total)
Probable breeding:	1 (100% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	1	3	100
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

quechee River, between Woodstock and Dewey's Pond in Quechee (ASR, A. L. Gosnell and S. B. Laughlin); and a pair was observed in June and July 1978 at Gale Meadows Pond in Winhall (ASR, W. J. Norse).

Single Osprey have appeared in summer months in Vermont with increasing frequency in recent years. These may have been wandering, second-year birds. Henny and Van Velzen (1972) estimated that 5% to 10% of Ospreys on the breeding grounds are 2-year-olds. They found that 2-year-olds may pair up and build a nest, but will not lay eggs.

The species is more common during migration than it is in the summer, as hawk-watch summaries and *Records of Vermont Birds* reports attest. Spring totals range between 23 and 100 Ospreys, while autumn totals are 39 to 150. Peak hawk-watch counts in the fall usually occur around the second and third weeks of September; up to 41 Ospreys may be observed in a day (0.18 per observer hour) (RVB, Fall 1980). Spring migrants are generally observed from late March to late May, and fall visitors as late as November 3.

CHRISTOPHER FICHTEL

Bald Eagle

Haliaeetus leucocephalus

The Bald Eagle is one of two birds found in Vermont that are classified as Endangered by the federal government; it is also classified as Endangered by the state of Vermont. At present Vermont appears to have no nesting population of Bald Eagles. During the Atlas Project survey, Bald Eagles were recorded as possible breeders at South Bay, Lake Memphremagog, near Newport. Single adult birds were observed at South Bay in June or July in 1975, 1976, 1978, 1979, and 1981. In the mid-1960s, sightings were made of Bald Eagles from the Lake Memphremagog drainage in Coventry, Derby, Holland, and Charleston (Stewart 1965). The Holland sighting was of a pair on May 29, 1962. Other Vermont localities where Bald Eagles have been sighted include Lake Champlain and, during migration or in the winter, major river drainages. Sightings of Bald Eagles near Lake Champlain have been recorded from the Crown Point bridge north to Mud Creek in Alburg. During the summer of 1982, one adult and one or two immatures were observed several times at Missisquoi National Wildlife Refuge (RVB, Summer 1982).

Bald Eagles are scarce but regular migrants in Vermont; up to 12 individuals have been observed in a season. In the spring they are seen from late March through May, and in fall from late August through December.

Historically, breeding Bald Eagles in Vermont have been very rare. Thompson (1853) knew of no nesting records but mentioned that the species was regularly seen. Knowlton (1878) and Perkins and Howe (1901) mentioned Bald Eagles breeding at Castleton, presumably near Lake Bomoseen. Bald Eagles nested at Lake Bomoseen in the 1940s (S. B. Laughlin, pers. comm.) Fortner et al. (1933) considered the Bald Eagle to be a "rare summer resident."

Investigations of possible nest sites during a survey in the 1960s revealed no evidence of nesting Bald Eagles (Stewart 1965); however, a summer roost tree was discovered in Vernon. Summer records of adult and immature Bald Eagles near Lakes Champlain and Memphremagog may represent breeding birds from New York and Quebec or wandering birds from the southern U.S. population, which breeds in late winter and wanders northward after breeding. The increased number of sightings in recent years provides hope that Vermont may again play host to nesting Bald Eagles.

CHRISTOPHER FICHTEL

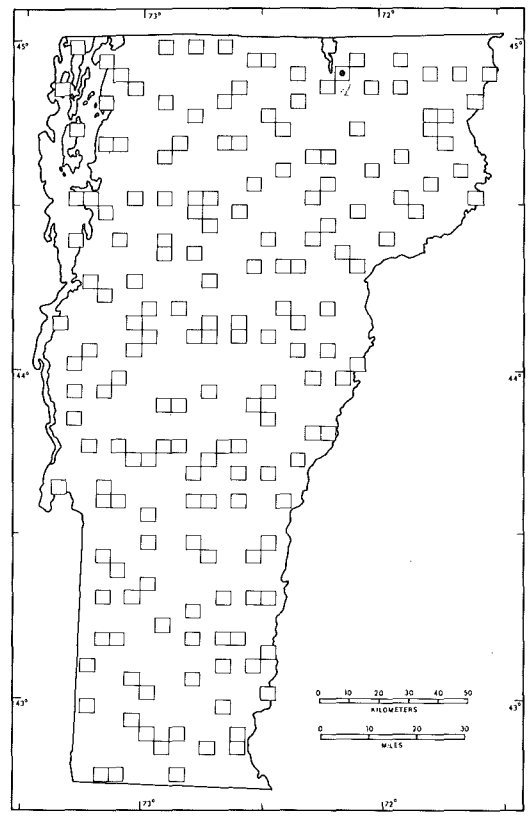
No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	1 (100% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	1	5	100
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0



Ring-necked Pheasant

Phasianus colchicus

The date when the Ring-necked Pheasant was first introduced to Vermont is uncertain, but the Vermont legislature gave the species protection in 1892 (Foote 1946). Birds were primarily stocked in the Champlain Lowlands; up to 5,000 were released at a shooting preserve in Shelburne in 1894. Banded birds from this release were later found near Bennington and Barre (Foote 1946). Favorable conditions, including mild winters and fields of grain and corn, helped fuel a population increase. However, a severe winter in 1904–5 decimated the population, and numbers remained low into the 1920s. The first state-run game farm for raising pheasants was opened in 1922 in Milton by the Vermont Fish and Game Service. An average of 1,500 birds were raised annually until 1937 when, because of economic difficulties, the farm was closed (Foote 1946). The Fish and Game Service continued stocking the Champlain Valley, lower Connecticut River valley, and Bennington County, using pheasants purchased from outside the state (Foote 1946). This system was eventually abandoned. On a trial basis between 1966 and 1971, the Fish and Game Service again stocked pheasants for hunting; since then Ring-necks have not been released by that agency (J. D. Stewart, pers. comm.). Local releases by private individuals have continued.

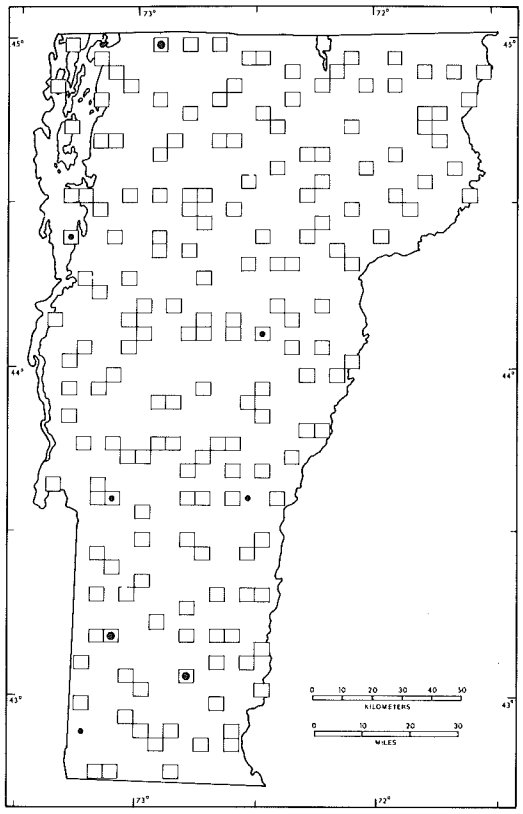
During the 1976–81 Atlas Project survey, nine reports (six possible and three probable nestings), encompassing both priority and non-priority blocks, were recorded.

