THE ROOSTING BEHAVIOR OF THE RED-WINGED BLACKBIRD IN THE SOUTHERN UNITED STATES

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A study of the roosting behavior of the Red-winged Blackbird (*Agelaius phoeniceus*) and associated species in southern United States was made during the 14-year period of 1950 through a part of 1964. Observations were made chiefly in the lower Mississippi Valley region of Arkansas, Mississippi, and Louisiana, and in the Atlantic Coastal Plain area from Chesapeake Bay to Savannah, Georgia. Other studies of the roosting behavior of blackbirds in the South have been made by Dunbar (1952), Neff and Meanley (1952, 1957*a*, 1957*b*), Meanley (1956), and Meanley and Webb (1960, 1961).

Red-winged Blackbirds and several other icterids form roosts during every month of the year. The size of roosts varies considerably from season to season; the low point in numbers is reached during the breeding season when most of the population is dispersed. Most large rural roosting populations in southeastern United States are composed of several species, including Red-winged Blackbirds, Common Grackles (*Quiscalus quiscula*), Brown-headed Cowbirds (*Molothrus ater*), and Starlings (*Sturnus vulgaris*). In coastal areas, Boat-tailed Grackles (*Cassidix mexicanus*) also are found. During the winter half of the year, Rusty Blackbirds (*Euphagus carolinus*) and sometimes Robins (*Turdus migratorius*) join these aggregations.

METHODS

Roosts were observed continuously throughout the year on the Arkansas Grand Prairie in Arkansas and Prairie Counties, during the period 1950 through 1955. Nearly continuous observations were made at a tidal marsh roost along the Patuxent River, Anne Arundel County, Maryland, from 1958 through 1963. Observations for a period of at least one month were made at roosts located near Lobdell, West Baton Rouge Parish, Louisiana; Hick's Station, St. Francis County, Arkansas; and in the Dismal Swamp, Camden County, North Carolina, and Norfolk County, Virginia. Numerous other roosts were observed for shorter periods of time.

Information about species composition, sex and age ratios, and molt of roosting birds was obtained by trapping, netting, collecting, and making observations at roosts; information on segregation, density, height of roosting, and other aspects of roosting behavior were obtained by using a headlight in roosts at night.

Estimates of the number of birds in roosts were obtained by one of several

methods. In a small roost (up to 20,000 birds) a total count was made as the birds moved toward the roost in established flightlines. Larger roosting populations were estimated in the following manner: (a) by making block counts on a time basis as birds passed between two points along a roost flightline; (b) by taking a series of representative photographs at regular intervals during the evening flight; and (c) by making density counts in quadrats at night; this procedure is feasible in ground roosts in rice (*Oryza sativa*) stubbles and in weathered-down cattail (*Typha* sp.) marshes.

Several specimens collected at roosts were identified to subspecies by Allen J. Duvall of the U.S. Fish and Wildlife Service.

DISTRIBUTION OF ROOSTING POPULATIONS AND COMPOSITION OF ROOSTS

The greatest concentrations of Red-winged Blackbirds in the southern states occur in the Coastal Plain Province in or near major rain-producing areas (Kalmbach, 1937; Neff and Meanley, 1957a; Meanley and Webb, 1961). Within this vast lowland region, the major population centers include the rice belts and river deltas of Arkansas, Louisiana, and Mississippi; the Gulf Coast marshes; the Virginia–Carolina peanut belt; the South Atlantic coastal marshes; and the lower Florida peninsula. Common Grackles, Brown-headed Cowbirds, and Starlings also occur in large numbers in some of these coastal plain areas, as well as in the Piedmont and Ridge and Valley provinces where the Red-winged Blackbird is less numerous.

The composition of roosting blackbird and Starling populations varies considerably. For example, in the Southeast in winter, Red-winged Blackbirds occur in greater numbers farther south and nearer the coast than do Common Grackles. Therefore, many tidal marsh roosts contain only Red-winged Blackbirds. Conversely, some winter roosts in the Piedmont Province do not contain Red-winged Blackbirds, but are composed of Common Grackles, Brown-headed Cowbirds, Rusty Blackbirds, and Starlings.

