5-1990

Bulletin No. 31: Birds of Connecticut College Arboretum - Population Changes Over Forty Years

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Birds of the Connecticut College Arboretum

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The Connecticut College Arboretum • New London, Connecticut

BIRDS OF THE CONNECTICUT COLLEGE ARBORETUM

Population Changes Over Forty Years

Robert A. Askins

THE CONNECTICUT COLLEGE ARBORETUM
Bulletin No. 31 May 1990

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Cataloging information: Askins, Robert A. *Birds of the Connecticut College Arboretum: Population Changes Over Forty Years.* Connecticut College Arboretum Bulletin No. 31. 1990. Pp. 50. Published by the Connecticut College Arboretum, Box 5511 Conn. College, 270 Mohegan Ave., New London, CT 06320-4196.

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Front cover: Male Hooded Warbler. During early summer the clear, ringing song of the Hooded Warbler is a frequent sound in the woods along Bolles Road in the Arboretum. (Painting by Julie Zickefoose.)

FOREWORD

Arboreta and Botanic Gardens nationwide have recently begun to define their roles in native plant conservation, preservation of natural areas and ecological research. At Connecticut College these have been priorities for decades, and this bulletin is one excellent example of the fruits of our support and encouragement of long-term field research.

In 1958 the Arboretum published its first treatment of local birdlife in Bulletin No. 10. That booklet described the first two breeding bird studies (1953, 1955) in the Arboretum's Bolleswood Natural Area. Since that time natural changes in the vegetation have occurred as have related changes in the bird communities. The present publication describes thirty-five years of changes in bird populations documented by the research of Dr. Askins and other College staff and students. Such long-term studies are necessary for understanding population trends and formulating conservation strategies that will maintain viable wildlife populations. In addition, this bulletin serves as a concise guide to observing birds year-round on the Arboretum grounds. Finally, this publication describes some of the excellent research opportunities available to undergraduates at Connecticut College.

We are most fortunate to have had Dr. Robert Askins, ornithologist, ecologist and Connecticut College Zoology Professor, author this bulletin. We are also pleased to feature noted bird artist Julie Zickefoose's lovely watercolor of a Hooded Warbler on the cover and two of her pencil drawings in the text.

Glenn D. Dreyer
Director

ACKNOWLEDGMENTS

I appreciate help from Glenn Dreyer, Karen Askins, Dale Julier and Susan Olmstead in preparing this bulletin. The line drawings and the painting for the cover were done by Julie Zickefoose. Wendy Dreyer and Maggie Philbrick ('85) helped me with bird censuses, and Dan Kluza ('91), Tom Ford ('92) and Bob Dewire shared their field notes with me. Bill Niering, Greg Chasko, and Bob Dewire commented on early drafts of the manuscript. Recent research on birds in the Arboretum has been supported by the Connecticut College Arboretum, the Andrew W. Mellon Foundation and the Connecticut Chapter of the Nature Conservancy.

Robert A. Askins


American Woodcock Dickeyporn

INTRODUCTION

The Connecticut College campus is set within the wooded expanse of the Connecticut College Arboretum, an extensive area of plant collections and natural areas. A short walk from campus brings one to a variety of habitats with an impressive diversity of birds. During the summer 11 species of warblers can be heard in the upland habitats. Egrets and herons wade in the shallow coves of the Thames River and Broad-winged Hawks soar over the forest canopy. By December hundreds of ducks and Mute Swans concentrate in the coves on the Thames River; one can see rafts of hundreds of Canvasback and smaller flocks of Greater Scaup, Hooded Merganser, and Gadwall on the river near Mamacoke Island. On March evenings woodcocks spiral upward over grassy fields in spectacular courtship flights. In early May the open woods near the Arboretum Pond are often filled with migrants; after a particularly favorable warm front has brought a "wave" of migratory birds, it is possible to see more than 20 species of warblers during a morning walk.

This bulletin is intended as a guide to the birds of the Connecticut College Arboretum, with precise descriptions of when and where different species occur. However, the checklist (page 21) indicating the seasonal occurrence of each species should be applicable to similar habitats in coastal Connecticut and Rhode Island. This bulletin is also an introduction to some of the research on birds that has been completed in the Arboretum. The Arboretum has been the site of numerous ecological studies, and its bird life is exceptionally well known. Connecticut Arboretum Bulletin No. 10, which was published in 1958, describes some of the early research. The bird populations in two study areas (a former agricultural field and a hemlock-hardwood forest) have been monitored since 1953 (Niering, 1958), and the dramatic changes in these bird communities have been described in two scientific papers (Butcher et al., 1981; Askins and Philbrick, 1987). Since 1983 birds have also been surveyed at two other sites: a powerline right-of-way that crosses the southern boundary of the Arboretum, and on the Thames River from Smith Cove south to the Connecticut College Boathouse. In addition, many undergraduate research projects have been completed in the Arboretum. Students have studied the ecology and behavior of Mute Swans, the response of winter birds to bird feeders, the ecology of winter flocks consisting of chickadees and other species, the feeding behavior of ducks, fruit dispersal by songbirds, and the territorial behavior of woodpeckers.

The Arboretum has also been monitored by amateur birders and students in ornithology courses and the Connecticut College Ornithology Club. Intensive field observations by Fleur A. Grandjouan ('59) between 1955 and 1957 formed the basis for the first annotated list of birds of the Arboretum (Goodwin and Grandjouan, 1958). This list includes a table showing the relative abundance and seasonal occurrence for each species. For most species this table is remarkably consistent with a similar table in this bulletin. The new table is based on a weekly log of bird observations that has been maintained since 1982. Discrepancies between the two tables generally reflect regional

changes in bird populations between 1958 and 1989. These include the northward extension of the ranges of southern species such as Red-bellied Woodpecker, Carolina Wren, Tufted Titmouse, Northern Mockingbird and Northern Cardinal, and the spread of introduced species such as Mute Swan and House Finch. Also several species of forest birds have declined or disappeared in the Arboretum. The last trend has occurred at several widely scattered sites in eastern North America, and it is a cause for special concern for conservationists.

One goal of this bulletin is to describe changes in bird populations in the Arboretum during several decades. Another goal is to provide a guide to the birds of the Arboretum. The checklist summarizes their relative abundance and seasonal occurrence, while a seasonal guide describes the most interesting birds to look for at different times of the year, providing a more vivid introduction to the birds of the Arboretum.

Figure 1. View in 1982 from above the Connecticut College campus looking west across the Arboretum Native Tree and Shrub Collection and the Bolleswood Natural Area. This winter photograph shows the boulder-strewn Arboretum Pond temporarily drained of water. The dense plantation of red pine below the pond was removed in 1987 and is now the location of the Lillian Dauby Gries ('27) Conifer Collection. Beyond the pond the hemlock-forested ledges and ravine appear as an area of darker trees. (Photograph by Virginia Welch.)

HABITATS IN THE ARBORETUM

The Connecticut College Arboretum covers 435 acres in New London and Waterford, Connecticut (Figure 1; Goodwin, 1982; Niering, 1982). The predominant vegetation is deciduous forest, but the tract has an impressive diversity of habitats, as described in detail by Niering and Goodwin (1965). Poorly drained areas are characterized by red maple (*Acer rubrum*) bogs and swamps, and there are a few pine and mixed conifer plantations. Two Natural Areas (in which the vegetation is not managed) have special habitats: Mamacoke Island Natural Area includes a small salt marsh that connects the island to the mainland, and the Bolleswood Natural Area is centered on a 50-foot deep, rocky ravine that is heavily shaded by a high canopy of hemlock (*Tsuga canadensis*) and various species of hardwoods. (See map in the center of the bulletin for locations.) Parts of the forest on the ledges above the ravine were probably never completely cleared for agriculture, but most of the large hemlocks here were blown down in the hurricane of 1938 (Avery et al., 1940). Since 1938 canopy openings created by the hurricane have closed and the trees have grown considerably. These progressive vegetation changes have been documented by vegetation surveys every ten years since 1952 along four permanent vegetation transects that cross the Bolleswood Natural Area (Niering and Goodwin, 1965; Hemond et al., 1983).

Dramatic vegetation changes have occurred in other sections of the Arboretum since Goodwin and Grandjouan's description of Arboretum birds in 1958. Much of the Arboretum was acquired by purchasing farms that had been used for crops or pasture since the mid 17th century (Goodwin, 1982). Farming had been abandoned on different tracts at different times between 1910 and the early 1950s, so in 1958 the Arboretum was a mosaic of vegetation types ranging from open grassy fields to shrub thickets to mature forest. Much of this diversity has been lost as most of the abandoned farmland has become young deciduous forest (Figure 2) with a bird community surprisingly similar to the older forest in the Bolleswood ravine (Askins and Philbrick, 1987). Consequently bird species that require open country have declined. In 1937 Logan (1958) found an Eastern Meadowlark nest on the Connecticut College campus. It contained four meadowlark eggs and two additional eggs that had been laid in the nest by a Northern Bobwhite. Neither Eastern Meadowlarks nor Northern Bobwhites currently nest on campus or in the adjacent Arboretum; in fact, these two species now occur in the Arboretum only infrequently. Other open-country species that once nested in the Arboretum (Ring-necked Pheasant, Horned Lark, Yellow-breasted Chat and Indigo Bunting) have either disappeared entirely or have become rare visitors.

The bird communities of upland areas in the Arboretum would be even more homogeneous today if open habitats had not been maintained artificially. This has been accomplished with controlled burning in two small areas in the Matthies and Avery tracts, resulting in an open, prairie-like grassland. A larger area in the Matthies Tract (the Arboretum Field) has been mowed periodically to maintain grassland with scattered redcedars (*Juniperus vir-*

giniana) and crabapples (*Malus* sp.). Also, along the Northeast Utilities powerline on the southwestern border of the Bolleswood Natural Area, a shrubland has been maintained by selective removal of trees. These manipulations of vegetation have maintained populations of species that depend on open country or low vegetation. The Arboretum Field, for example, has breeding Prairie Warblers, Orchard Orioles and Field Sparrows, species that are missing in the surrounding woodland. Also, the open, park-like vegetation of the plant collections of the Arboretum supports species such as Yellow Warbler and Northern Oriole that are typical of the forest edge and open woodland.

The Thames River and the Arboretum Pond provide the primary habitats for aquatic birds. The river is a major feeding area for a great diversity of wintering waterfowl. In summer Ospreys and herons search for fish on the river coves adjacent to Mamacoke Island. Until the 1980s the Arboretum Pond was characterized by open water with water-lily *(Nymphaea odorata*) and pickerelweed (*Pontederia cordata*), but it has steadily filled in and is making a speedy transition to a cattail *(Typha latifolia*) marsh (Figure 3). In 1989 emergent marsh vegetation covered the northern half of the pond and Red-winged Blackbirds had established breeding territories for the first time. Other species of marsh birds will probably become established soon if this trend continues.

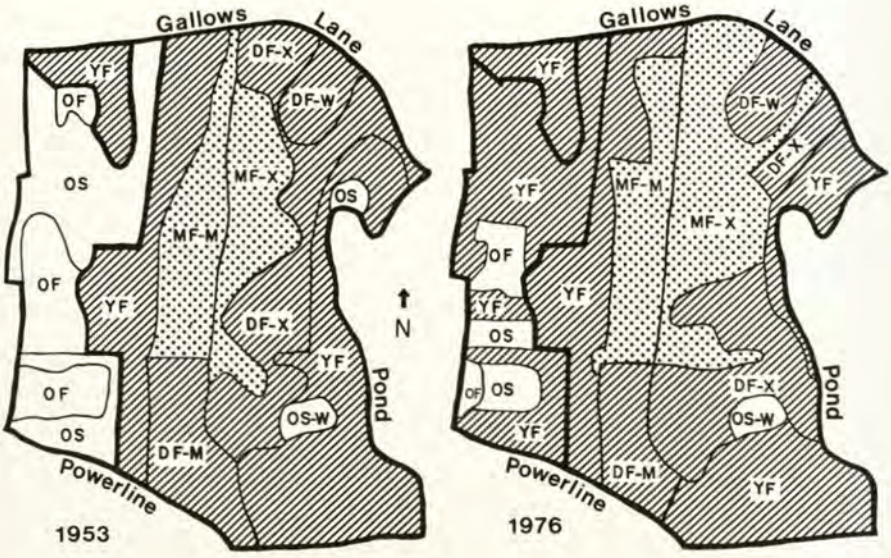


Figure 2. Vegetation types in the Bolleswood Natural Area in 1953 and 1976. OF - open fields, OS - open shrub, OS-W - shrubby bog, YF - young forest, DF-X - dry deciduous forest, DF-M - moist deciduous forest, DF-W - red maple swamp, MF-X - dry hemlock-hardwood forest, MF-M - moist hemlock-hardwood forest. The white area on the left side of the 1953 map is the old-field study site; the remainder is the oak-hemlock study site. (From Butcher et al., 1981.)

SEASONAL GUIDE TO BIRDS

This section describes seasonal changes in the bird communities of the Connecticut College Arboretum. The intent is to supplement the details given in the checklist with a more vivid description of the birds of the Arboretum. It also serves as a guide to visitors, indicating the best locations to look for birds within the Arboretum at particular times of the year. These locations can be found with the help of the map in the center of the bulletin.

November to mid March - During winter many birders visit the Arboretum to observe the large concentrations of ducks on the Thames River. One may see hundreds of ducks of more than a dozen species during the 1.1-mile walk from the Connecticut College Boathouse to Smith Cove. The river immediately north of the boathouse typically has small flocks of dabbling ducks (Gadwalls, American Wigeons, American Black Ducks and Mallards) as well as small groups of diving ducks (primarily Canvasbacks and Greater Scaups). Redheads occur here regularly, and during the first two weeks of February 1987, a flock of 11 Redheads remained in this area, diving and performing courtship displays.

South Mamacoke Cove and the adjacent Brackish Pond are good places to look for Pied-billed Grebe, Hooded Merganser and Belted Kingfisher. Also, Lesser Scaup are sometimes mixed in with the more common Greater Scaup in the cove.

The largest flocks of ducks are found in North Mamacoke and Smith coves. Several species of dabbling ducks usually feed and rest inside North Mamacoke Cove, while large numbers of diving ducks dive for food in both coves. In contrast, Mute Swans typically feed in the shallow water near the river shore north of Smith Cove. More than 150 swans may aggregate in this area. During January and February the shallow coves often freeze, and both ducks and Mute Swans are forced to move to open water on the river, creating spectacular concentrations of waterfowl. Typically a variety of diving ducks, including both species of scaup, two or three species of mergansers, Ring-necked Ducks, Common Goldeneyes, and Redheads, are mixed in with 400 to 600 Canvasbacks.