Two possible nestings and one probable nesting occurred in the Champlain Lowlands; similar numbers were recorded in the Valley of Vermont: two possibles (at West Rutland and Bennington) and one probable (Manchester). Possible nestings—one each at East Barre and Woodstock—occurred in eastern Vermont, and there was one Ring-neck sighted in the Green Mountains (a displaying cock pheasant at Wardsboro). Ring-necks have also been recorded periodically during the past decade in the vicinity of Westminister.

Foote (1946) estimated that during periods of relative pheasant abundance in Vermont areas with substantial cover supported a fall population of 1 Ring-neck per 2.03 ha (5 a), while areas with "average" cover supported 1 bird per 20.3 ha (50 a). However, Allen (1956) doubted that fall populations in Vermont exceeded 1 bird per 40.5 ha (100 a).

Severe winters undoubtedly take their toll on any released pheasant stock, as demonstrated by the species' decline after the 1904–5 winter; in addition, predations affect the population. Hessler et al. (1970) determined that 81% of pen-reared pheasants died within a month of release; 92% of those were killed by predators. These pheasants showed no fear or tendency to seek cover.

CHRISTOPHER FICHTEL



No. of priority blocks in which recorded

TOTAL 6 (3%)

Possible breeding:	3 (50% of total)
Probable breeding:	3 (50% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	2	6	33
Green Mountains	1	2	17
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	1	5	17
Taconic Mountains	2	12	33
Eastern Foothills	0	0	0

Northern Bobwhite

Colinus virginianus

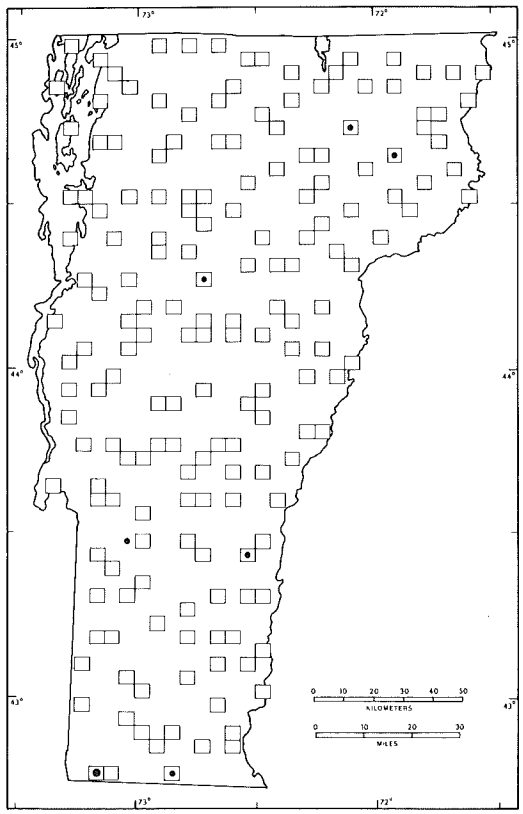
The Northern Bobwhite almost certainly did not occur in Vermont before the arrival of Europeans. Bobwhites now breed throughout eastern, central, and parts of the western U.S. and portions of eastern Mexico and Central America.

Perkins and Howe (1901) and Thompson (1842) alluded to the presence of Northern Bobwhites in Windham and Bennington counties only. Perkins and Howe (1901) stated that bobwhites "occur around Burlington and elsewhere . . . but most probably none are native," and Fortner et al. (1933) mentioned that bobwhites were introduced into Vermont at various times. All introductions were by sportsmens' clubs or breeders; no bobwhites have been stocked by the Vermont Fish and Game Department (J. D. Stewart, pers. comm.).

Northern Bobwhites require a mosaic of vegetative types, including grassy fields, cultivated fields, and brushy areas (Casey 1965). Breeding habitat must contain areas suitable for nesting, feeding, roosting, and dusting. Nesting sites are generally in low, sparse herbaceous vegetation that contains patches of nearly bare ground (Johnsgard 1973). Dusting sites, visited daily, require dry, powdery soil in open areas. Cover requirements are met by brushy habitat along field borders or in clumps within fields.

The six possible and one probable breeding occurrences recorded in priority and non-priority blocks during the Atlas Project were distributed uniformly throughout the state's physiographic regions, with the exception of the Champlain Lowlands. The one report in a non-priority block was in the Taconic Mountains.

Because Northern Bobwhites are nonmigratory, adequate food and cover are necessary to sustain populations through New England winters. Long, cold, snowy winters limit quail populations in northern areas. Lack of food when there is ice or deep, constantly drifting snow is the major limiting factor affecting quail survival (Rosene 1969).



No. of priority blocks in which recorded

TOTAL 6 (3%)

Possible breeding:	5 (83% of total)
Probable breeding:	1 (17% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	2	6	33.3
North Central	1	5	16.7
Northeast Highlands	1	6	16.7
East Central	1	5	16.7
Taconic Mountains	0	0	0
Eastern Foothills	1	4	16.7

Roosting birds can become imprisoned under heavy snows, particularly if an icy crust forms; such entrapment occurs when birds are flushed as by predators during severe weather and take refuge in the snow.

Since the 1900s, much of Vermont has reverted to second-growth forest, habitat unsuitable for the Northern Bobwhite.