In Arkansas County, Arkansas, Common Grackles formed an estimated 80 per cent of the population in a large winter roost in the bottomland forest along the White River; while a winter roost located on the Grand Prairie in the same county contained an estimated 70 per cent Red-winged Blackbirds. The difference in composition probably is related to the food habits of these two species. The Red-winged Blackbird is essentially a bird of the prairie, feeding mostly on grain and weed seeds in winter, while the Common Grackle sometimes feeds to a great extent on acorn (*Quercus* sp.) and hackberry (*Celtis* sp.) mast found in the bottomland forest.

Most roosts undergo a marked change in composition with the advent of

migration. Roosts on the Arkansas Grand Prairie that were composed of birds of several age classes and both sexes of four species in late February 1951, contained mostly female Red-winged Blackbirds one month later.

Several different populations and geographic races may be represented in a roosting population. Banding data show that Arkansas roosts containing several species of blackbirds in late February are composed of both birds that breed locally (approximately 20 per cent) and birds that breed in the North-Central states (approximately 80 per cent). Specimens of three races of Red-winged Blackbirds were collected at one roost.

ANNUAL ROOSTING CYCLE

Late summer roosting.—With the termination of the nesting season and the onset of molt in July, resident Red-winged Blackbirds congregate mainly in wetland habitat, such as tidal marshes, nontidal marshes, and rice fields, where they not only roost but spend part of the day feeding and loafing. The size of roosting populations at this time is relatively small (an estimated 5,000 roosted at the Patuxent River marsh, Maryland, 9 July 1962). There is a marked increase in numbers after the first of August with a peak usually some time between the first of September and the first of October. With the completion of molt in late September, there is a gradual exodus from roosts, except from those in the Gulf Coast area.

Fall roosting.—Fall roosts are of several types: (a) those used for comparatively short periods by transient birds en route from breeding to wintering ground; (b) those used as late summer roosts that continue to be used throughout the fall and sometimes into the winter (many such roosts occur in tidal marshes of the South Atlantic coast, and in the Gulf Coast marshes, where the Gulf Coast Red-winged Blackbird (*Agelaius phoeniceus littoralis*) is resident the year around); and (c) roosts formed in the fall that continue to be used through the winter and early spring.

Some fall roosts may contain segments of both the outgoing resident breeding population and the incoming winter population.

Winter roosting.—On the wintering ground, roosts are formed which vary in size from a handful of birds to several million (Sykes et al., 1961). Such roosts may have been formed in the fall or in the early winter. These winter roosts usually are occupied over a longer period of time and are larger than other seasonal roosts. Some roosts may reach their greatest size in midwinter; while others may reach peak size in late winter. Most roosts on the Arkansas Grand Prairie reach a peak during the last week in February or the first week in March.

Spring roosting.—Most of the large winter roosts on the Arkansas Grand

Prairie continue in use until mid-April. Band-recovery information indicates that these roosts are occupied in the early spring by resident breeding birds, and by breeding birds from the North-Central states. In late February and early March, resident adult male Red-winged Blackbirds occupied breeding territories near roosts, and usually would return to communal roosts on cold nights. Birds occupying these roosts in April were mainly female and subadult male Red-winged Blackbirds. The roost at Slovac, Arkansas, contained an estimated 10,000 female redwings as late as 30 April 1951. In more northern latitudes, spring-transient roosts often are formed in old fall roost sites that were unoccupied during the winter.

Nesting season.—Red-winged Blackbirds occupying roosts during the earlier part of the nesting season on the Arkansas Grand Prairie were observed to be predominantly subadult males. A roost located at Stuttgart, Arkansas, on 15 May 1951, contained an estimated 15,000 birds, mostly of this age class. Observations indicated that subadult males were predominant throughout the period that the roost was in use (until late June). In a sample of 30 birds collected at this roost, 26 were subadult males, 1 was an adult male, and 3 were subadult females.

An estimated 3,000 Red-winged Blackbirds and 1,000 Boat-tailed Grackles were observed roosting together in a sawgrass (*Cladium jamaicense*) marsh 10 miles south of Fellsmere, Indian River County, Florida, on 7 May 1964. Both sexes of the two species were represented. Ages were not determined.