In the evening, soon after sunset, the Canvasbacks fly up from Smith Cove in large flocks, heading for a roosting site further upriver. Soon afterward Hooded Mergansers gradually arrive on the river adjacent to the cove, splashing down in groups of three or four. They gather in rafts, and by dark from 100 to 175 of these elegant ducks may be present. Usually small groups of males within these large aggregations court females with slow, graceful head-pumping and head-throw displays, while other birds preen in preparation for roosting.

Rare species such as Tufted Duck, Harlequin Duck and Eurasian Wigeon have been recorded in the vicinity of Mamacoke Island during the winter. Also, loons and sea ducks (Oldsquaw, Black Scoter, and White-winged Scoter) occasionally appear near the island, which is only five miles from Long Island Sound.

In contrast to the river, the upland forests of the Arboretum have a rela-

tively low diversity of birds during the winter. Mixed flocks of Black-capped Chickadees, Tufted Titmice, White-breasted Nuthatches and Golden-crowned Kinglets are regularly encountered in deciduous forest, and Hermit Thrushes are sometimes seen hopping across the forest floor. Brown Creepers and Red-breasted Nuthatches occasionally occur in the conifer plantations. However, many of the winter residents appear to spend a large proportion of their time near bird-feeders in the residential areas adjacent to the Arboretum. During the winter of 1967-1968, Robert Dewire surveyed birds in the woods of the Arboretum and at ten bird-feeders near the Arboretum. Several species, such as Tufted Titmouse, White-throated Sparrow, and Fox Sparrow, were primarily recorded at feeding stations rather than in natural habitats within the Arboretum.

March - By mid March a few summer residents (Eastern Phoebe, American Robin and Red-winged Blackbird) have returned to the Arboretum. Owls call during the evening in the Bolleswood Natural Area: Barred Owls to the south of Gallows Lane and Great Horned Owls to the north. At dusk American Woodcocks display over open, grassy fields fringed by woods. Male woodcocks attract females by giving emphatic, buzzy "peent" calls from the ground and then launching themselves into an elaborate display flight. The male spirals upward while producing a twittering sound with his flight feathers. When he is a speck in the evening sky, at an elevation of about 300 feet, he begins to zigzag downward while singing a series of liquid chirps, finally landing silently at the spot where he took off. This spectacular display can be seen most dependably at the Arboretum Field and the nearby burn field in the Matthies Tract. Two to three male woodcocks normally have territories in this area, and they often engage in swift dogfights during their courtship flights. Woodcocks also display in the grassy areas east of the Connecticut College Athletic Center and in open fields along Bolles Road. Since 1984 I have monitored the woodcock activity in the Arboretum Field and Matthies burn field. Courtship flights occurred during the following periods:

Year	Dates of Woodcock Displays
1984	Feb. 10 - March 11
1985	Feb. 14 - March 25
1986	March 4 - 23
1987	March 5 -15
1989	March 2 - 14

Early and mid May - During the peak of spring migration, the area around the Arboretum Pond (particularly the plant collections) has an exceptional diversity of birds. In addition to the species of warblers that nest in the Arboretum (see the discussion for June), there are many warblers that are in transit to their breeding areas in the northern coniferous forests of Maine and Canada. Northern Parula, Magnolia Warbler, Yellow-rumped Warbler, Blackburnian Warbler, Blackpoll Warbler and Canada Warbler are among the most frequent. Other migrants, such as Ruby-throated Hummingbird, Ruby-crowned Kinglet, Solitary Vireo and Rose-breasted Grosbeak, appear at the same time as the warblers. Moreover, Wood Duck and Solitary Sandpiper occasionally stop at

the pond.

A visit to the Arboretum Field complements a morning of watching woodland birds near the Arboretum Pond. Cedar Waxwing, Blue-winged Warbler, Prairie Warbler, Field Sparrow and other open-country species can be seen in the field. Also, in early May the many apple and crabapple trees scattered across the field are in bloom. Orchard Orioles (which nest in the field) often visit the blossoms to feed on nectar.

Figure 3. Arboretum Pond in 1989. (Photo by Glenn Dreyer.)

Figure 4. Ravine stream in Bolleswood Natural Area. (Photo by Mark Braunstein.)

Late May to early July - An impressive number of warbler species nest in the Arboretum. Most of these can be seen or heard during a morning walk along Bolles Road in early summer. The southern section of Bolles Road, south of the gas pipeline right-of-way, is an excellent place to see Hooded Warblers; in recent years there have been three to four territories along this stretch of the road. Black-and-white Warblers, Ovenbirds, and Worm-eating Warblers can be heard in the same area. In the shrubby fields between the pipeline right-of-way and the Bolles Road Ponds, a different set of species (Blue-winged, Chestnut-sided and Prairie warblers) can be seen. One can return from the area near the ponds by way of the Coffey Farm Trail, which passes through a variety of habitats, from mature hemlock groves to grassy old fields with scattered redcedars. Ruffed Grouse are sometimes flushed along this trail.

The ravine in the Bolleswood Natural Area also has a diversity of nesting forest birds (Figure 4). Early June, when the mountain laurel (*Kal-*

mia latifolia) is in bloom, is a particularly attractive time to visit the shady hemlock stands and tall oak and beech (*Fagus grandifolia*) forest bordering the ravine. The cascading songs of Louisiana Waterthrushes come from the stream banks at the bottom of the ravine, while the deep, flute-like songs of Wood Thrushes and Veeries come from the forest above the ravine. Acadian Flycatchers have been summer residents here in recent years, and Eastern Wood-Pewees and Scarlet Tanagers are fairly common. With luck you may see a family of Barred Owls, the adults clicking their bills to warn you away from the white, downy owlets.

Late July to early September - During late summer several species of herons and two or more Ospreys hunt for fish in the coves at Mamacoke Island and on the nearby Brackish Pond. Great Blue Herons and Green-backed Herons are frequent and Snowy Egrets, Great Egrets and immature Little Blue Herons occur regularly. Also, Black-crowned Night Herons forage along the river during the night. They are usually present late in the evening and early in the morning.

Late August to early October - The open shrubby habitat north of the gas pipeline right-of-way on Bolles Road is the best place to search for fall migrants. Mixed flocks of warblers and vireos often can be found moving through the low vegetation during September. Philadelphia Vireos have been recorded in such flocks twice during recent years.

Mid and late October - Mixed flocks of sparrows can be seen in the brushy vegetation around Dawley Field (below the Athletic Center) and along the railroad tracks between the Connecticut College Boathouse and Arboretum Field. In addition to species that nest in the Arboretum (Song, Field, and Chipping sparrows), one may see migrants such as Savannah, Sharp-tailed, Fox, Swamp, White-throated and White-crowned sparrows.

In early November, after the migratory sparrows have departed, winter ducks begin to appear on the Thames River. American Wigeons and Hooded Mergansers are the first to arrive.

Interesting birds can be found in the diverse habitats of the Arboretum at any time of year, and seasonal changes in the bird communities are dramatic. Shifts in the bird community of the upland deciduous forest are tracked in a changing exhibit at the Thames Science Center, which is located in the Arboretum on Gallows Lane. Paintings and tape recordings illustrate the characteristics of some of the most common birds in the forest during the current season (winter, spring or summer). Other exhibits illustrate the characteristics of the major habitats of the Thames River Valley, including those in the Arboretum.

RESEARCH ON BIRDS IN THE ARBORETUM

The Bolleswood Natural Area of the Arboretum is one of only a small number of sites in North America where both birds and vegetation have been monitored for more than 30 years. Studies in the Arboretum have provided important information about general processes of biological change such as succession and about the effects of suburban development on bird populations. Bird censuses were initiated in two study areas in the Bolleswood Natural Area in 1953 by William Niering, Richard Goodwin, Barbara Kashanski ('54), and Susan Rayfield ('62). At that time one study area was an old field with open meadows and shrub thickets, and the other was dominated by oak-hemlock forest with a tall, dense shrub layer (Figure 2).

The vegetation and bird communities of both sites have changed continuously during the past 37 years (Figure 2). We have a detailed record of vegetation change because plants were mapped along four permanent transects in 1952, 1962, 1972 and 1982 (Niering and Goodwin, 1962; Hemond et al., 1983). These 20-foot wide, parallel transects run across the Bolleswood Natural Area at 400-foot intervals. During vegetation surveys, measurements were made of the diameter of trees and the density of all species of trees, shrubs and herbs.

Birds have been censused in the two study areas periodically between 1953 and 1976 and each year since 1982. Population estimates have been determined using the spot-mapping technique (Niering, 1958), which is generally considered the most accurate of the standard census methods for breeding songbirds (Robbins, 1978). During early summer observers walk slowly through the study site, covering the entire area on a series of parallel trails. Ten visits are made during the early morning when birds sing most frequently. Nearly all data are obtained by listening rather than looking; the position and species of each singing bird is recorded on a map of the study area. Most of the summer-resident birds in the Arboretum defend territories during the early summer when they are nesting (Askins, 1987), and the goal of the census is to determine the location of these territories. This is relatively easy because each male sings to announce his possession of the territory to other males of the same species. Because each male primarily sings from within his territory, a particular male will consistently be recorded in the same area. When neighboring males sing at the same time, it demonstrates the presence of two or more adjacent territories. By compiling this kind of information after ten visits to the study site, maps can be drawn for each species showing individual territories. Most species are monogamous, so, assuming that each male has a single mate, the actual population size of adult birds could be calculated by doubling the number of territories. This assumption is often invalid, however, because some males are not mated. Also, there is growing evidence that males of supposedly monogamous species frequently have more than one mate. Consequently population estimates are reported in terms of the number of territorial males.

In addition to the long-term censuses in the old field and oak-hemlock study sites, bird populations have been monitored recently in two other areas: a powerline that borders the Bolleswood Natural Area, and the Thames River adjacent to the Arboretum and the Connecticut College Campus. The results of these four studies are summarized in the following sections.

Old field study site - The bird community in this area has changed dramatically as the open fields and low scrub thicket have been replaced by tall thicket and young forest (Figure 2). By the 1980s this 16-acre site was covered either by young forest with a closed canopy or tall thickets where tree growth has been inhibited by dense tangles of Oriental bittersweet (*Celastrus orbiculatus*), wild grape (*Vitis* sp.), and greenbrier (*Smilax rotundifolia*). By the early 1970s all species characteristic of open grassland (Ring-necked Pheasant, American Goldfinch, Field Sparrow and Song Sparrow) had disappeared, and none of these species has been recorded as a summer resident in the study area since 1973 (Figure 5). Brown Thrasher, Prairie Warbler, and Yellow-breasted Chat, which are typically found in low, shrubby vegetation, also disappeared during this period (Figure 5). However, some other species that are usually found in open scrubby habitats (White-eyed Vireo, Blue-winged Warbler, Chestnut-sided Warbler, and Common Yellowthroat) continued to nest in the study area. By the 1980s they were concentrated in the sections of the former old field in which tree growth has been stalled by the growth of vines, and they were generally absent from the sections of the study area with a more continuous tree canopy where typical woodland species (such as Eastern Wood-Pewee, Blue Jay, Black-capped Chickadee, Tufted Titmouse, Wood Thrush, Veery, Red-eyed Vireo, Ovenbird and Hooded Warbler) had become established. These woodland species did not become regular summer residents until the 1970s (Figure 6). By the 1980s this young forest supported a bird community similar to the adjacent older forest and distinctly different from the original bird community in the old field in 1953 (Askins and Philbrick, 1987).

The number of species with territories in the study area increased from an average of 16 in the 1950s to an average of 22 in the 1980s. A progressive increase in the number of species of birds during old-field succession has been documented in several other studies (Johnston and Odum, 1956; Shugart and James, 1973; Lanyon, 1981). The loss of open country species is more than offset by the establishment of woodland species because the complex, layered vegetation in a forest provides ecological niches for a greater number of species than the relatively simple vegetation in an open field. Although the number of species increased during the 36 years of the study, the number of individuals (territorial males) declined from an average of 57 in the 1950s to an average of 36 in the 1980s.

Most studies of old-field succession have depended on a simultaneous comparison of a large number of former fields that were abandoned from agriculture at different times (Johnston and Odum, 1956; Shugart and James, 1973). This provides an approximate description of typical biotic changes as a field changes to a forest, but the various sites differ in unknown ways. The study of the Arboretum old field is one of the few studies in which changes in bird populations have been monitored at a single site during a long period of vegetation change. Other examples are Lanyon's (1981) 20-year study of bird

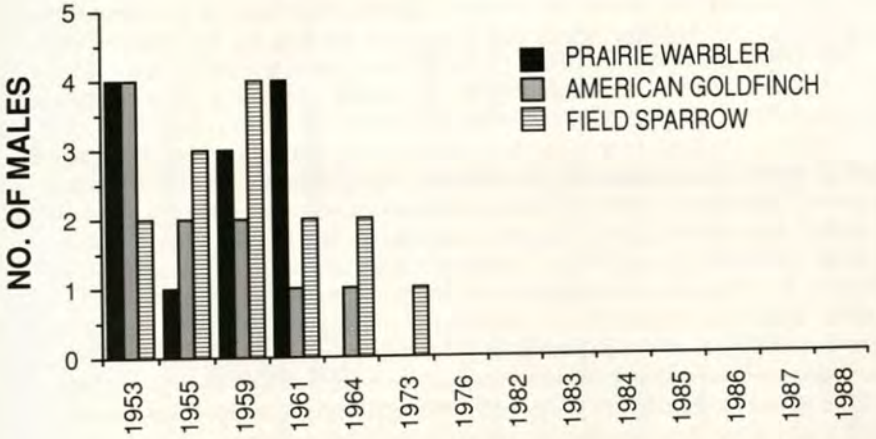


Figure 5. Changes in the number of territorial males in the old field study site for three species of birds that are characteristic of open habitats (grassland and low thicket).

populations on abandoned farm land in Long Island and Evans' (1978) long-term study of Field and Chipping sparrows in an old field in Michigan.