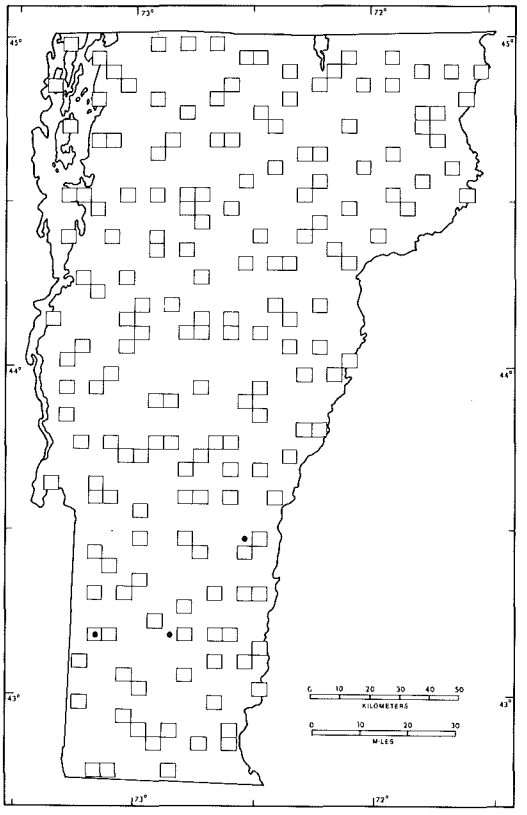
CHRISTOPHER FICHTEL

Yellow-breasted Chat

Icteria virens

The Yellow-breasted Chat is very rare in Vermont. The American Ornithologists' Union's *Check-list of North American Birds* (1983) included southern Vermont as part of the northern fringe of the chat's range, on the basis of the state's one breeding record. The earliest reference to the occurrence of Yellow-breasted Chats in Vermont comes from Cutting (1884), who mentioned it as "very rare." In 1896, the Yellow-breasted Chat was a summer resident at Pownal (Chapman 1907). Ross (Field notes) discovered the first and only instance of nesting in Vermont at Bennington on June 20, 1912: 2 adults, a nest, 3 young, and 1 egg were found. The young were gone from the nest on June 30. Ross also mentioned occurrences of single chats at Bennington on July 23, 1939; May 19, 1940; and May 20, 1941. Ramsey (1950) found a singing male in Dorset on June 15, 1948.

There were four records of Yellow-breasted Chats during the Atlas Project period. A Yellow-breasted Chat giving the breeding season squeaks, grunts, and whistles typical of the species was flushed from shrubs in a semi-open wooded ravine in Reading on May 23, 1978 (ASR, L. N. Metcalf); four years later, on May 25, 1982 (after the Atlas Project), near that site, a chat was again heard singing, but no further nesting evidence was found. In mid June 1979 near Winhall, a male was heard singing in habitat described as "scrub apple and other bushes along the road" (ASR, W. J. Norse). A possible nesting occurrence in Rupert was reported in 1981 (ASR, C. S. Chapin): a pair was seen on July 16 in an abandoned orchard overgrown with dense



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	1 (100% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	1	6	100
Eastern Foothills	0	0	0

shrub cover (lilac, blackberry, honeysuckle, and blueberry). A follow-up visit was made in early August, but no chats were found. The northernmost breeding season report is of a singing male seen July 10, 1976, at Mud Creek Wildlife Management Area in Alburg (B. O'Donnell, GMAS records).

Only one other breeding season report exists—a Yellow-breasted Chat was discovered in White River Junction on June 14, 1974 (RVB, Spring 1974). Few migration records exist for this species in Vermont. There are three May records: May 14, West Rutland; May 18, Rockingham; and May 20, Reading. There are five fall records: single birds reported from Marshfield, Wallingford, and Pomfret, all in August; a chat banded at Woodstock in September (VINS banding data); and a chat banded in October in Shelburne (Woods 1981).

CHRISTOPHER FICHTEL

Henslow's Sparrow

Ammodramus henslowii

The Henslow's Sparrow was only recorded twice in Vermont during the Atlas Project period. One record (of possible breeding) was of a singing male found June 24, 1977 in Quechee, on an old hillside hayfield covered in milkweed, dogbane, wild raspberries, grasses, ferns, and sedges; the bird was not located on subsequent visits that year or in subsequent years (ASR, A. L. Gosnell). The second record was of a male heard singing several times in June 1981 in Clarendon, in a low sedge meadow that had not been cut for several years; a thorough search did not reveal a nest (ASR, L. H. Potter). This same site had held breeding pairs off and on since the early 1900s. Potter (1915) stated that Henslow's Sparrows were quite common in suitable habitats in West Clarendon, with six to eight pairs nesting on or near his farm. He described their preferred habitat as "moist upland meadows not under the plow, grown up to clumps of ferns, tall meadow rue, and scattered shrubbery." He reported locating two nests, one on August 9, 1909 and one on August 9, 1911, each of which contained one fresh egg. The nests were on the ground in a depression; they were composed of fine grasses, were concealed in a patch of thick grass, and were "mowed out" during haying operations.

Historically, the species has bred at four or more additional sites in Vermont: in Pownal a Henslow's was reported feeding young on June 23, 1883 (Brewster 1895); in Bennington a Henslow's was found nesting in 1909, and each year thereafter from 1911 to 1917, in a swamp south east of the town (Ross 1927); at Wells River at least six pairs were reported in a 12 ha (30 a) field (Smith 1950c); in Saxtons River three young were raised in June and July 1953 (Blakney 1953).

Vermont appears to have suitable habitat for this sparrow at present. Henslow's Sparrows occur erratically in loose breeding colonies in fallow grasslands (Hyde 1939; Graber 1968; Robins 1971). Their erratic occurrence, insectlike song (a short *ser-rit*), and choice of habitat make them a difficult species to find, much less confirm.

Recent concerns have been expressed about population declines in the Northeast that are presumably a result of habitat loss (Dowlan and Craig 1976; Tate and Tate 1982). The Henslow's has been proposed for Endangered Species status in Vermont. It has disappeared from almost all of New England—only one active nest site is currently known—and is rare and declining in New York (L. Master, pers. comm.).

DOUGLAS P. KIBBE
SARAH B. LAUGHLIN

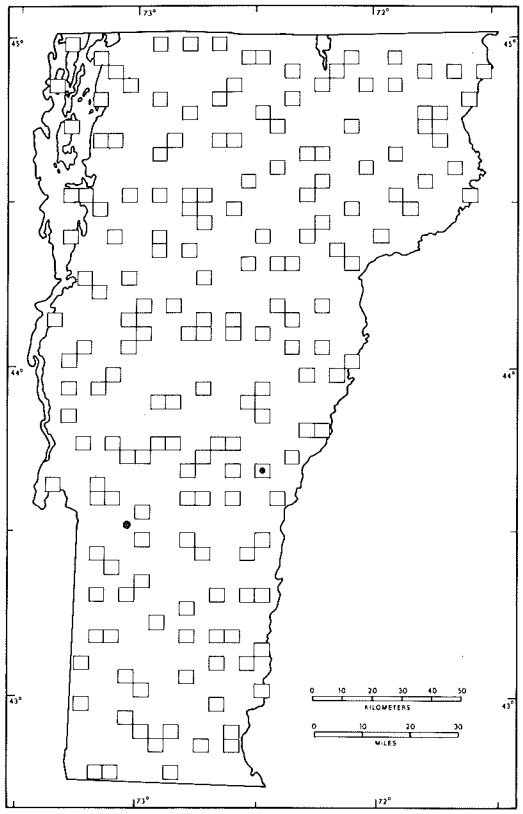
No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	1 (100% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	0	0	0
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	1	4	100



Pine Grosbeak

Pinicola enucleator

The Pine Grosbeak's nesting status in Vermont is uncertain. The American Ornithologists' Union's *Check-list of North American Birds* (1983) stated that the species probably breeds in northern Vermont, perhaps because the species is known to have nested in northern New Hampshire (Forbush 1929; Bent 1968).