ROOST LOCATIONS

The general locality in which large roosts are located is probably influenced by food supply. As an example, 15 roosts, each containing an estimated one million or more blackbirds and Starlings, were located in Arkansas in the winter of 1962–63. All of these roosts were in or within 25 miles of the rice belt. The precise location of a roost is determined by several factors, chief of which is the character of the habitat. Dense cover appears to be important. A wetland situation is usually chosen by Red-winged Blackbirds.

The importance of water in a roost site can be demonstrated by the preference of roosting blackbirds for flooded rice fields in the lower Mississippi Valley. Rice is planted in water which is maintained at a depth of 4 to 8 inches during the growing season. When the fields are drained 2 weeks before harvest, birds that have been roosting in such fields usually move to a roost in greener fields with standing water.

Some roosts are located in dry sites. Favorite dry land sites are deciduous thickets, coniferous stands, canebrakes (*Arundinaria*), and sugarcane fields. Although some roost sites may be used year after year, in areas where many sites are available birds may shift about from year to year. During eight

FIG. 1. Pocosin roost cover type. Pinetown, Beaufort County, North Carolina, January 1960.

winters of observation on the Arkansas Grand Prairie, birds roosted in five different sites, all within a 15-mile square area. Where extensive areas of similar cover occur, such as in the great pocosin bogs of eastern North Carolina, birds may relocate their roost several times during the course of a single winter. Some roost sites are used the year around or most of the year, but seldom are occupied by the same population at all seasons.

Atlantic and Gulf Coast marshes.—Most of the roosts in the Coastal Plain Province are located in marshes and swamps. Many forms of emergent vegetation provide excellent roost cover in marshes. In the Chesapeake Bay region the plants most commonly used are reed (*Phragmites communis*), cattail, and big cordgrass (*Spartina cynosuroides*). Reed averages 10 feet in height and big cordgrass about 7 feet.

Red-winged Blackbirds also may roost in a dense marsh mixture of several species of plants. One such roosting site in the Patuxent River marsh, Maryland, was composed of a rank mixture of wild rice (*Zizania aquatica*), water hemp (*Acnida cannabina,*) and beggar-tick (*Bidens laevis*).

In marshes of the South Carolina–Georgia low country, giant cutgrass

FIG. 2. Deciduous thicket roost type. Prairie County, Arkansas, February 1951. Branches of low tree broken by the weight of roosting birds.

(*Zizaniopsis miliacea*), reaching a height of 6–7 feet, produces one of the most important roosting habitats. Extensive stands of this plant, known as "White Marsh" because of the blanched appearance in winter, grow in the fresh and slightly brackish tidal zones of coastal rivers.

In the Louisiana gulf coast marshes, favorite roosting sites are reed (known locally as roseau cane), southern bulrush (*Scirpus californicus*), and giant cut-grass.

North Carolina pocosins.—In much of the Outer Coastal Plain of North Carolina there are vast pine bog wilderness areas known as pocosins (Fig. 1). Pond pine (*Pinus serotina*) is the dominant overstory, while various broad-leaved evergreen shrubs and vines such as bays (*Persia borbonia*) and (*Gordonia lasilanthus*), titi (*Cyrilla racemiflora*), gallberry (*Ilex glabra*), and catbrier (*Smilax laurifolia*) form the understory. The largest winter roosts on the Atlantic Coastal Plain are located in pocosins. Such roosts are often remote and nearly inaccessible because of the jungle-like understory.

Mississippi River delta.— The largest winter concentration of blackbirds found in the United States is in the Mississippi River delta area of Arkansas, Louisiana, and Mississippi. Deciduous thickets (Fig. 2) are the main roosting cover used by wintering blackbirds, and most of these are swampy. Other

habitats include the canebrakes and willow bars along the Mississippi, Arkansas, and other rivers; and cattail and giant cut-grass marshes bordering old riverbed lakes or oxbows.

In the southeastern Louisiana sugar belt, sugarcane fields are an important roosting site in late fall. After the fields are harvested in November and December, the birds move into characteristic winter habitats. In the south Florida sugar belt bordering the southern rim of Lake Okeechobee, sugarcane also is an important roost habitat.