Oak-hemlock study site - This 57-acre site is adjacent to the old field study area and is also a part of the Bolleswood Natural Area. The dominant vegetation is deciduous and mixed hemlock-hardwood forest (Figure 2). Many of the large trees were toppled or damaged by the 1938 hurricane, and in 1953, when bird censuses were initiated, the forest canopy was still relatively open. Since

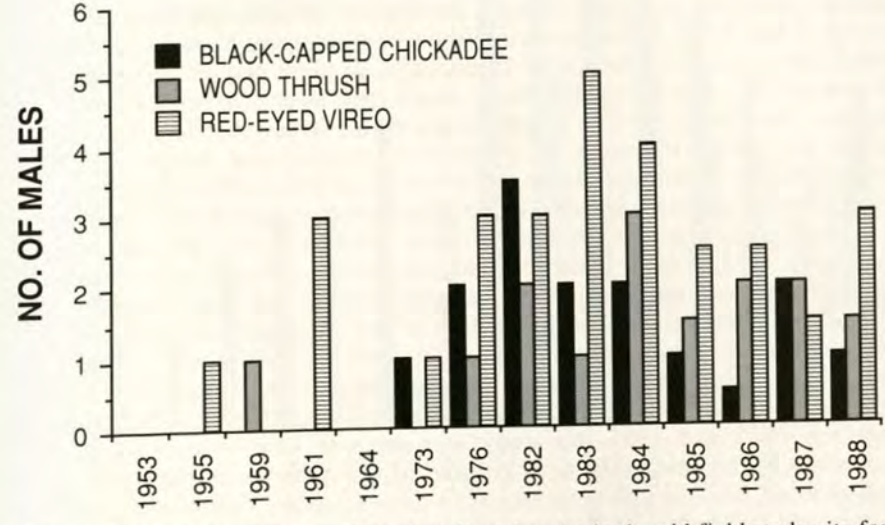


Figure 6. Changes in the number of territorial males in the old field study site for three woodland species.

then the canopy has closed as trees have grown taller and the previously dense shrub layer has become sparse due to greater shading by the canopy trees.

During the 1950s and 1960s this site was characterized by an impressive diversity of forest-dwelling, migratory birds, including many species of warblers (Butcher et al., 1981; Askins and Philbrick, 1987). Between 1964 and 1973 seven of these forest species declined or disappeared in the study area (see Figure 7 for examples). In contrast, during the 1970s the abundance of several "suburban" species (those common in wooded residential areas) increased substantially; this pattern was shown by Black-capped Chickadee, Tufted Titmouse, House Wren, Northern Cardinal and Brown-headed Cowbird (Figure 8). Thus the composition of the bird community in the oak-hemlock study area has changed considerably. Many of the distinctive forest specialists that a nature preserve like the Arboretum is designed to protect are now gone or have become less abundant, while many of the species that are common in the residential areas surrounding the Arboretum (and which therefore require no special protection) are now more common in the deep forest of the study area.

A similar shift in species composition has been documented at several other study sites in the eastern United States (Lynch, 1987; Askins et al., 1990). Many of the same species of migratory, forest-interior birds have declined at these sites while generalized species such as chickadees have increased. Like the Connecticut College Arboretum, the other study areas showing this pattern are relatively small islands of woodland surrounded by extensive urban or suburban neighborhoods. One hypothesis is that these small remnants of forest became unfavorable habitats for many specialized forest bird species as the sites were enveloped by expanding cities. Several studies indicate that forest birds have low reproductive rates near the forest edge, where the forest abuts a more open habitat (Askins et al., 1990). Both nest predators and Brown-headed Cowbirds (a parasite that lays its eggs in the nests of other species, resulting in lower nesting success for the host parents) are more common near the forest edge than in the forest interior. Even the center of a small forest patch is close to the forest edge, so there may be no refuge from predators and cowbirds. Also, many forest species are especially vulnerable because they have cup-like nests that are easily accessible to predators and cowbirds (unlike the nests of chickadees, titmice, and wrens, which are located in tree cavities). Moreover, many forest species build their nests on or near the forest floor, where predators like raccoons and domestic cats hunt.

Aerial photographs show that between 1951 and 1975 the oak-hemlock study area became more isolated from other forests as woodland immediately to the south was replaced with highway interchanges and shopping malls. The amount of forest within two kilometers of the study area declined by 13%. This change primarily occurred between 1964 and 1973, the period when several species of forest birds declined, so the pattern is consistent with the hypothesis that loss of nearby forest can lead to loss of forest birds. However, between 1975 and 1985 the study area became less isolated from other woodland as thickets in the northern part of the Arboretum, especially along Bolles Road, became young forest with a closed canopy. The amount of forest within two kilometers of the study area increased by 28% during this period. In the early 1980s surveys of this young forest revealed a diversity of forest

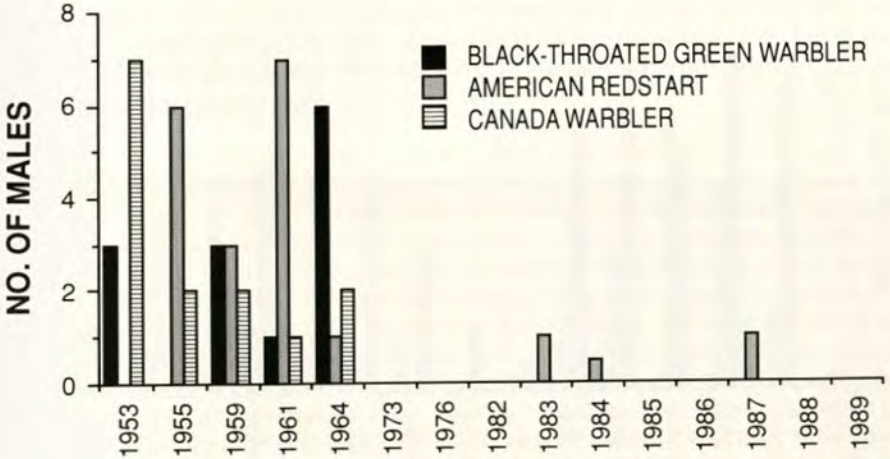


Figure 7. Changes in the number of territorial males in the oak-hemlock study site for three species of forest-dwelling migratory warblers.

birds (Askins and Philbrick, 1987). These areas had changed in much the same way as the old field study area. Meanwhile, in the oak-hemlock study area several species that had previously declined showed increases in abundance.

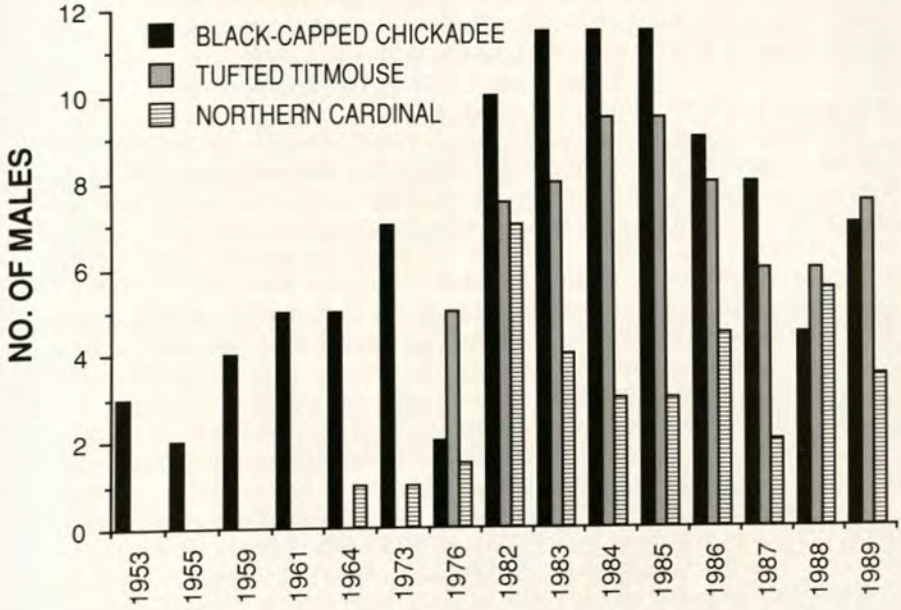


Figure 8. Changes in the number of territorial males in the oak-hemlock study site for three "suburban" species that are common in wooded residential areas.

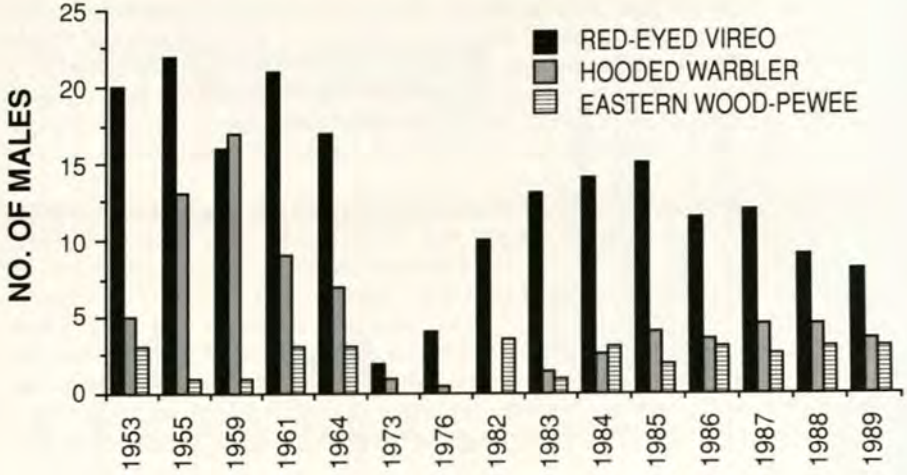


Figure 9. Changes in the number of territorial males in the oak-hemlock study site for three species of migratory birds that declined in the 1970s but have subsequently increased.

The populations of Red-eyed Vireos, Ovenbirds, Hooded Warblers, and Eastern Wood-Pewees all showed at least a partial recovery (Figure 9). Among the many study sites in the eastern U.S. where population declines have occurred in forest birds, the Arboretum site is the only one in which several species have shown this type of recovery. It is also the only site where forest has grown up in extensive, nearby areas. Hence this pattern is consistent with the idea that forest bird populations are more successful in preserves that are surrounded by forest rather than urban areas.

The study site is in a relatively small forest tract of 153 acres, however, and some species of forest birds that frequently nest in larger forests do not breed in the Arboretum. Surveys of 46 forest tracts within 24 miles of the Arboretum revealed that six species were restricted to forests larger than 125 acres (Askins et al., 1987). Notably, five of these species (Brown Creeper, Blue-gray Gnatcatcher, Yellow-throated Vireo, and Cerulean Warbler) have never been recorded as breeding birds in the Arboretum. Another species (Black-throated Green Warbler) disappeared from the study area during the 1960s and has never returned (Figure 7), and the seventh species (Hermit Thrush) has only been recorded as a summer resident once (a single male in 1989). All of these species occur regularly in upland forest in continuous tracts of 1500 to 6500 acres, suggesting that the Arboretum study site is too small and isolated to support a full complement of forest birds.

As noted above, habitat change has occurred in the oak-hemlock study area since 1953, and this may account for some of the changes in the bird community. The drastic declines of American Redstart, Canada Warbler and Hooded Warbler between 1964 and 1973 could be due to thinning of the shrub layer as the forest canopy closed (Figures 7 and 9). These three species nest and feed in the shrub layer and understory. The first two species have not

become permanently re-established in the study area, and the Hooded Warbler has shown only a partial recovery. In contrast, other species, such as Red-eyed Vireo, Ovenbird and Black-throated Green Warbler, declined despite an increase in their favored habitat, mature forest.

Right-of-way Demonstration Area - Since 1953 the Connecticut College Arboretum has managed a 3,500-foot powerline right-of-way in cooperation with Northeast Utilities. The goal has been to develop a low-maintenance, ecologically sound method of vegetation management (Niering and Goodwin, 1974). Herbicides were applied selectively to kill tall-growing trees, resulting in the growth of a stable shrub community that requires relatively little maintenance. In the 1980s, after more than 30 years of management, the right-of-way was covered with a low thicket consisting of a variety of shrubs and vines: greenbrier, Oriental bittersweet, wild grape, winged sumac (*Rhus copallina*), multiflora rose (*Rosa multiflora*), northern arrowwood (*Viburnum recognitum*), and various other species. Each year between 1983 and 1989 bird populations were censused along this right-of-way. The bird community is similar to the community in the adjacent old-field study area during the 1960s, before woodland birds started to invade the latter site. Gray Catbirds, White-eyed Vireos, Blue-winged Warblers, Chestnut-sided Warbler, Prairie Warblers, and Common Yellowthroats are still common along the right-of-way. For example, during the period of the study the four-acre right-of-way site has had two to four White-eyed Vireo territories, three to five Chestnut-sided Warbler territories and two to four Prairie Warbler territories. Moreover, in many years both Field Sparrow and Northern Mockingbird have each had a single territory. Vegetation management has not only produced a relatively stable shrub community, but has also sustained appropriate habitat for species such as Prairie Warbler and Field Sparrow, both of which disappeared from the unmanaged old field study area before 1976. As shrub communities disappear in southern New England because of forest regrowth on long abandoned farmland, vegetation management of this sort will be important for maintaining bird species that depend on open habitats. One thicket specialist, the Yellow-breasted Chat, has already declined markedly and is now listed as a species of special concern in Connecticut (Connecticut Natural Diversity Data Base, 1985).

Thames River study site - Since 1982 I have completed weekly surveys of waterfowl on the Thames River between the Connecticut College Boathouse and Smith Cove during the winter months (October to April). The study area includes the coves north and south of Mamacoke Island and the interior of Smith Cove between the Central Vermont Railroad tracks and Route 32. Table 1 (page 16) shows the maximum number of individuals recorded during a single observation period. For most species these numbers would be representative of a very cold period in January and February when shallow areas are covered with ice and ducks and swans are concentrated in the open water north of Mamacoke Island and off the College Boathouse.

Gadwalls have increased in Connecticut in recent years, a trend that is reflected in the Thames River data (Table 1). In contrast, Canvasbacks, Common Goldeneyes and American Wigeons have tended to decline at the

Table 1. Maximum number of individuals recorded during particular winters between 1982 and 1989 for waterfowl species that regularly occur on the Thames River between Smith Cove and the Connecticut College Boathouse.

Species	82/83	83/84	84/85	85/86	86/87	88/89
Mute Swan	164	104	75	151	150	141
American Black Duck	15	58	20	32	33	47
Mallard	42	104	40	52	47	44
Gadwall	8	7	7	15	25	21
American Wigeon	18	26	25	12	15	5
Canvasback	558	533	600	423	370	221
Redhead	2	3	10	7	11	2
Ring-necked Duck	1	1	0	2	1	0
Greater Scaup	18	141	107	150	70	130
Lesser Scaup	0	0	2	6	2	0
Common Goldeneye	177	41	21	7	3	1
Bufflehead	14	20	10	7	5	11
Hooded Merganser	58	46	176	97	32	69
Common Merganser	15	1	9	6	12	35
Red-breasted Merganser	0	0	1	8	11	35

Thames River site. These populations will have to be monitored for several more years to determine whether these declines are more than temporary fluctuations. The abundance and diversity of ducks in this study area will serve as one measure of the ecological health of the Thames River.