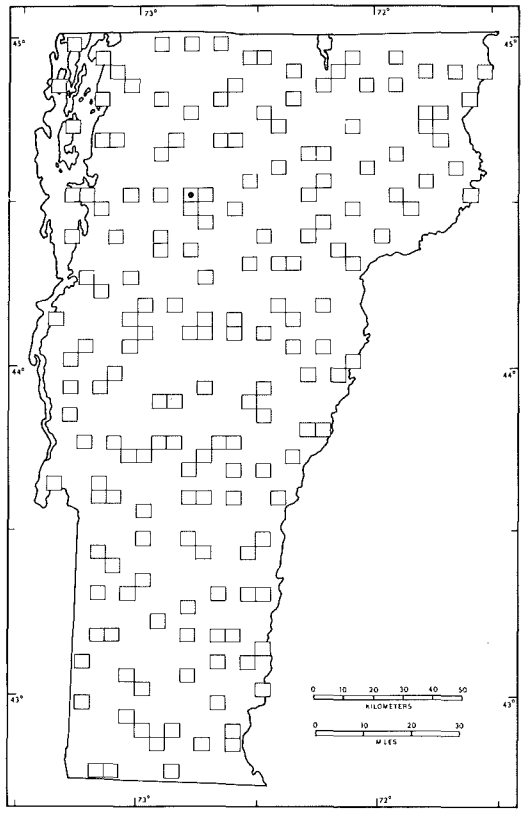
The only documented summer records during the Atlas Project came from Mt. Mansfield; in addition, in 1978 a sighting was reported on Wheeler Mountain in Sutton, but no details were given (RVB, Summer 1978). The Atlas Project records for the species were a male in old growth spruce-fir on Mt. Mansfield (ASR, A. Wagner), seen and heard singing for 4 to 5 days during the latter half of June, 1980 (PO); and a male observed and heard singing on three separate occasions during the latter half of June 1979 (PR), at 975 m (3,200 ft) in mixed spruce-fir-birch forest on Mt. Mansfield (ASR, C. Schultz).

Historical evidence of Pine Grosbeaks nesting in Vermont is almost nonexistent. Cutting (1884) referred vaguely to the Pine Grosbeak as "a resident of northern Vermont and found now and then almost everywhere."

Fall, winter, and spring counts vary from year to year; up to 1,155 Pine Grosbeaks were found on 13 Christmas Bird Counts in December 1980. Pine Grosbeaks generally begin to appear in Vermont during the second or third week of October; they linger through March, and scattered sightings are

made into early May. Unlike the crossbills, which often do not appear in years of low conifer seed crops, Pine Grosbeaks occur in greater or lesser numbers every winter, probably because they seem to prefer such a variety of wild foods, including the fleshy fruits of the crabapple, mountain ash, sumac, and holly; the buds of maple, birch, and aspen; and the seeds of yellow and white birches.

CHRISTOPHER FICHTEL



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	1 (100% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	1	2	100
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

Red Crossbill

Loxia curvirostra

The Red Crossbill is considered one of Vermont's most erratic nesting species. Neither dates nor locations of nesting are predictable for this bird. Food supply probably influences when and where Red Crossbills will nest (DeGraaf et al. 1980); breeding often occurs where conifer seed crops are plentiful, and does not occur when such crops fail. Nesting generally takes place in late winter and early spring but can occur during the summer and fall as well (Bent 1968). Following nesting, family groups often join together and invade new areas, usually conifer stands, in search of food (Bent 1968).

Early references to Red Crossbills in Vermont mention nesting. Eggs were collected at Orleans (Thompson 1853), and nests were found at Middlebury and Craftsbury (Howe 1902). Davenport (1907) noted that Red Crossbills nested in towns at 366 m (1,200 ft) elevation in Bennington and Windham counties. A pair was observed collecting nesting material in late May 1948 at Wells River (Smith 1948). A male and female were seen daily throughout September 1953 in South Londonderry, where in late October 1953 an adult male, adult female, and eight immatures were also observed (Downs 1953).

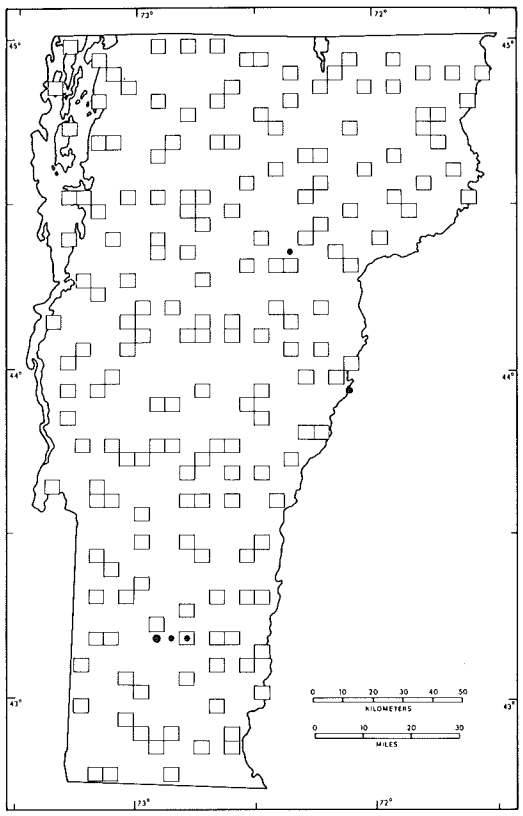
Summer records abound. Perkins and Howe (1901) mentioned Red Crossbills summering in Burlington and other parts of the

state. Davenport (1908) found them in flocks and pairs all summer on Mt. Mansfield in the summers between 1902 and 1906; Ross (1914) had a June record for Bennington; Eaton and Curry (1926) recorded sightings of Red Crossbills along portions of the Long Trail in the Green Mountains in June, July, and August; and Potter (1944) reported immatures on Pico Peak in June. Ten additional summer records exist between 1945 and 1968 from Burlington south to Marlboro (RNEB 1945–68).