Mid-South rice belt.—In the rice belt of Arkansas and Mississippi during late summer and early fall, most of the roosts are located in domestic rice fields. Rice fields are veritable man-made marshes with plants averaging about 5 feet high. The fields are used until the harvest is completed in late October or early November. In southwestern Louisiana and the contiguous coastal prairie of Texas, late summer roosts occur mainly in rice fields and coastal marshes.

The most unusual roost site that I have ever seen was a rice stubble that had been flattened by severe winter weather and was completely coated with a sheet of ice. Several hundred thousand blackbirds of five species were using the location, and were roosting on the ice. This was a temporary situation as the ice soon thawed.

Southern Piedmont.—Although fewer Red-winged Blackbirds occur in the Piedmont than in the Coastal Plain, some of the highland roosts contain large numbers of this species. In a roost at Clemson, South Carolina, located in the upper Piedmont, Red-winged Blackbirds and other blackbirds roosted in a bamboo (*Phyllostachys* sp.) thicket. On the Fall Line at Montgomery, Alabama, and in the lower Piedmont at Auburn, Red-winged Blackbirds and other icterids and Starlings also roosted in bamboo. Coniferous stands and deciduous thickets sometimes are used as roost sites.

MOVEMENTS TO AND FROM ROOSTS

Blackbirds move out of roosts each morning at about dawn or shortly after and return in the evening, usually before sunset. Regardless of the location of the roost most blackbirds apparently prefer to "get out and get going" before settling down to feed. Often they disperse over a wide area and begin feeding at a considerable distance from the roost. Some birds may travel many miles from the starting point in the course of a day's feeding activity, although the same kind and abundance of food may be available less than a mile from the roost. In Texas Red-winged Blackbirds and other icterids were observed to fly 46 and 52 miles, respectively, from two coastal marsh roosts to their feeding ground in the rice belt. Although a ripen-

ing Arkansas rice field was used as a roost by an estimated one-half million Red-winged Blackbirds, fewer than 100 birds fed there each day. However, when birds roost in the earliest or latest ripening rice field in an area, considerable feeding may take place at the roost.

The return trip to the roost may be made by a series of short movements, sometimes beginning by midafternoon or several hours before arrival at the roost, but birds feeding at a great distance from the roost in late afternoon must make an extended flight to reach the roost by sundown or nightfall.

On cloudy days, blackbirds feed closer to the roost, and were observed to move into the roost 15 to 30 minutes earlier than on sunny days. On a cloudy day, 4 February 1959, at a point 10 miles from a roost in the Dismal Swamp, Virginia and North Carolina, the main flight to the roost was from 4:45 to 5.15 PM. The following evening was sunny and the main flight at this same point was between 5:10 and 5:40 PM.

In flying to and from roosts, birds usually follow the same route. The route of travel is generally along natural landmarks, such as a drainage system, hedgerows, or bushy field borders, that lead in the direction of the roost.

The composition of a roost flight (or flightline) may depend upon the time of day, distance from the roost, and the composition of feeding groups. Some species precede others to a roost. The later in the day and the closer to the roost, the more integrated the flight may become. In the Patuxent River Valley, Maryland, subadult male Red-winged Blackbirds were always the first to arrive at late summer roosts. These were followed usually by females and juveniles. Adult males were sporadic in their time of arrival. Red-winged Blackbirds were followed by Bobolinks (*Dolichonyx oryzivorus*), Starlings, Common Grackles, and finally cowbirds. Red-winged Blackbirds arrived over a longer period of time than the other species.

Different species fly in characteristic formation all the way to some roosts and at least part of the way to all roosts. The flight pattern of Common Grackles is usually a long line. Other species when flying alone tend to fly more in a broad front, but in a long line when integrated.

Stratification in a roost flight was observed where birds were flying downstream to a river marsh roost. Bobolinks flew at the greatest elevations and in smaller flocks than other species. Next in order of height were Starlings, grackles, cowbirds, and Red-winged Blackbirds (closest to the ground). The later the flight, the closer to the ground all of the birds fly until the last birds flying toward the roost at dusk just skim over the top of the marsh vegetation. At 10 miles from a roost in southwestern Louisiana, birds were flying at an estimated 1,000 to 1,500 feet elevation over the rice fields toward their roost in the marsh.