In addition to the surveys, several research projects on the ecology and behavior of waterfowl have been completed in the Smith Cove-Mamacoke Island Area. Maria O'Brien ('84) and Robert Askins studied the feeding behavior of Mute Swans and several species of ducks to determine whether the introduced swans were having a negative impact on native species of waterfowl. They found that swans tend to feed in sections of the river that are usually not used by the ducks, suggesting that they do not compete with ducks for food (O'Brien and Askins, 1985). In other situations, however, Mute Swans may displace ducks or deplete the aquatic plants used by some species of ducks (Allin et al., 1987). In another study, Daniel Kluza ('91) completed a detailed comparison of the feeding behavior of the different species of ducks. As part of his study, he mapped the feeding locations of individual ducks of each species. These maps (see Figures 10 and 11 for examples) indicate the sections of the river that are particularly important for wintering waterfowl.

The Connecticut College Arboretum is one of only a few sites in North America where simultaneous studies of birds and vegetation have been continued for several decades. In combination with regional surveys such as the Breeding Bird Surveys, Midwinter Waterfowl Surveys, and Christmas Bird Counts, these long-term studies at particular sites provide invaluable information about trends in bird populations. Moreover, because bird populations are often a sensitive indicator of environmental change, these studies provide indirect evidence concerning the health of the natural environment.

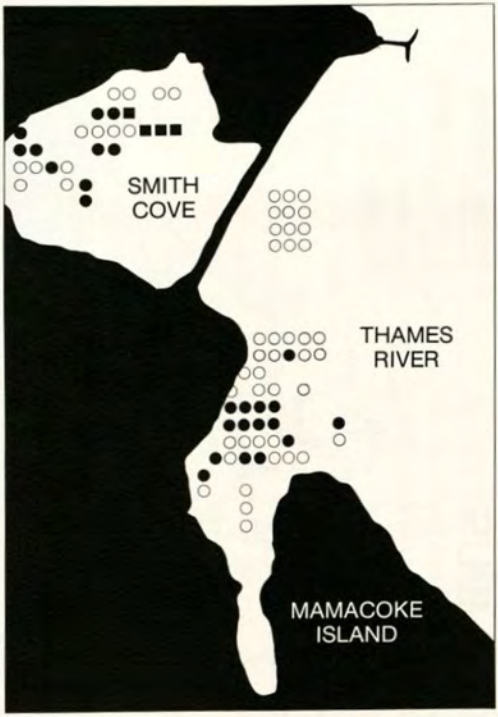
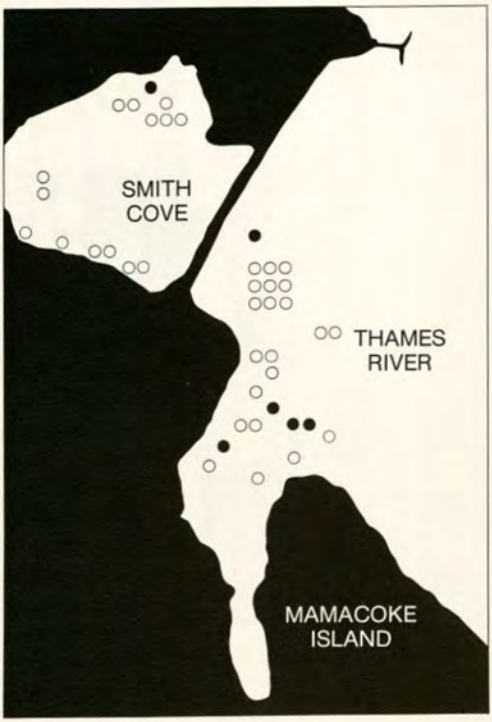


Figure 10. Distribution of feeding Canvasbacks at Smith Cove and North Mamacoke Cove, Thames River during the winter of 1989. Based on an independent study report by Daniel Kluza.

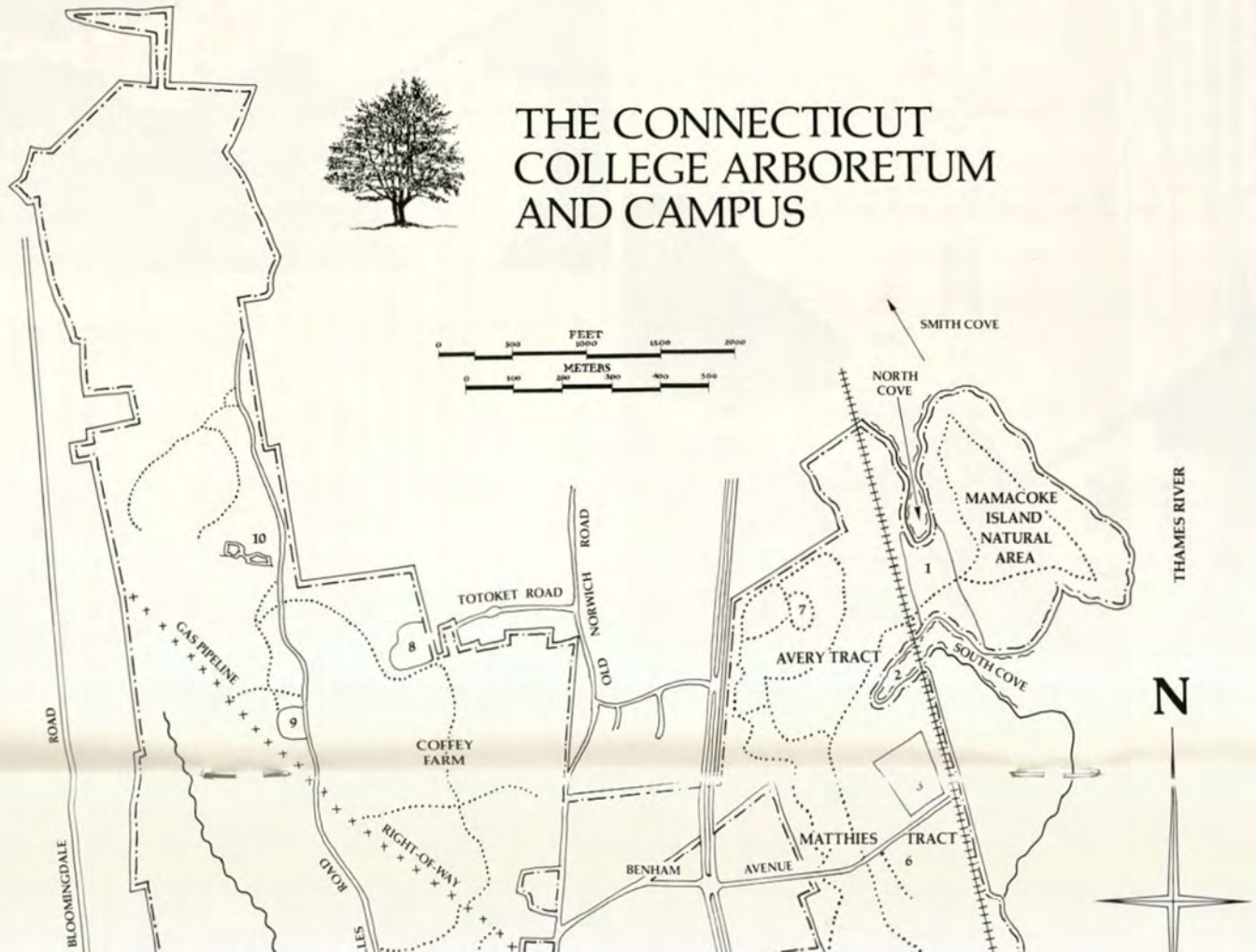
○ 1-5 Canvasbacks
● 6-25 Canvasbacks
■ over 75 Canvasbacks

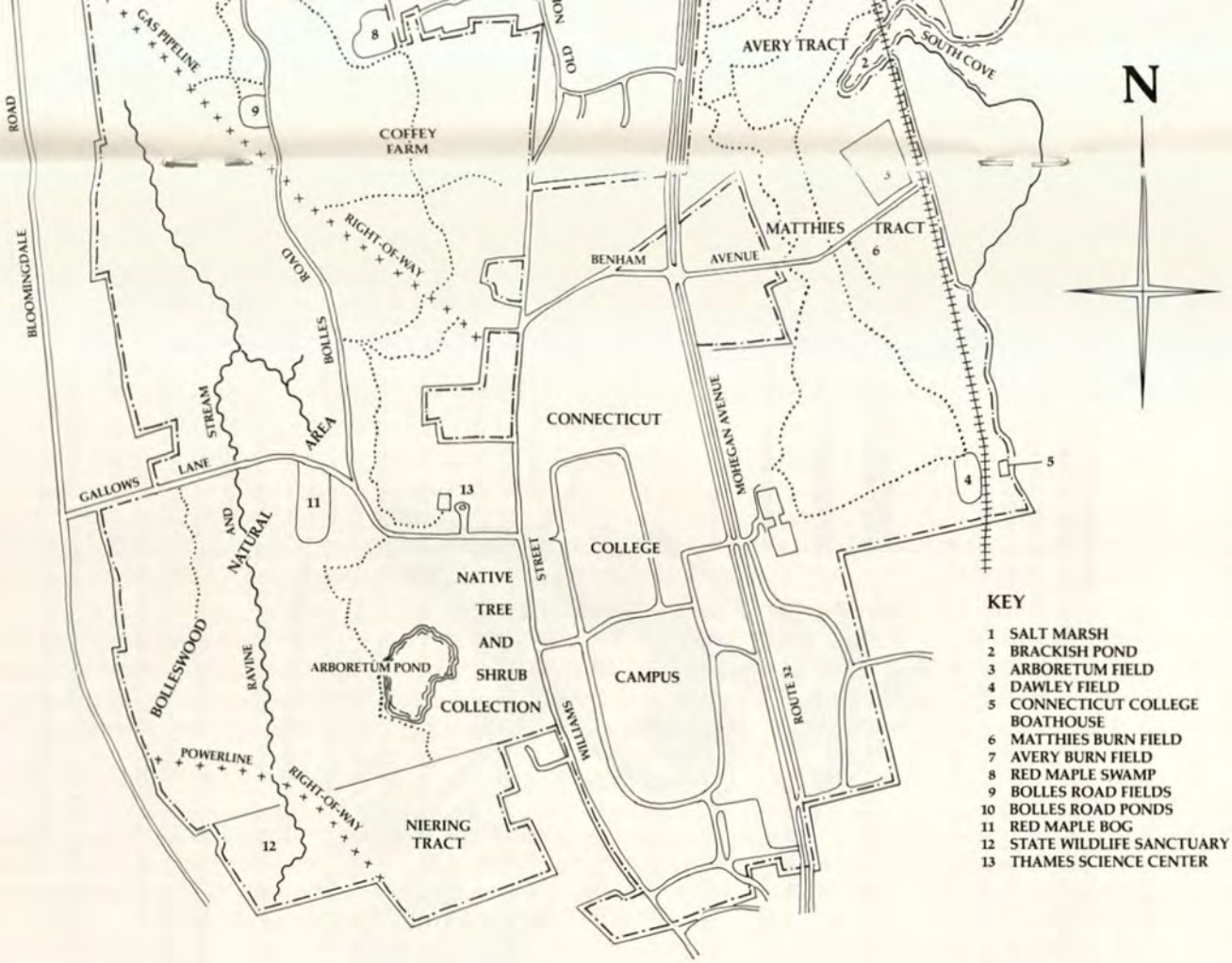


○ 1-5 Hooded Mergansers
● 6-25 Hooded Mergansers

Figure 11. Distribution of feeding Hooded Mergansers at Smith Cove and North Mamacoke Cove, Thames River during the winter of 1989. Based on an independent study report by Daniel Kluza.

THE CONNECTICUT COLLEGE ARBORETUM AND CAMPUS





KEY

1 SALT MARSH
2 BRACKISH POND
3 ARBORETUM FIELD
4 DAWLEY FIELD
5 CONNECTICUT COLLEGE BOATHOUSE
6 MATTHIES BURN FIELD
7 AVERY BURN FIELD
8 RED MAPLE SWAMP
9 BOLLES ROAD FIELDS
10 BOLLES ROAD PONDS
11 RED MAPLE BOG
12 STATE WILDLIFE SANCTUARY
13 THAMES SCIENCE CENTER


Belted Kingfisher

ANNOTATED CHECKLIST OF BIRDS

The chart on the following pages lists all species of birds that have been recorded in the Connecticut College Arboretum, on the Connecticut College Campus or on the adjacent Thames River (from the Connecticut College Boathouse in New London to Smith Cove in Waterford). Seasonal occurrence and relative abundance are indicated for each species on the basis of weekly records that I maintained from 1982 to 1989. The bars on the chart indicate the likelihood of seeing or hearing a particular species in the Arboretum during each week of the year (modified from Zeranski and Smith, 1980):

Abundant (More than 90% of visits)

Common (50-90% of visits)

Frequent (25-50% of visits)

Infrequent (5-25% of visits)

o — Rare (single observation since 1980)

x — Rare (single observation before 1980)

The status indicated in the chart is influenced both by the abundance and conspicuousness of the species. For example, American Woodcocks are probably equally abundant in March and May, but they are shown as more frequent in March when males are conspicuous because of their flight displays and infrequent in May when they are difficult to find.