During the five years of the Atlas Project there were no nesting confirmations and only five records for this species, three of which were clumped around Winhall and Londonderry in the southern Green Mountains. On June 26, 1979, 5 Red Crossbills—possibly a family group, as some appeared to have streaked juvenile plumage—were seen moving through a mixed conifer (spruce-fir-hemlock) stand at Gale Meadows Pond in Winhall (ASR, W. J. Norse). From November 1979 through April 1980, 10 to 12 Red Crossbills were seen in the vicinity of a pine stand in Winhall; singing males were heard there in February. On June 30, 1981 a Red Crossbill was observed flying from one pine stand to another in Londonderry (ASR, W. J. Norse). The only other occurrences during the Atlas Project were of 4 crossbills in suitable habitat in Marshfield on June 30, 1979 (ASR, M. F. Metcalf), and a pair in red pines at Eel Pot Ledges in Fairlee on May 12, 1980 (ASR, N. L. Martin).

According to sightings reported to *Records of Vermont Birds* (1973–83), Red Crossbills are most commonly seen from October through January and in March, although they have been reported in all months of the year. A spring invasion occurred in 1973; flocks of 10 to 30 birds were observed daily in Londonderry, Grafton, and Hartford, with a maximum of 150 in Londonderry on March 16. During irruptive periods both Red Crossbills and White-winged Crossbills are common; but in general the latter are seen more frequently and in higher numbers than the former.

CHRISTOPHER FICHTEL



No. of priority blocks in which recorded

TOTAL 1 (0.6%)

Possible breeding:	1 (100% of total)
Probable breeding:	0 (0% of total)
Confirmed breeding:	0 (0% of total)

Physiographic regions in which recorded

	no. of priority blocks	% of region's priority blocks	% of species' total priority blocks
Champlain Lowlands	0	0	0
Green Mountains	1	2	100
North Central	0	0	0
Northeast Highlands	0	0	0
East Central	0	0	0
Taconic Mountains	0	0	0
Eastern Foothills	0	0	0

A Reintroduced and a Post-Atlas Project Breeding Species

Peregrine Falcon

Falco peregrinus

The Peregrine Falcon, now on the federal government's Endangered Species List, once bred on many Vermont cliffs and may do so once more if current reintroduction efforts are successful. Extirpated as a breeding species east of the Mississippi River by the mid-1960s, the Peregrine is included in the species accounts because of the reintroduction efforts that took place in Vermont in 1977, 1982, 1983, and 1984.

A careful search of historical data undertaken for the atlas documented 27 cliff sites where the Peregrine once bred in Vermont. Firm evidence is available for these sites in the form of photographs, collected eggs, or reports of nests or young. References exist to an additional 32 sites, but refer to "breeding" or "nesting" with no substantiating details. These historic locations occur in all of Vermont's physiographic regions.

Peregrines were already in decline in the eastern U.S. by the end of World War II as a result of the depredations of egg collectors, hunters, and farmers, and because of other human disturbances at their nesting sites; but the heavy use of pesticides in the late 1940s caused their drastic and nearly global reductions, with European and eastern North American populations especially hard hit (Ratcliffe 1967). Pesticides were widely and heavily used in Vermont in that period (R. Spear, pers. comm.).

Forbush (1927), citing Karl Pember, considered the Peregrine a rare and local summer resident in Vermont, with at least 20 pairs present here. Fortner et al. (1933) stated that there had been "a decrease from Pember's 20." Smith (1934) wrote that the Peregrine "has become increasingly rare. Only a third the number are now present in Rutland County in comparison with 50 years ago." Peregrines were photographed raising their young on White Rocks in Wallingford in the early 1950s (L. H. Potter, pers. comm.). The last documented Vermont nesting occurred in the Taconic Mountains in 1957 (W. R. Spofford, pers. comm.). The eastern race of the Peregrine Falcon was extirpated as a breeder from the entire eastern part of the continent by 1965 (Cade 1970). A male Peregrine Falcon seen in 1968 and 1970 at Mt. Pisgah, above Lake Willoughby, could have been the last wild member of that population (Fyfe et al. 1976; Eldred, Field notes; W. Spofford, pers. comm.).

When pesticide controls led to declining levels of DDT in prey species, the Peregrine Fund at the Laboratory of Ornithology at Cornell University and the U.S. Fish and Wildlife Service launched a reintroduction program. Five hundred and eleven captive-produced young Peregrines were released in the east between 1975 and 1983 (Barclay and Cade 1983; J. Barclay pers. comm.). The first Vermont release took place in the Green Mountain National Forest in 1977. In 1982, 1983, and 1984, Peregrines were hacked at three Vermont sites—two in the Green Mountain National Forest, and one in east central Vermont. Hacking is the process of placing young falcons in artificial nest boxes and then releasing them; hack site attendants then provide food and protection for the young birds, while carefully avoiding direct contact with them, for the over two-month period required for them to reach independence. In Vermont 39 Peregrines have been hacked between 1977 and 1983, with 35 of the birds surviving to become independent. Some of these captive-bred falcons were sighted in 1983; and in the spring of 1984 a female released in 1982 from the Vermont Institute of Natural Science's site paired with a male in Montreal and raised 2 young on a ledge of a downtown skyscraper.

An increasing number of Peregrine Falcons are being sighted in Vermont during migration, but only a single summer sighting occurred during the 1976–81 Atlas Project: an adult was observed July 1, 1978 on the Barton Marshes of Lake Memphremagog (RVB, Summer 1978).

G. FRANK OATMAN

Great Black-backed Gull

Larus marinus

The Great Black-backed Gull was not recorded as a possible, probable, or confirmed breeder in Vermont during the period of the Atlas Project. The Great Black-backed Gull was added to Vermont's list of breeding species in 1983, when on May 21 a pair, one of which was incubating eggs, was discovered on Young Island in Lake Champlain (BVR, R. M. and D. Lavallee; RVB, Spring 1983 and Summer 1983). The first record of the Great Black-backed Gull in the state was of an adult near Brattleboro on December 31, 1948; this bird was joined by an immature on January 2 (Smith 1950a; CBC 1948–49). Numbers increased steadily during the next two decades, especially on Lake Champlain, so that Spear (1976) considered the species a regular winter visitor and a rare summer straggler to Vermont. A first breeding occurred on New York's Four Brothers Islands in Lake Champlain in 1975, and by 1983 five nesting pairs occupied all the islands (J. M. C. Peterson, pers. comm.).

The traditional breeding range of the Great Black-backed Gull is along the coastal areas of the North Atlantic, although the species has also bred sporadically on the Great Lakes since 1954 (Bull 1974). Breeding pairs were also discovered at two inland New York sites in 1983. Before 1931, Great Black-backs were known to breed only as far south as Nova Scotia. The National Association of Audubon Societies employed wardens to protect important coastal bird colonies beginning in 1904, which led to dramatic increases in the numbers of nesting gulls, terns, and other birds (Norton and Allen 1931). In 1931 Norton and Allen (1931) documented nesting by Great Black-backed Gulls at 10 locations on the Maine coast, and the same year Eaton (1931) found the first Massachusetts breeding pair at Salem. The southward expansion has continued and this species is apparently in the process of extending its inland breeding range as well. Further population growth should be expected. Continued population expansion may be a problem if it occurs at the expense of less aggressive species such as the Common Tern and Ring-billed Gull; Great Black-backed Gulls typically nest on islands among colonies of other gulls and terns, upon whose young they frequently prey.