At virtually all roosts, a small percentage of the roosting population arrives after dusk. Some of these birds strike telephone wires or other obstacles that are located near the roost. This often results in considerable mortality.

Arrival at the roost.—At a Patuxent River marsh roost in Maryland, birds entered over a longer period of time in summer than in winter. For example, an estimated 100,000 birds entered the roost during a period of about 2 hours in July, while in November approximately the same number arrived within a half-hour.

Birds began arriving at the roost about one hour before sunset in late July 1961. Birds arrived at this roost at about the same time in both November and December, one-half hour before sunset.

On bright sunny evenings in early spring, some early arrivals at a roost have been observed to occupy a prominent perch in the roost area, chorus for a short while, and then depart for a brief period of feeding somewhere about the periphery of the roost, or as far as 2 or 3 miles away. At the Patuxent marsh, some Red-winged Blackbirds were observed to bathe shortly after arrival at the roost.

In late winter, just before the large roosts begin to break up or diminish in size, birds are sometimes quite unsettled when they arrive. With no apparent provocation, they fly up and circle about the roost many times. In a 14-acre wooded "island" roost on the Arkansas Grand Prairie I have seen the entire population of an estimated 20 million birds fly up from the roost, wheel around, and return. This performance was repeated several times before the birds settled down for the evening. The causes of disturbance at roosts are many. Hunters shooting at ducks near a tidal marsh roost in the Chesapeake Bay region kept the birds from settling down until dark. Birds of prey coursing about roosts may do the same. Strong gusts of wind may also disturb the birds.

On warm, sunny evenings as the birds settle down they begin a chorus that may continue in part through much of the night, and especially on warm moonlight nights. Such chorusing is especially marked at large, early spring roosts just before and during the period the roosts diminish in size. By contrast, on stormy nights the birds settle down quickly and remain quiet.

Morning exodus.—The exodus of a large roosting population is of shorter duration than the movement into the roost. The departure from a cattail marsh roost at Hazen, Arkansas, was witnessed on the cloudy morning of 10 February 1952. The roosting population was estimated at about one-half million birds, and was composed of several species of Icteridae. The first activity noted at the roost was at about 6:45 AM (CST), when grackles began to chorus. Shortly after the chorus began, small flocks flew up and out of

the roost, circled, and returned. Following this maneuver, the birds began leaving the roost shortly after 7:00. The complete departure took only about one-half hour, the birds moving out in large flocks and completely leaving the roost area.

At a canebrake roost near Baton Rouge, Lousiana, the morning exodus was observed on 3 January 1963. The temperature was 38 F; sunrise was at 7:02 AM (CST); the weather was clear. An estimated 10 million blackbirds and Starlings, and 1 million Robins were roosting in the canebrake. The first activity noted was the morning chorus, which began at about 6:05. At 6:35 some of the blackbirds began moving out of the cane understory where they roosted and up into the overstory of scattered hardwoods. The Robins also began to leave the roost. By 6:38, the first blackbirds began to leave the roost. The main exodus was from 6:40 to 7:03 (sunrise). All birds had come up out of the cane roosting cover by 6:55, but about 50 per cent were still in the hardwood overstory. Starlings appeared to be the last to leave the roost. The entire roost was clear of blackbirds, Starlings, and Robins by 7:10.

ROOSTING BEHAVIOR

Segregation.—Some segments of the population are segregated in virtually all roosts. Segregation is the result of: (a) birds feeding in segregated flocks during the day and returning to the roost the same way; (b) flocks of birds of one species or one sex returning to a favorite section of the roost each evening; and (c) stratification in the roost. In a large roost on the Arkansas Grand Prairie, several thousand female Red-winged Blackbirds roosted every night for three consecutive winters in the same low brushy vegetation in the same section of the roost. In two Arkansas roosts in deciduous thickets, Starlings roosted highest in the trees; then came grackles and male Red-winged Blackbirds together; below them were cowbirds and female Red-winged Blackbirds; lowest were Rusty Blackbirds and more female Red-winged Blackbirds.