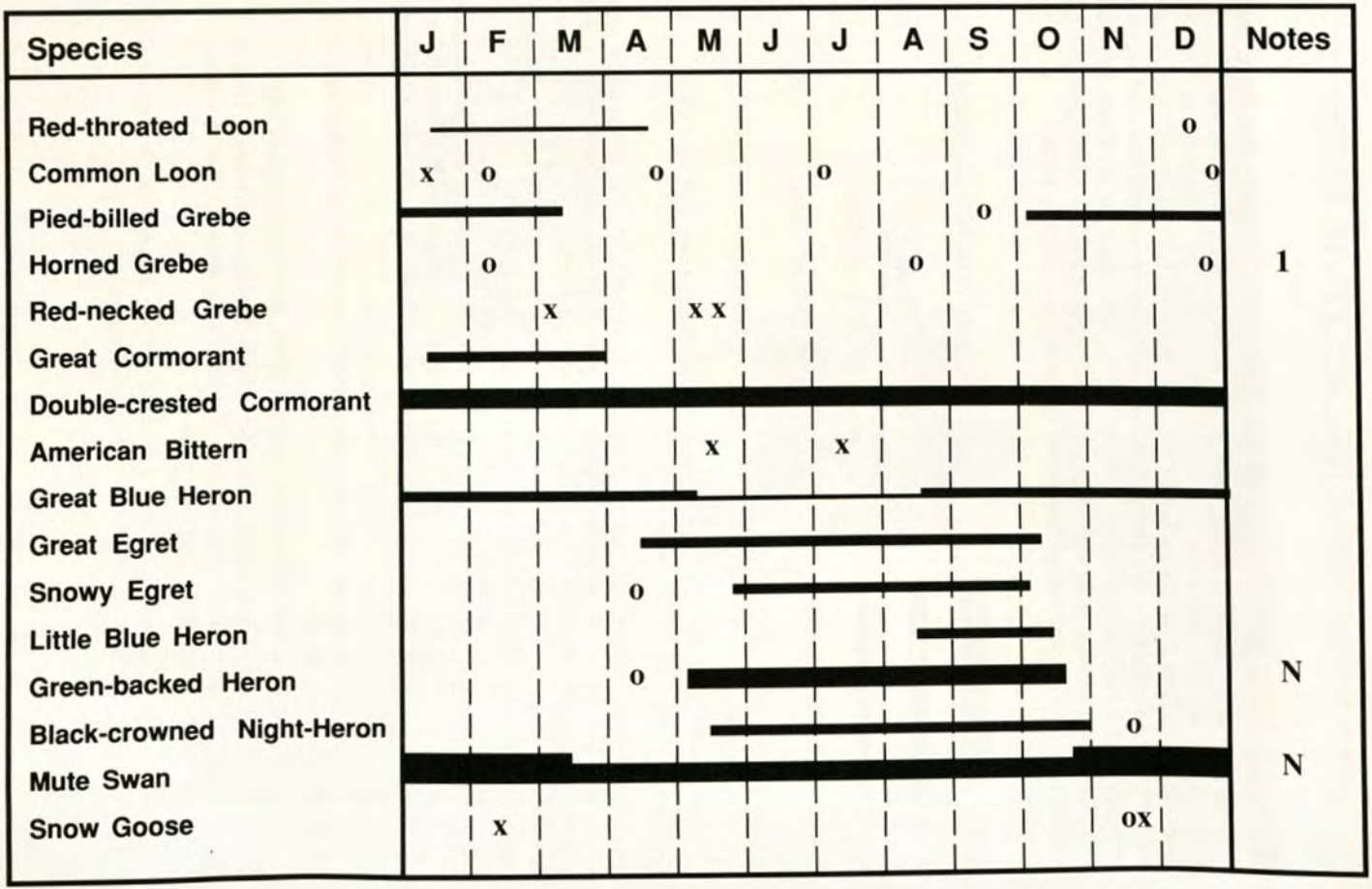
Both footnotes and the breeding status of particular species in the Connecticut College Arboretum are indicated in the "Notes" column. The footnotes are located at the end of the chart. Breeding status is described with the following symbols:

N - direct evidence of nesting since 1980 (active nest, fledglings or adult carrying food)

(N) - direct evidence of nesting before 1980, but not subsequently

T - evidence of stable territories since 1980 (males consistently sing or display in a particular area during the breeding season), but no direct evidence of nesting during that period

Common names are based on the checklist of the American Ornithologists' Union (1983); see this checklist for scientific names.