Great Black-backed Gulls are among Vermont's longest-lived birds; some individuals may survive for nearly two decades. Since the young require 3 to 4 years to reach sexual maturity, a long life is a prerequisite to successful reproduction. The origin of the birds discovered on Young Island is unknown, but the likelihood seems high that they were descendents of the gulls breeding on New York's Four Brothers Islands only a few miles away.

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SARAH B. LAUGHLIN

Appendixes, References Cited, and Index of Bird Names

APPENDIXES

APPENDIX A: Vermont Geography and Ecology

Vermont's environment has undergone major changes since European settlement began in the mid-1700s. The primeval forests were composed primarily of sugar maple, beech, birch, and hemlock, interspersed with other hardwoods and spruce. Oak and chestnut were prominent forest trees in the larger river valleys, particularly in the southern and western parts of the state. The sandy soil of the Champlain Valley supported forests of white, pitch, and red pine. White pine was also found in regenerating fire clearings. Openings in the original forest included marshes, beaver meadows, bogs, alpine mountain summits, and clearings created by the native Abenaki peoples. These open areas probably accounted for no more than 5% of the land in Vermont at the time of European settlement (Harper 1918). The higher elevations were dominated by forests of spruce, hemlock, and fir.

The first European settlers arrived in Vermont from the south, primarily along the Connecticut River and other waterways. As they arrived, settlers cleared the land for farms and villages. The wood from the forests was used for homes, tools, and fuel, or exported or burned. Most people were engaged in agriculture, and, as a result of their activities, hillsides became pastures for cattle and sheep, and valley bottoms became hay and grainfields. By the time Vermont became a state in 1791, the population had reached 85,000; by 1810, it had grown to 218,000 (Johnson 1980). By the 1880s, forests covered only about 35% of the state. The ridge of the Green Mountains and most of Essex County were the only areas in Vermont that remained unsettled (Harper 1918). By this time, large numbers of farms had been or were in the process of being abandoned—rocky soil and poor farming practices had led to impoverished soil and extensive erosion, and new, fertile land was available in the West. White pine invaded the abandoned fields and quickly formed dense stands. By the time the pines were clear-cut near the end of the 1800s, shade-tolerant trees such as sugar maple and American beech had established themselves in the understory; Vermont's present hardwood forest developed from these saplings and from seedlings left behind by the loggers. Currently, in an almost complete reversal, most of Vermont is covered by second-growth forest, and only 25% of the land is cleared (Johnson 1980).

Vermont has a highly varied landscape and encompasses an impressive array of habitats within a relatively small area. The state is 416.8 km (259 mi) long and 138.4 km (86 mi) wide at its widest point, with an area of 24,887 sq km (9,609 sq mi). It encompasses farmland, forests, and alpine mountaintops, and ranges from the rocky islands of Lake Champlain to the boreal forest of the Northeast Kingdom (as the northeast corner of the state is called). For further information, the reader is referred to *The Nature of Vermont* (Johnson 1980), *A Guide to New England's Landscape* (Jorgensen 1971), *The Geographic Regions of Vermont* (Meeks 1975), *The White-tailed Deer Resource of Vermont* (Dickinson and Garland 1974), and *A Guide to Bird Finding in Vermont* (Ellison 1981).

The physiographic regions used by the Atlas Project and in this book are based, with some variations, on those developed by the Vermont Fish and Game Department in their studies of the deer herd in Vermont. These physiographic regions are based on geology, topographical features, soil types, and vegetative cover (Dickenson and Garland 1974; Garland 1977).

The *Green Mountains*, the dominant physical feature of Vermont—form a long narrow strip bisecting the state from Canada to Massachusetts. Mt. Mansfield, 1,339 m (4,393 ft) and many of the state's highest mountains are in this range. The western boundary of the region is fairly well defined, but the mountains gradually merge with the hills to the east. The high elevation of the region gives it

the greatest annual rain and snowfall as well as a cool climate. The southern third of the region consists of a broad upland plateau, while to the north of Sherburne the Green Mountains divide into three parallel ranges. Much of the region is covered with northern hardwood forest, dominated by sugar maple, American beech, yellow birch, and eastern hemlock. As elevation increases, these trees are replaced by red spruce, white birch, and balsam fir. The spruce-fir forest becomes stunted at high elevations, and two of Vermont's mountains (Mansfield and Camels Hump) support small areas of alpine tundra. Forestry practices and the expansion of several ski areas in the region, accompanied by second-home development, will inevitably have some impact on the region's birdlife in the future.

The *North Central* and *East Central* regions, and *Eastern Foothills* have been treated as a single physiographic region by many geographers. For the Atlas Project they are divided because of latitudinal climatic differences and slight differences in topography and land use. All three are characterized by hills and valleys, forests and farms. Northern hardwood is the dominant forest type, although pockets of spruce-fir forest are common in the North and East Central regions, and oaks are an important forest component along the Connecticut River, especially in Windham and Windsor counties. The milder climate along the Connecticut River provides a corridor for range expansion by traditionally southern birds. Small lakes and beaver ponds are important water habitats in the two northern regions; small wetlands along backwaters of the Connecticut River influence the distribution of certain waterbirds in the Eastern Foothills. The area around Lake Memphremagog, in the North Central region, has characteristics similar to the Champlain Lowlands; there are delta marshes on Lake Memphremagog, and the flatter topography creates a landscape in which agriculture is very important. Farming has become marginal in parts of the other regions, and open habitats may become scarce during the next several decades.

The *Taconic Mountains* are generally not as high as the Green Mountains, although several peaks in the Vermont part of the range exceed 914 m (3,000 ft), and two, Equinox and Dorset, exceed 1,128 m (3,700 ft). This region is sometimes also referred to as the Western Foothills. The highest ridges support spruce-fir forest, while most slopes are covered with northern hardwoods. The climate of the Taconics is warmer than that of the Green Mountains; here oaks, and in some places hickories, are an important forest component. The range is cut by several rivers whose flat valleys provide agricultural land. The eastern edge of the Taconic Mountains is the geographically distinct Valley of Vermont, a narrow, low valley extending from the Pownal-Bennington area north to the Champlain Lowlands. Its lower elevation acts as a corridor for several bird species that are excluded from cooler, mountainous areas.