Stratification also was observed in a marsh roost near Hazen, Arkansas. Three species of plants were predominant in the marsh: cattails (*Typha latifolia*), which were standing erect; a sedge (*Carex hyalinolepis*), most of the plants of which were partly blown over; and smartweed (*Polygonum* sp.), which was lying prostrate over the water forming a mat. All species and sexes and ages were roosting in the cattails; grackles and male Red-winged Blackbirds were roosting in the blown-over sedge; and only female Red-winged Blackbirds were roosting on the smartweed mat. The feet, tail, and lower underparts of many of the female red-winged blackbirds were in the water.

In an Arkansas cattail roost, grackles were observed to roost in the more

open part of the roost while Red-winged Blackbirds roosted in a part of the marsh where there was a scattering of willows, or in the more shrubby or wooded part of the marsh, and along brushy edges.

Around the periphery of many large roosts where observations have been made, there have been small groups of roosting birds, usually of one species and often of one sex. Such peripheral roosting is especially characteristic of female Red-winged Blackbirds and Rusty Blackbirds. Brewer's Blackbirds often perch near the edges of large roosts until it is time to bed down, then they move out in broom-sedge fields or rice stubble to roost by themselves. Robins in roosts generally separate themselves from blackbirds. In a canebrake near Baton Rouge, Louisiana, Robins roosted mainly along the edge of the roost, although a few were observed roosting with female Red-winged Blackbirds.

Height and density of roosting.—As noted in the foregoing discussion, blackbirds may roost on partly submerged vegetation in a marsh, on the ground in grassy fields, in branches of trees, or in various other sites. Birds roosting in reed cane, which average about 10 feet high in some marshes, usually perch within 1 or 2 feet of the water. Rice plants average about 5 feet high, and blackbirds were observed perching near the base of the stalk, usually within 6 inches or a foot of the water. In deciduous thickets with extremely high bird densities, birds by necessity are forced to roost in all available space; they may be perched at elevations of 1 foot to 30 feet or more.

In high-density roosts in deciduous thickets on the Arkansas Grand Prairie, Red-winged Blackbirds roosted along branches at an average of about three birds per foot. Where a flock of an estimated 5,000 female Red-winged Blackbirds was roosting on a mat of aquatic vegetation in a pond near Stuttgart, Arkansas, I caught from three to 10 birds with each thrust of a long-handled hoop net having a diameter of 23 inches.

SUMMARY

This report concerns the roosting behavior of the Red-winged blackbird and associated species; and is based on observations made over a 14-year period mainly in the Southern United States.

The greatest concentrations of Red-winged Blackbirds in the southern states occur in the Coastal Plain Province in or near major grain growing regions.

Roosts are formed during every month of the year. The largest roosts are usually found in winter; the smallest during the breeding season. Composition of roosts may vary from place to place and from season to season.

The general locality in which roosts are found is probably influenced by food supply. The precise location is determined by the character of the habitat. Wetland situations are preferred by Red-winged Blackbirds. Most of the roosts in the Coastal Plain Province are located in marshes and swamps. Rice fields are important in the southern rice-

producing area. Coniferous stands and bamboo are frequently used in the Piedmont Province.

Blackbirds move out of roosts each morning at about dawn or shortly after, and return in the evening usually before sunset. Some birds may travel 35 miles or more from the starting point in the course of a day's feeding activity. On cloudy days blackbirds move into the roost earlier than on sunny days. At a Maryland roost subadult male Red-winged Blackbirds were the first to arrive at the roost. Females and then juveniles followed. Adult males were sporadic in their time of arrival. Stratification in a roost flight was observed where birds were flying downstream to a river marsh roost. Bobolinks flew at the greatest elevations; next in order of height were Starlings, Common Grackles, Brown-headed Cowbirds, and Red-winged Blackbirds. The exodus of a large roosting population is usually of shorter duration that the movement into the roost.

In virtually all roosts some segments of the population are segregated. Stratification by species and by sexes of some species has been noted in roosts. Blackbirds may roost on partly submerged vegetation in a marsh, on the ground in grassy fields, in branches of trees, or in various other sites. In deciduous thickets with high bird densities they may roost at elevations of 1 foot to 30 feet or more. In one Arkansas roost Red-winged Blackbirds were roosting along branches at an average of about three birds per foot.

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