Species
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Red-throated Loon
Common Loon
Pied-billed Grebe
Horned Grebe
Red-necked Grebe
Great Cormorant
Double-crested Cormorant
American Bittern
Great Blue Heron
Great Egret
Snowy Egret
Little Blue Heron
Green-backed Heron
Black-crowned Night-Heron
Mute Swan
Snow Goose
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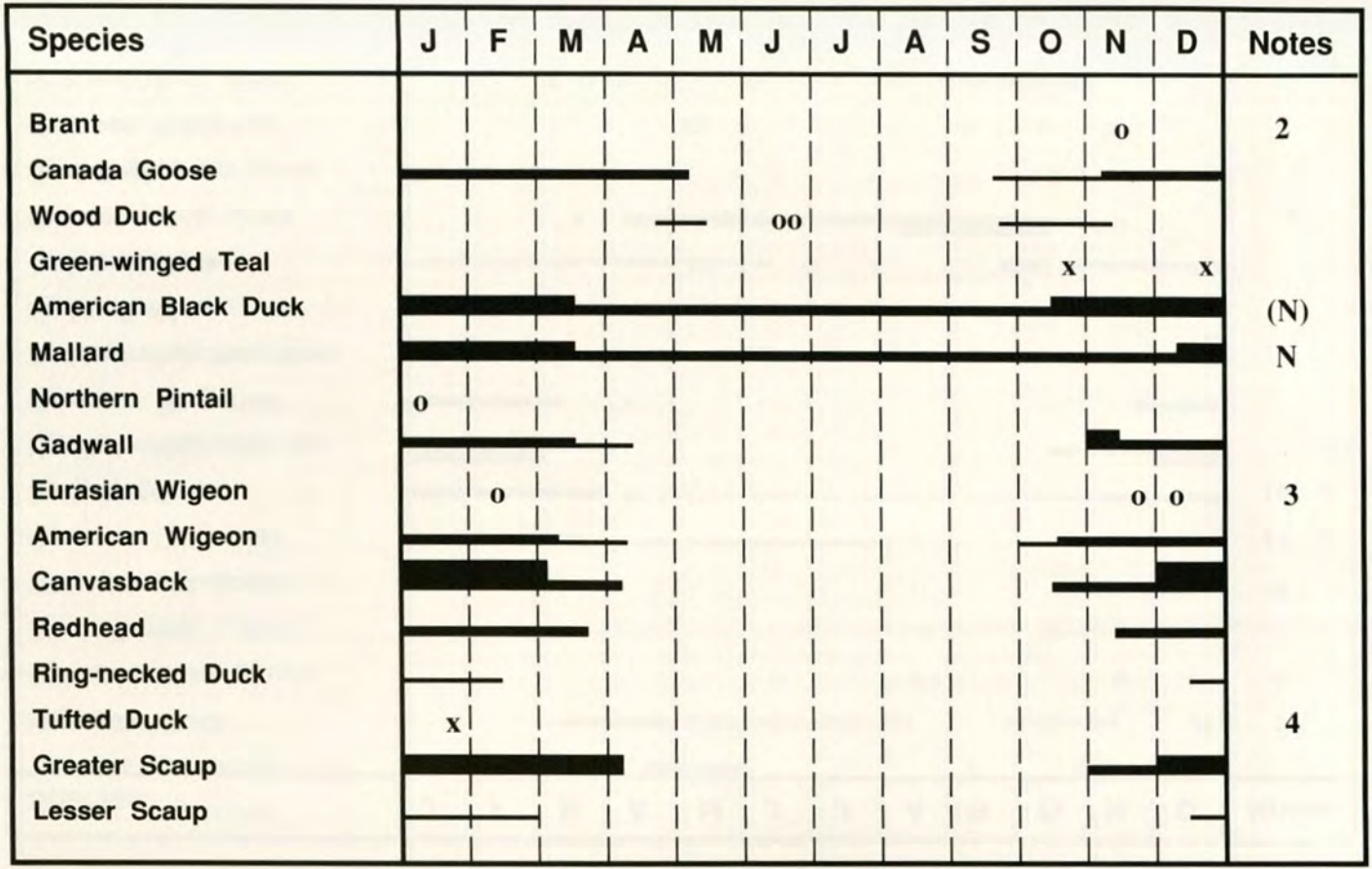
Species
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Brant
Canada Goose
Wood Duck
Green-winged Teal
American Black Duck
Mallard
Northern Pintail
Gadwall
Eurasian Wigeon
American Wigeon
Canvasback
Redhead
Ring-necked Duck
Tufted Duck
Greater Scaup
Lesser Scaup
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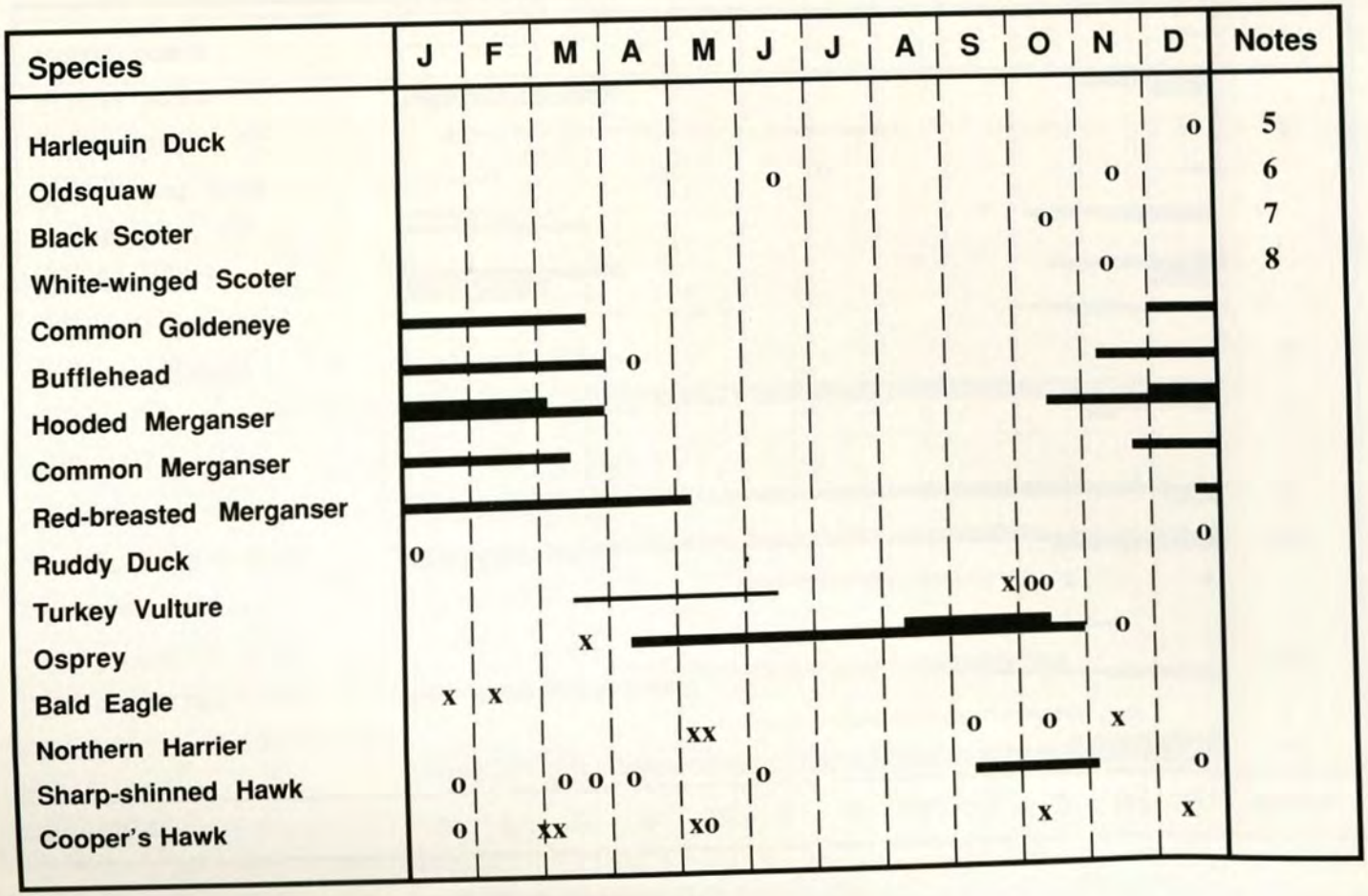
Species
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Harlequin Duck
Oldsquaw
Black Scoter
White-winged Scoter
Common Goldeneye
Bufflehead
Hooded Merganser
Common Merganser
Red-breasted Merganser
Ruddy Duck
Turkey Vulture
Osprey
Bald Eagle
Northern Harrier
Sharp-shinned Hawk
Cooper's Hawk
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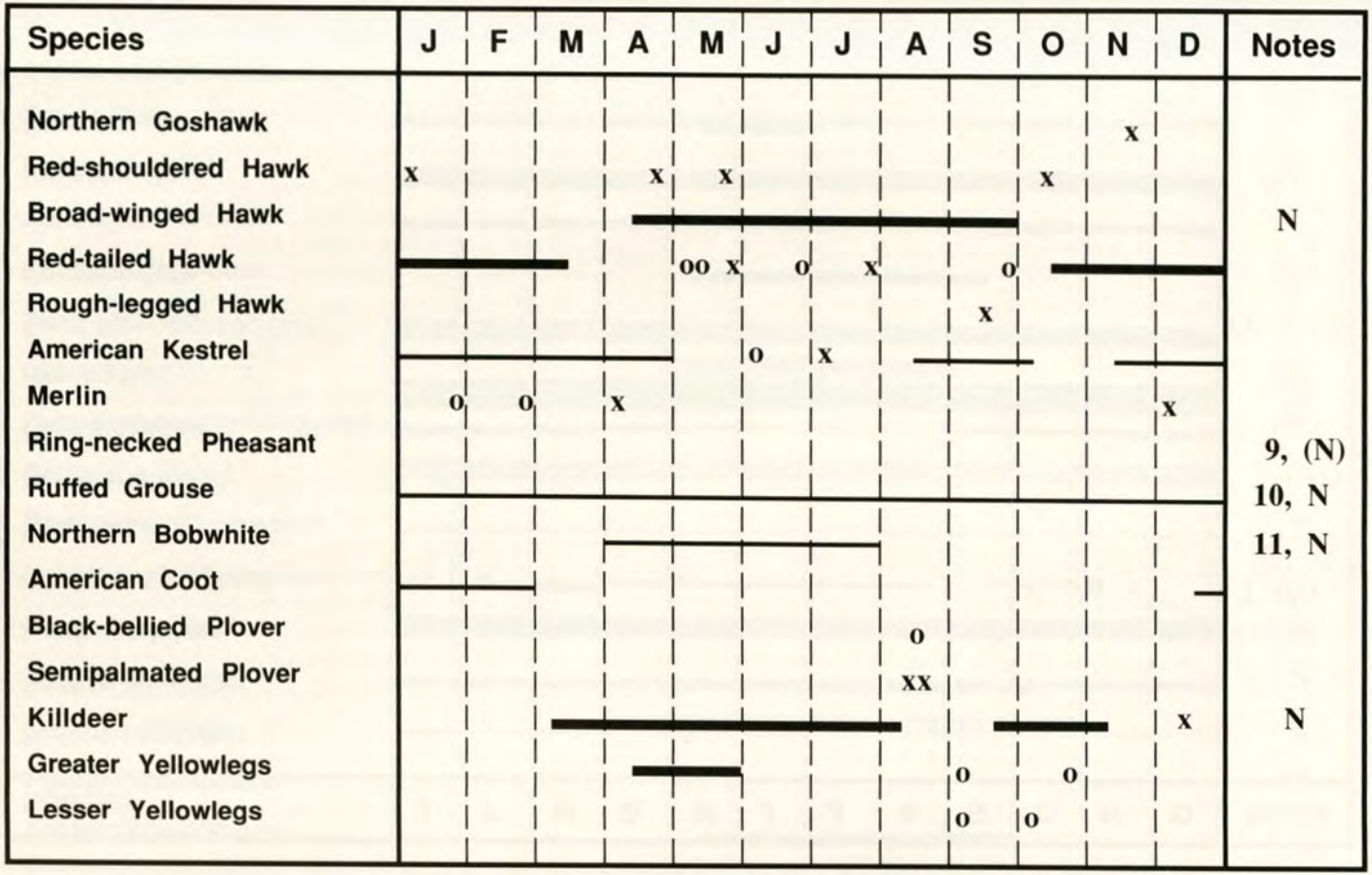
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Northern Goshawk
Red-shouldered Hawk
Broad-winged Hawk
Red-tailed Hawk
Rough-legged Hawk
American Kestrel
Merlin
Ring-necked Pheasant
Ruffed Grouse
Northern Bobwhite
American Coot
Black-bellied Plover
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Killdeer
Greater Yellowlegs
Lesser Yellowlegs
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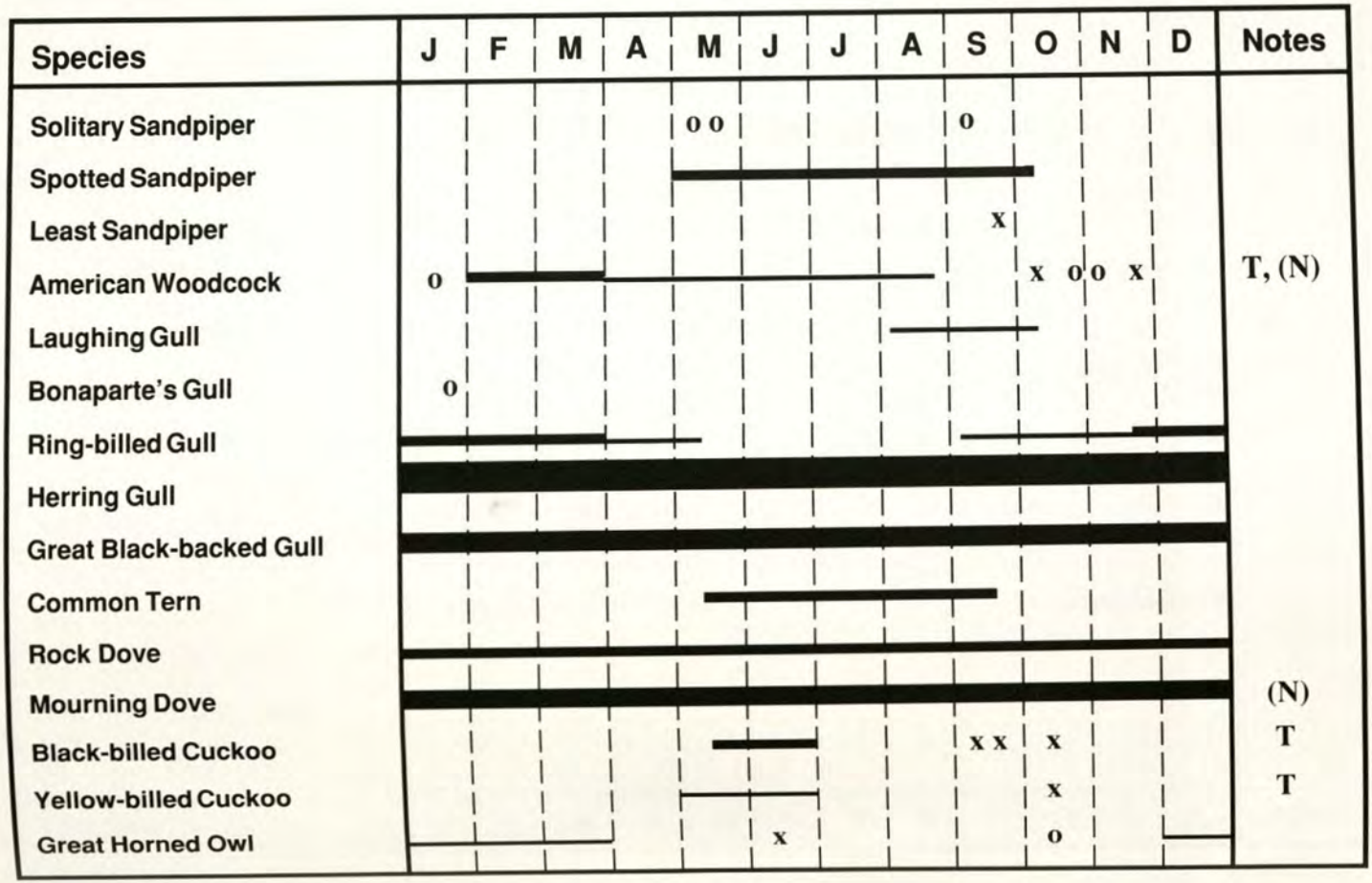
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Solitary Sandpiper
Spotted Sandpiper
Least Sandpiper
American Woodcock
Laughing Gull
Bonaparte's Gull
Ring-billed Gull
Herring Gull
Great Black-backed Gull
Common Tern
Rock Dove
Mourning Dove
Black-billed Cuckoo
Yellow-billed Cuckoo
Great Horned Owl
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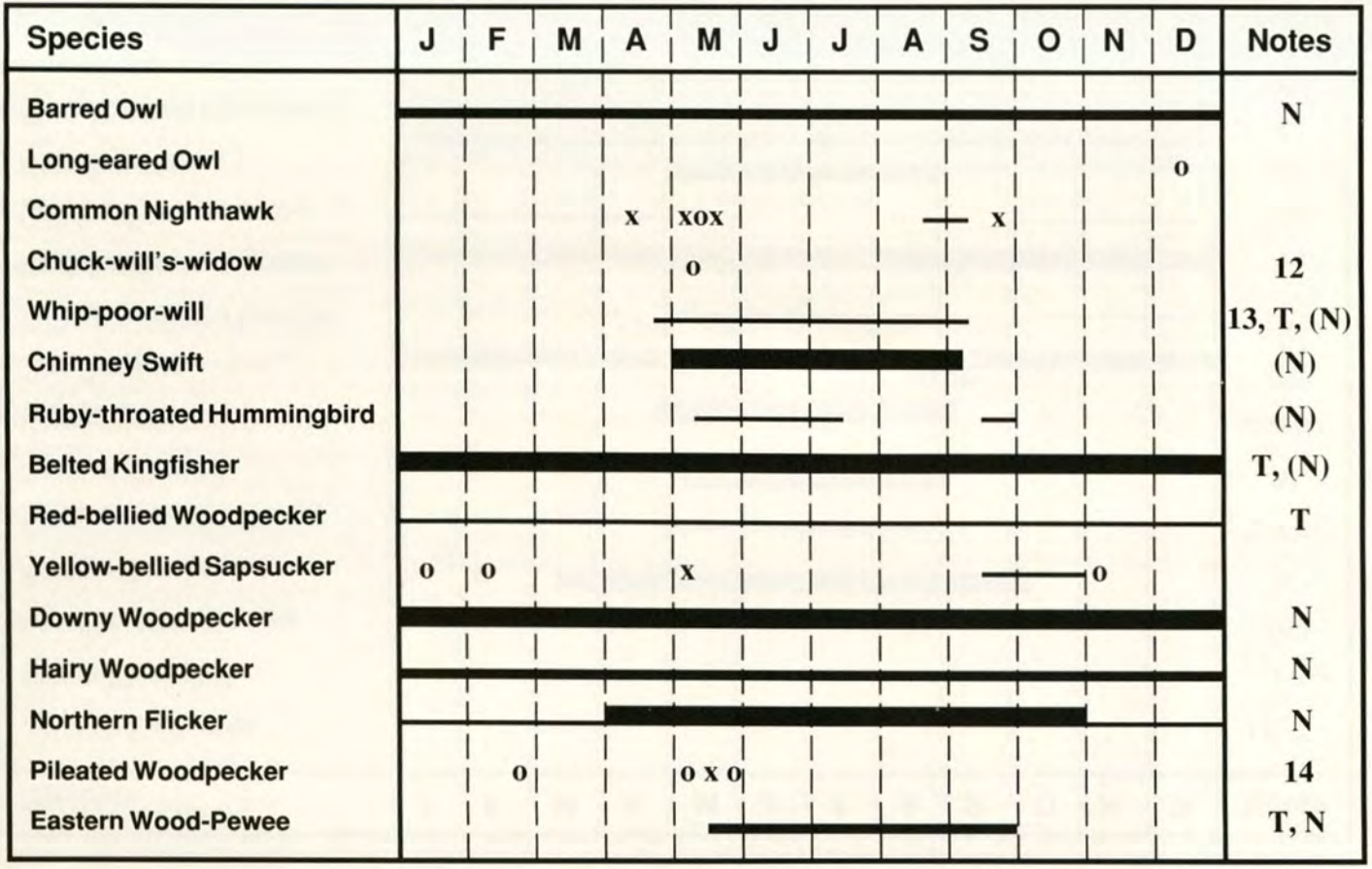
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Barred Owl
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Long-eared Owl
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Whip-poor-will
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Chimney Swift
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Ruby-throated Hummingbird
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Belted Kingfisher
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Red-bellied Woodpecker
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Yellow-bellied Sapsucker
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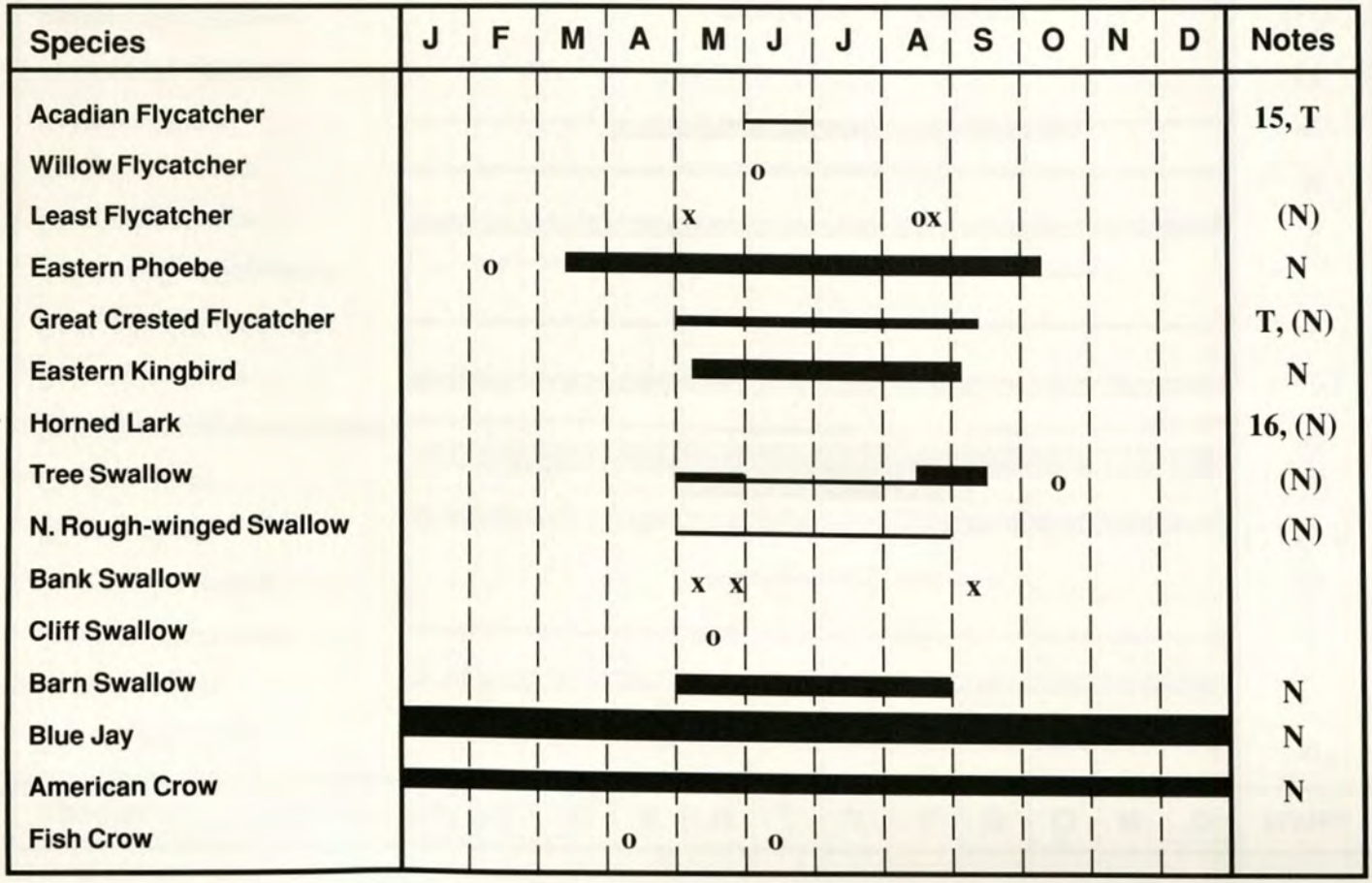