The *Champlain Lowlands* have a flat or gently rolling landscape, calcareous bedrock, and deep soils. Much of the region is open agricultural land, with fields, pastures, orchards, and scattered small woodlots. More extensive wooded tracts are found on the steeper hills and on swampy land along rivers and the lakeshore. Upland forests in the Champlain Lowlands are mainly northern hardwoods, with northern red and white oaks and shagbark hickory replacing hemlock and yellow birch. White pine is also common. Silver maple, swamp white oak, and cottonwood predominate in the swamp forests. A few isolated northern white cedar and black spruce wetlands affect the distribution of certain birds with northern affinities. The most extensive cattail marshes in Vermont are located in this region; they are, indeed, some of the finest inland marshes in the eastern United States. The rain shadow created by the Adirondack Mountains to the west make this the driest region in Vermont. Its low elevation and the ameliorating effect of Lake Champlain make it the warmest as well. Since the 1960s, the area around Burlington has experienced rapid growth, with extensive suburban development and consequent changes in habitat.

The *Northeast Highlands* are the Vermont portion of the granitic dome system centered in the White Mountains of New Hampshire. The region's mountains are significantly higher than those in the adjacent North and East Central regions, with eight named peaks over 914 m (3,000 ft) high. The region's acidic soils and cool climate support extensive stands of boreal forest dominated by balsam fir and red spruce, and replaced by black spruce in wet forests. The boreal forest provides habitat for northern birds either not found or very rare in other regions of Vermont. Northern hardwood forests grow at middle elevations and near the Connecticut River. Clear-cutting is a widely used logging technique in the region, creating habitat for birds of edge and second growth, while reducing habitat available for boreal forest species.

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WALTER G. ELLISON

APPENDIX B: Plants Cited in the Text

alder *Alnus rugosa/serrulata/crispa*
alfalfa *Medicago sativa*
apple *Pyrus malus*
ash *Fraxinus* spp.
aspen *Populus tremuloides/grandidentata*

bee-balm *Monarda didyma*
beech, American *Fagus grandifolia*
birch *Betula papyrifera/lutea/lenta*/etc.
  white *B. papyrifera*
  yellow *B. lutea*
blackberry *Rubus allegheniensis*/etc.
blueberry *Vaccinium* spp.
box elder *Acer negundo*
butternut *Juglans cineria*
buttonbush *Cephalanthus occidentalis*

cattail *Typha latifolia/angustifolia*
cedar *Thuja occidentalis/Juniperus virginiana*
  red *J. virginiana*
  white (northern white) *T. occidentalis*
cherry *Prunus pensylvanica/serotina/virginiana*/etc.
  black *P. serotina*
  pin *P. pensylvanica*
chestnut *Castanea dentata*
clover *Trifolium pratense/repens/arvense/hybridum*/etc.
corn *Zea mays*
cottonwood, eastern *Populus deltoides*
crabapple *Pyrus prunifolia/baccata/* etc.
(bald) cypress *Taxodium distichum*

dogbane *Apocynum* spp.
dogwood *Cornus stolonifera/obliqua/racemosa/amomum*/etc.

elm, *Ulmus americana/rubra*
  American *U. americana*

fern Osmundaceae/Polypodiaceae
fir, balsam *Abies balsamea*
fireweed *Epilobium angustifolium*
fungus, Dutch elm disease *Ceratocystis ulmi*
  heart rot *Spongipellis pachyodon*
  hoof or tinder *Fomes igniarius*

grape *Vitis* spp.
grass Gramineae
  reed Canary *Phalaris arundinacea*

hardhack *Spiraea tomentosa*
hawthorn *Crataegus* spp.
heath Ericaceae
hemlock, eastern *Tsuga canadensis*
hickory *Carya cordiformis/ovata*/etc.
  shagbark *C. ovata*
hobblebush *Viburnum alnifolium*
holly *Ilex* spp.
honeysuckle *Lonicera tatarica*

jewelweed *Impatiens capensis*
juniper *Juniperus communis*

larch *Larix* spp.
(mountain) laurel *Kalmia latifolia*
leatherleaf *Chamaedaphne calyculata*
lichen Ascomycetes: Lecanorales
  (used in nest decoration: *Parmelia* spp.)
  old-man's-beard *Usnea* spp.
lilac *Syringa vulgaris*
linden *Tilia americana*

(red) mangrove *Rhizophora mangle*
maple *Acer* spp.
- mountain *A. spicatum*
- red *A. rubens*
- silver *A. saccharinum*
- striped *A. pensyvanicum*
- sugar *A. saccharum*

meadow rue *Thalictrum polygamum*
meadowsweet *Spiraea alba/latifolia*
milkweed *Asclepias syriaca/incarnata/* etc.
moss, sphagnum *Sphagnum* spp.
mountain-ash *Pyrus americana/decora*
mulberries *Morus* spp.

nettle *Urtica dioica/gracilis/*etc.

oak *Quercus rubra/alba/prinus/velutina/bicolor/*etc.
- northern red *Q. rubra*
- swamp white *Q. bicolor*

pine *Pinus strobus/resinosa/rigida/sylvestris/*etc.
- pitch *P. rigida*
- red *P. resinosa*
- white *P. strobus*

poison ivy *Rhus radicans*
pondweed *Potamogeton* spp.

raspberry *Rubus idaeus*
reed *Phragmites communis*
rhododendron *Rhododendron maximum*
rose, multiflora *Rosa multiflora*

salvia *Salvia splendens*
sedge Cyperaceae: *Carex* spp.
smartweed *Polygonum* spp.
spanish-moss *Tilandsia usneoides*
spiraea *Spiraea* spp.
spruce *Picea* spp.
- black *P. mariana*
- Norway *P. abies*
- red *P. rubens*
- white *P. glauca*

steeple-bush *Spiraea tomentosa*
sumac *Rhus typhina/glabra/*etc.
sweet-gale *Myrica gale*

tamarack *Larix laricina*
thistle *Cirsium* spp.
trumpet-creeper *Campsis radicans*

viburnum *Viburnum alnifolium/cassinoides/lentago/recognitum/acerifolium/edule/trilobum*

willow *Salix* spp.

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APPENDIX C: Animals (other than Birds) Cited in the Text

ant Hymenoptera: Formicidae
- carpenter *Camponotus* spp.

bat Chiroptera: Vespertilionidae
beaver *Castor canadensis*
beetle Coleoptera
- bark Scolytidae
- click Elateridae
- elm bark *Scolytus multistriatus*
- Japanese *Popillia japonica*

budworm, spruce *Choristoneura fumiferana*
butterfly Lepidoptera: Rhopalocera

caterpillar Lepidoptera
- spiny elm (mourning cloak) *Nymphalis antiopa*
- tent *Malacosoma americana/disstria*

cattle *Bos taurus*
chafer, leaf Coleoptera: Rutelinae
chipmunk *Tamias striatus*
cicada Homoptera: Cicadidae
cottontail *Sylvilagus floridanus/transitionalis*
crab Decapoda: Brachyura

crayfish Decapoda: Astacidae
cricket Orthoptera: Gryllidae
cutworm Lepidoptera: Noctuidae

deer *Odocoileus virginianus*
dragonfly Odonata: Anisoptera

earthworm Oligochaeta: Lumbricidae

fly Diptera
frog Anura: Ranidae
  pickerel *Rana palustris*

grasshopper Orthoptera: Acrididae

hare, snowshoe *Lepus americanus*
harvestman Arachnida: Opilones
honeybee *Apis mellifera*

kangaroo-rat *Dipodomys* spp.
katydid Orthoptera: Tettigonidae

leech Annelida: Hirudinea

moth Lepidoptera: Heterocera
  cecropia *Hyalophora cecropia*
  gypsy *Porthetria dispar*
  hawk Sphingidae
  tussock Liparidae
mouse *Mus/Peromyscus* spp.
  deer *P. maniculatus*
  white-footed *P. leucopus*
muskrat *Ondatra zibethica*

pike, northern *Isox lucius*
pocket-gopher Rodentia: Geomyidae

raccoon *Procyon lotor*
rat *Rattus norvegicus*

sheep *Ovis aries*
shrew *Blarina brevicauda/Sorex* spp.
shrimp Decapoda: Natantia
skunk *Mephitis mephitis*
snail Mollusca: Gastropoda
snake Squamata: Serpentes
  black rat *Elaphe obsoleta*
spider Arachnida: Araneida
squirrel *Sciurus/Tamiasciurus/Glaucomys* spp.
  flying *Glaucomys sabrinus/volans*
  red *Tamiasciurus hudsonicus*

tadpole Anura: Bufonidae/Hylidae/Ranidae

vole *Microtus/Clethrionomys* spp.
  meadow *Microtus pensylvanicus*
  red-backed *Clethrionomys gapperi*

wasp, gall Hymenoptera: Cynipidae
  parasitic Hymenoptera: Ichneumonoidea/Chalcidoidea/etc.
webworm, fall *Hyphantria cunea*
weevil Coleoptera: Cucurlionidae
  clover *Hypera* spp.

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APPENDIX D: Northeastern Breeding Bird Atlas Conference Recommendations

Grid Recommendations

The Northeastern Breeding Bird Atlas Conference held in November 1981 at the Vermont Institute of Natural Science adopted the following guidelines for choosing an atlas grid:

There are four basic Atlas grid systems in use in North America: latitude-longitude (latilong); Universal Transverse Mercator (*UTM*); modified, state *UTM*; and section/township. The Northeastern Breeding Bird Atlas Conference recognized that each system has its own regional advantages, and that it is impractical to recommend any one type of grid exclusively.

Important considerations for a state or province choosing an Atlas mapping grid system are:

1. the grid's compatibility with neighboring states and provinces

2. a grid that is likely to be repeatable in 10, 20, or 40 years, by which time all maps may be metric

3. a grid that is available on existing maps

4. the grid's compatibility with land use classification mapping programs in the state or province, or in adjoining states or provinces.

For the Northeastern United States, we recommend a standard block 5 kilometers on a side (25 square km area) which is one-sixth of a 7.5 minute (latitude and longitude) *USGS* map quadrangle, with the option of dividing the one-sixth into quarter blocks if any state so decides. For Canada, five or ten kilometer blocks (100 square km) are recommended, depending on the size of the geographical area to be surveyed, and the available survey force.

In a state or province, or portion of a state or province, where it is not possible to obtain complete coverage using the recommended block, the Conference recommended that randomly or systematically selected "priority blocks" be surveyed, rather than adopting a larger block size.

Standardized Breeding Criteria Codes Recommendations

Recommended by the Northeastern Breeding Bird Atlas Conference of November 1981 (for codes used in Vermont Atlas Project see p. 25)

	CODE[1]	EVIDENCE
OBSERVED	O	Species (male or female) *observed* in a block during the breeding season but believed not to be breeding
POSSIBLE	✓	Species (male or female) observed in suitable nesting habitat during its breeding season
	X	Singing male present in suitable nesting habitat during its breeding season
PROBABLE	P	*Pair* observed in suitable habitat during its breeding season

[1] The letter code is entered by the fieldworkers in the appropriate space on the field report form. POSSIBLE and PROBABLE categories are represented by single letters or a symbol, CONFIRMED by double letters. Letters have been selected as a mnemonic aid, keyed to italicized words in criteria definitions.

	T	Permanent *territory* presumed through defense (chasing of other birds, or song at the same location on at least two occasions a week or more apart)
	C	*Courtship* behavior or *copulation*
	N	Visiting probable *nest site*
	A	*Agitated* behavior or anxiety calls from adult
	B	Nest *building* by wrens or excavation of holes by woodpeckers
CONFIRMED	NB	*Nest building* by all except woodpeckers and wrens
	PE	*Physiological evidence* of breeding (vascularized, edematous incubation [brood] patch or egg in oviduct) based on bird in hand
	DD	*Distraction display* or injury feigning
	UN	*Used nest* or eggshells found. Caution: These must be carefully identified if they are to be accepted
	FL	Recently *fledged young* (of altricial species) incapable of sustained flight[2] or downy young (of precocial species) restricted to the natal area by dependence on adults or limited mobility
	ON	*Occupied nest*: adults entering or leaving nest site in circumstances indicating occupied nest (includes high nest or nest holes, the contents of which cannot be seen), or adult incubating or brooding
	AY	*Attending young*: adult carrying fecal sac or food for young, or feeding[2] recently fledged young
	NE	*Nest* with *egg(s)*[2]
	NY	*Nest* with *young* seen or heard[2]

[2] The presence of cowbird eggs or young is confirmation of both cowbird and host species.

Caution must be used in approaching nest sites to minimize disturbance: most confirmations can be accomplished without locating actual nests.

APPENDIX E: Orders and Families of Birds Confirmed as Breeders in Vermont

REFERENCES CITED

Certain undated and unpublished sources, such as field notes by individual observers, are listed in the text and in the references under the last name of the author, followed by an appropriate phrase such as "Field notes."

Asterisked Species Reports (ASRs; see the introduction) are cited in the text by the initials ASR followed by the name of the person filing the report. They are on file at the Vermont Institute of Natural Science, Woodstock, Vermont.

Bird Verification Reports (BVRs; see Terms and Abbreviations) are cited in the text by BVR followed by the name of the person filing the report. They are on file at the Vermont Institute of Natural Science, Woodstock, Vermont.

Historical reports filed at the Green Mountain Audubon Society's Nature Center in Huntington, Vermont, are cited in the text as GMAS records, followed by the name of the person submitting the reports.

The Vermont Institute of Natural Science's bird-banding information (cited in the text as VINS banding data) represents 14 years (1970–84) of data collected on 20,000 birds by the institute's banding program in Vermont. It is on file at the Vermont Institute of Natural Science, Woodstock, Vermont.

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