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Acadian Flycatcher
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Eastern Phoebe
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Great Crested Flycatcher
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Horned Lark
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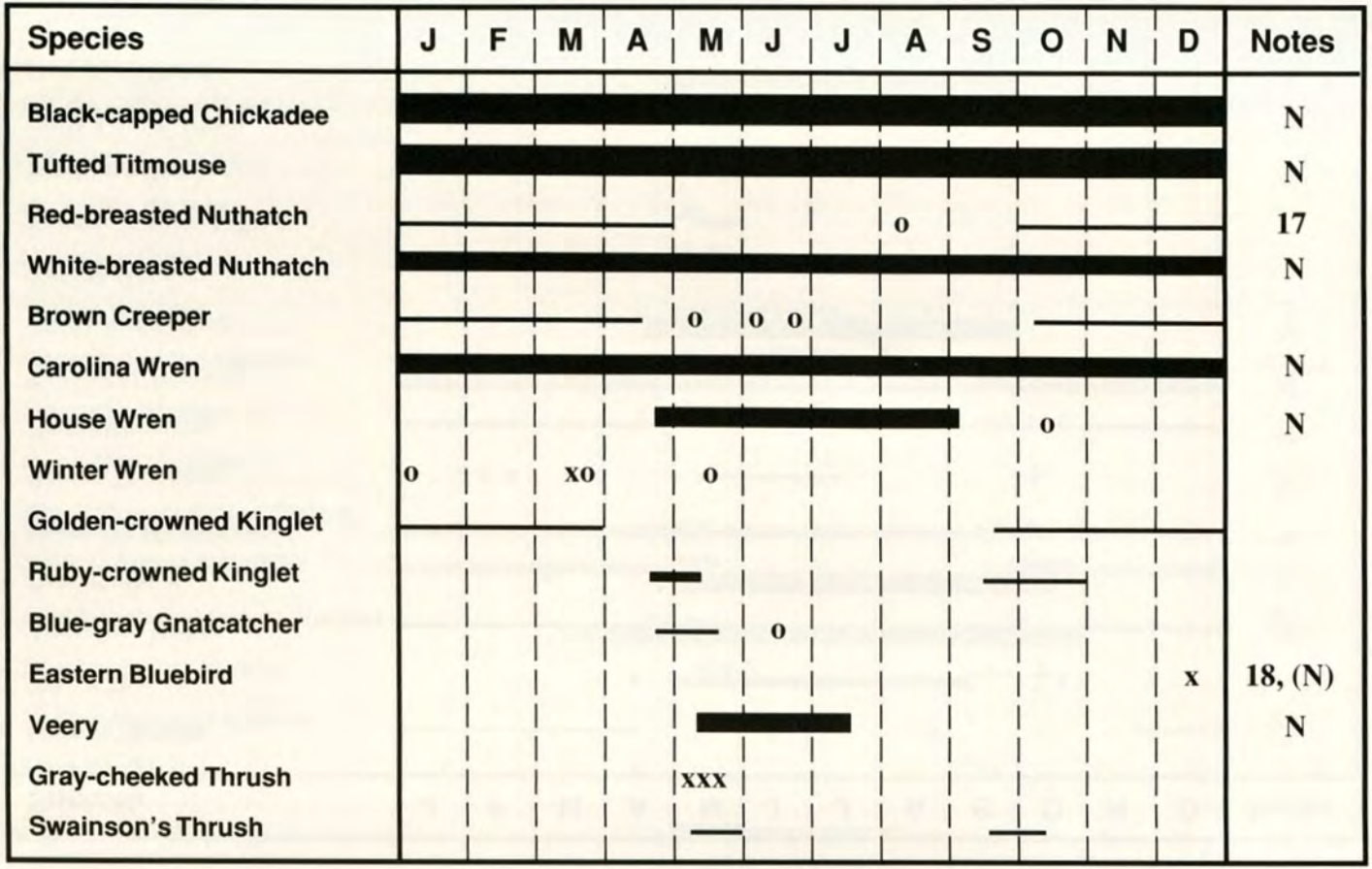
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Tufted Titmouse
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Red-breasted Nuthatch
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White-breasted Nuthatch
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Brown Creeper
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Carolina Wren
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House Wren
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Winter Wren
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Golden-crowned Kinglet
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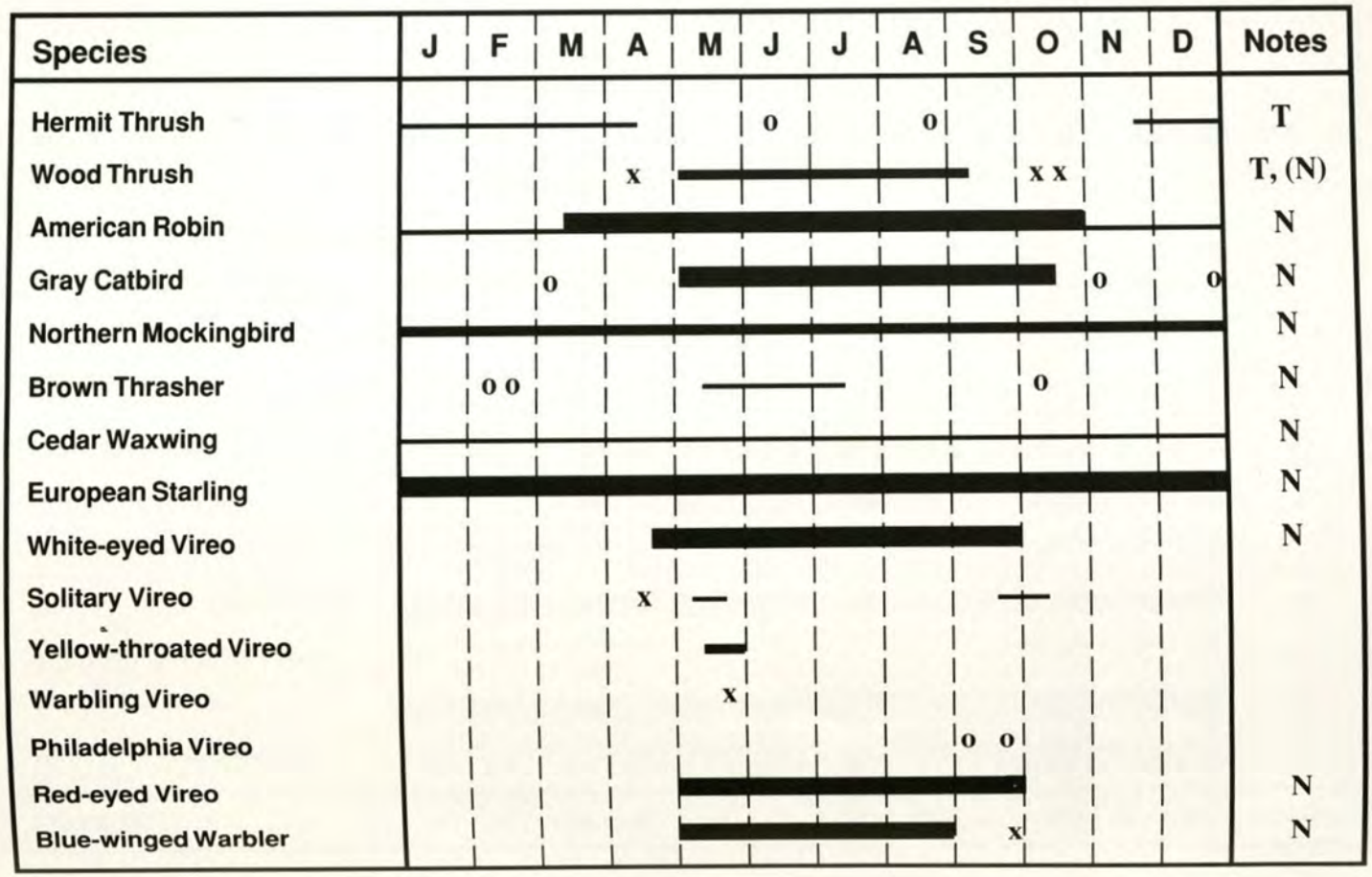
Swainson's Thrush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Northern Mockingbird
Brown Thrasher
Cedar Waxwing
European Starling
White-eyed Vireo
Solitary Vireo
Yellow-throated Vireo
Warbling Vireo
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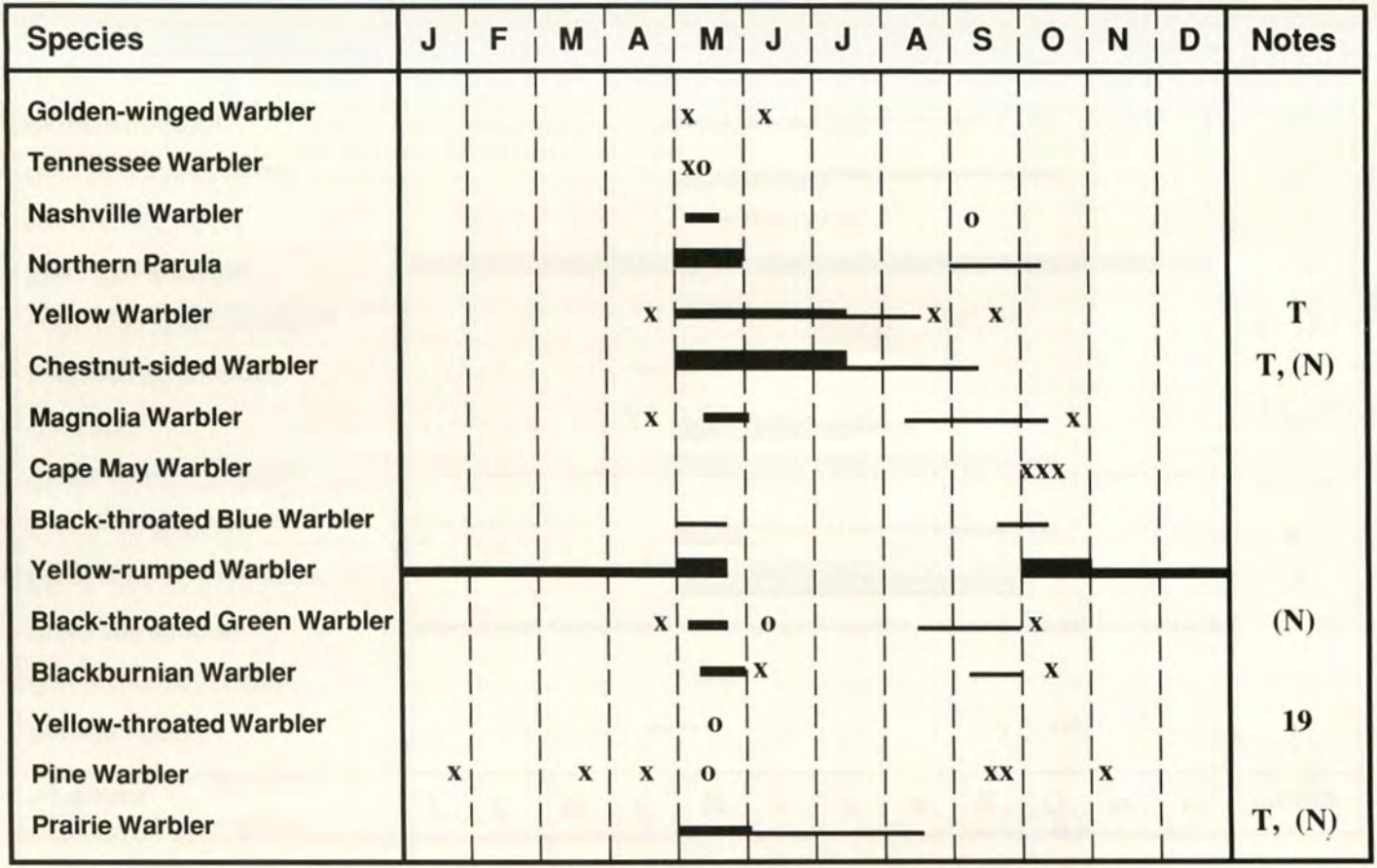
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Golden-winged Warbler
Tennessee Warbler
Nashville Warbler
Northern Parula
Yellow Warbler
Chestnut-sided Warbler
Magnolia Warbler
Cape May Warbler
Black-throated Blue Warbler
Yellow-rumped Warbler
Black-throated Green Warbler
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Pine Warbler
Prairie Warbler
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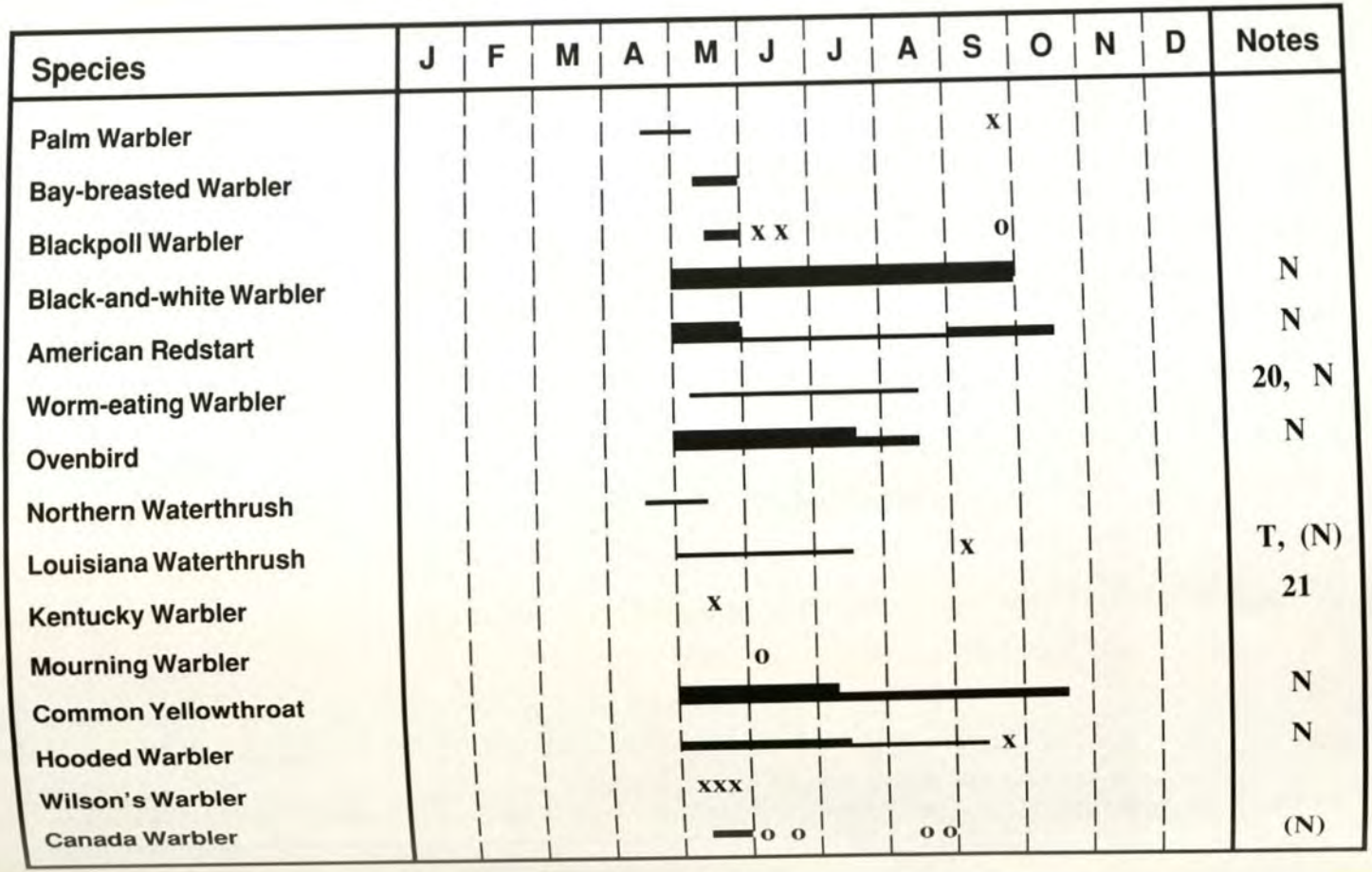
Species
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Notes
Palm Warbler
Bay-breasted Warbler
Blackpoll Warbler
Black-and-white Warbler
American Redstart
Worm-eating Warbler
Ovenbird
Northern Waterthrush
Louisiana Waterthrush
Kentucky Warbler
Mourning Warbler
Common Yellowthroat
Hooded Warbler
Wilson's Warbler
Canada Warbler
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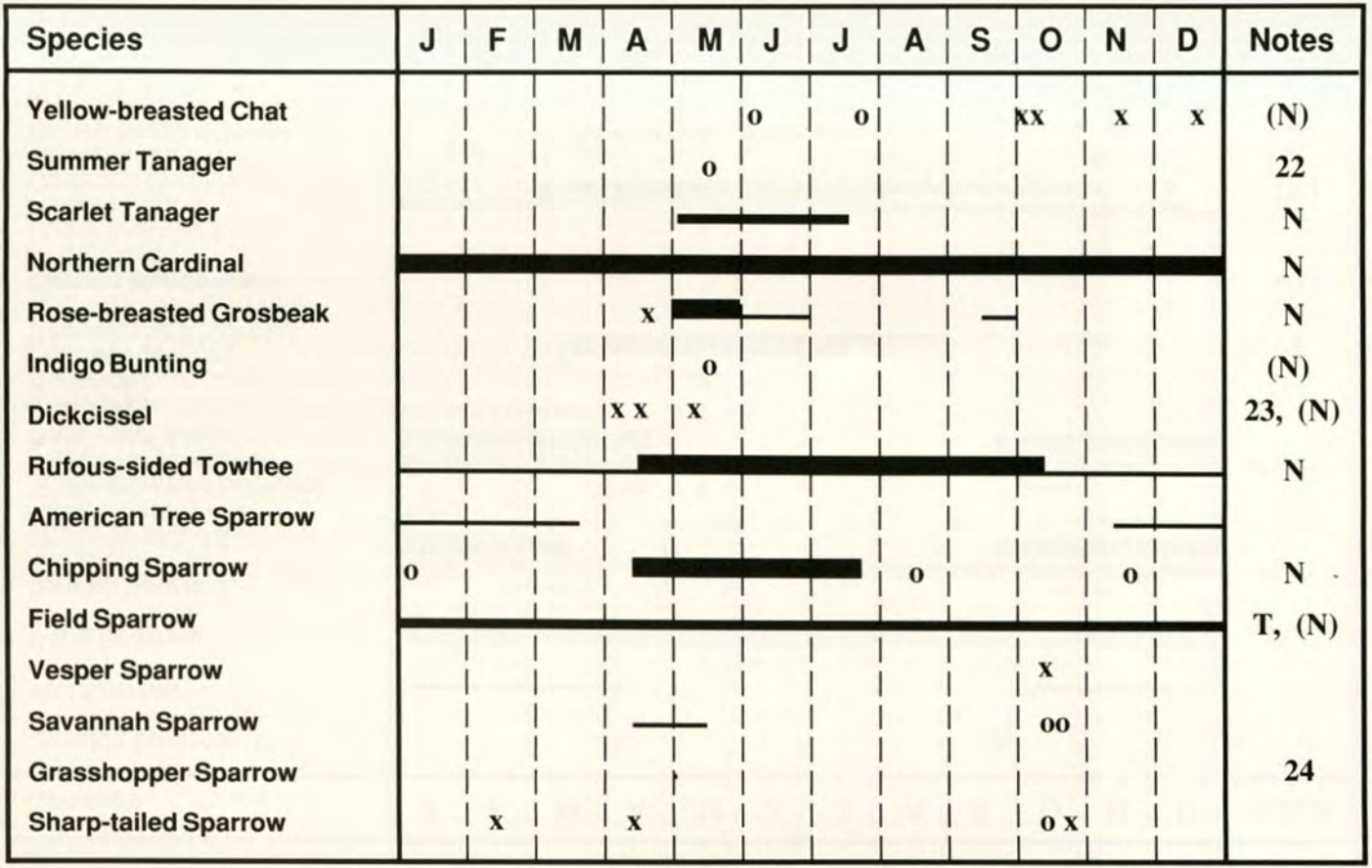
Species
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Notes
Yellow-breasted Chat
Summer Tanager
Scarlet Tanager
Northern Cardinal
Rose-breasted Grosbeak
Indigo Bunting
Dickcissel
Rufous-sided Towhee
American Tree Sparrow
Chipping Sparrow
Field Sparrow
Vesper Sparrow
Savannah Sparrow
Grasshopper Sparrow
Sharp-tailed Sparrow
(N)
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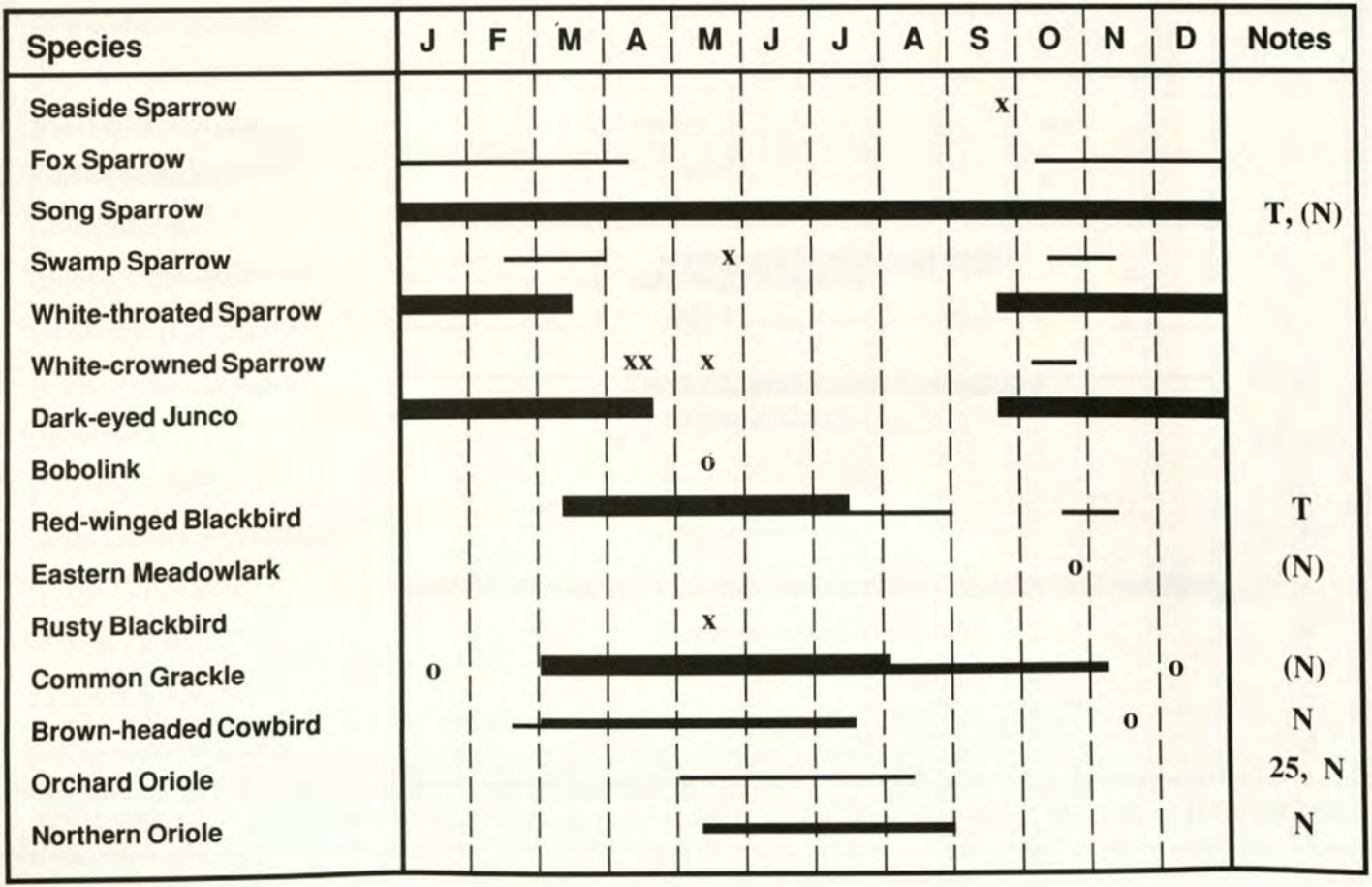
(N)
23, (N)
N
T, (N)
24


Species
J
F
M
A
M
J
J
A
S
O
N
D
Notes
Seaside Sparrow
Fox Sparrow
Song Sparrow
Swamp Sparrow
White-throated Sparrow
White-crowned Sparrow
Dark-eyed Junco
Bobolink
Red-winged Blackbird
Eastern Meadowlark
Rusty Blackbird
Common Grackle
Brown-headed Cowbird
Orchard Oriole
Northern Oriole
T, (N)
T
(N)
(N)
N
25, N
N

Species	J	F	M	A	M	J	J	A	S	O	N	D	Notes
Pine Grosbeak	x x	x x											
Purple Finch		o			o						o		(N)
House Finch	———	———	———	———	———	———	———	———	———	———	———	———	N
Red Crossbill		x											
White-winged Crossbill		x											
Common Redpoll		x	x										
Pine Siskin	———	———	———	———	x				x			———	
American Goldfinch	———	———	———	———	———	———	———	———	———	———	———	———	T, (N)
Evening Grosbeak	———	———								———	———	———	
House Sparrow	———	———	———	———	———	———	———	———	———	———	———	———	N

NOTES

1 **Horned Grebe** was described as infrequent from early December to early April by Goodwin and Grandjouan (1958).

2 Two immature **Brant** were observed on the Thames River by Thomas Ford ('92) on November 21, 1988.

3 A male **Eurasian Wigeon** observed by Robert Askins accompanied a flock of **American Wigeons** in the coves at Mamacoke Island during the winters of 1981-1982 and 1982-1983.

4 Grace Bissell reported a **Tufted Duck** on the Thames River on January 31, 1971.

5 An immature male **Harlequin Duck** was discovered on the Thames River on December 31, 1988 by Robert Askins and Wendy Dreyer. It was periodically observed off the Coast Guard Academy and at the mouth of Smith Cove until March 5.

6 Robert Askins observed a male and female **Oldsquaw** north of Mamacoke Island on November 23, 1986, and a single male near the Connecticut College Boathouse from June 17 to 20, 1987.

7 Four male **Black Scoters** were observed near the Connecticut College Boathouse on October 20, 1985.

8 Daniel Kluza ('91) reported a **White-winged Scoter** on the Thames River on November 15, 1987.

9 Goodwin and Grandjouan (1958) describe **Ring-necked Pheasant** as an infrequent permanent resident in the Arboretum, but there have been no records since 1980.

10 **Ruffed Grouse** are most frequently flushed along Bolles Road. They are observed only rarely south of Gallows Lane.

11 **Northern Bobwhite** was listed as a fairly common permanent resident by Goodwin and Grandjouan (1958). Since 1982, however, it has been an irregular visitor, occurring in small numbers some years but not others. It is heard most frequently in the Arboretum Field and along the powerline and gas pipeline right-of-ways.

12 A **Chuck-will's-widow** was heard singing on the night of May 8, 1982 in the Niering Tract by Eugene TeHenneppe.

13 Wendy Dreyer recorded **Whip-poor-wills** singing north of Gallows Lane near Bolles Road during the summers of 1985, 1986, and 1987.

14 All of the recent sightings of **Pileated Woodpecker** have been in the Bolleswood Natural Area (May 1986 and May 1987). Fresh Pileated Woodpecker excavations were found on dead trees on Mamacoke Island in February, 1981.

15 **Acadian Flycatcher** was first recorded in the Arboretum by Robert Askins and Margarett Philbrick ('85) during the summer of 1982, when there were two territories in the shady young hemlock forest along the ravine in the Bolleswood Natural Area. This species was present regularly in the same area during the summers of 1986 and 1987. Also, Acadian Flycatchers have occasionally been observed along Bolles Road.

16 Goodwin and Grandjouan (1958) describe the **Horned Lark** as infrequent from the beginning of February to early April, and in late October and early November, with occasional records from late April to early June. There have been no records since 1980, however, so this is another grassland species that has disappeared from the Arboretum.

17 **Red-breasted Nuthatches** are irregular visitors; they were infrequent in 1981 and 1986, and absent from 1982 to 1985 and in 1987 and 1988.

18 **Eastern Bluebird** was listed as infrequent and regular from early March to early June and infrequent and irregular from mid-September to late February by Goodwin and Grandjouan (1958). There have been no records since 1980.

19 Richard Noss reported a **Yellow-throated Warbler** in the vicinity of the Arboretum Pond on May 13, 1984.

20 Since 1982 **Worm-eating Warbler** have been occasional summer residents in the Bolleswood Natural Area and along Bolles Road.

21 Robert Dewire reported a **Kentucky Warbler** in the Arboretum on May 13, 1970.

22 Daniel Kluza ('91) reported a **Summer Tanager** near the Arboretum Pond on May 17, 1989.

23 Goodwin and Grandjouan (1958) report that a pair of **Dickcissels** nested in the eaves of a house near the Connecticut College campus in 1951.

24 Goodwin and Grandjouan (1958) report several observations of **Grasshopper Sparrows** during April and May from 1936 to 1941. There have been no reports since 1980.

25 **Orchard Orioles** were summer residents in the Arboretum Field in 1985, 1986, and 1987.

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The Annotated Checklist, except for the Notes, is not covered by this index.

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