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BIRD MOVEMENTS IN RELATION TO CONTROL

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Ecological studies are being carried out by Denver Wildlife Research Center personnel on starlings *(Sturnus vulgaris)* and blackbirds as part of a research program to alleviate damage by these species. The objectives are to determine the breeding and wintering areas, migratory routes, local movement patterns, and turnover rates of problem populations. Knowledge about the movement of problem birds is essential for determining those points in their daily and seasonal movement cycles where they are likely to be more vulnerable to control.

Banding and marking programs are presently the primary means of gathering movement data. Since 1960, Denver personnel and cooperators have banded nearly 200,000 starlings and blackbirds in Arizona, Nevada, California, Colorado, Oregon, South Dakota, and North Dakota. About 60,000 of these birds were also color-tagged with leg streamers to increase the normally low recovery rate of starlings and blackbirds and to provide data on the feeding, movement, and roosting patterns of local populations.

The most successful and efficient trapping technique used to capture these birds was the use of bait traps such as the modified Australian crow trap and the decoy trap used successfully by Patuxent Research Center biologists. Use of long-handled dip-nets in frozen marsh roosts at night and cannon nets and chemical soporifics in feeding and preroosting areas also resulted in thousands of banded birds.

Information from banded and tagged birds, coupled with observations of flock movement and behavior, has provided a basis for damage control research on the starling-feedlot problem in Colorado and on the blackbird-corn damage problem in South Dakota.

Starling Movements-Colorado

In the South Platte River Valley northeast of Denver, postbreeding flocks of locally reared birds begin congregating in feedlots in late July and steadily increase in numbers throughout the summer. Fall migration of northern birds usually begins in mid-September, reaches a peak in October, and ends in late November. Many of the northern migrants remain in the Valley and, with the locally reared

birds, form the wintering population, which in some years has been as large as 300,000 birds, Migrant starlings begin moving north by mid-February, and the spring migration is usually over by April, when "local-breeding" birds have their nesting cycle well under way. Most, if not all, of the starlings raised in the Valley are permanent residents.

During the height of the fall migration, there is an extremely high turnover rate of individual birds at feedlots. At one feedlot where about 5,000 birds were banded in 1964, retrap data indicated a 50 percent turnover every 2 weeks among starlings passing through the area. The number of retrapped birds, by week, was consistently about 1.6 percent of the total banded birds released into the population from July through November. Assuming that an equivalent percentage of the unbanded portion of the population was also being caught, the data indicate that the total number of starlings contributing to the problem at this lot numbered many thousands instead of the approximately 2,000 that were counted there daily.

Observations of birds tagged at another lot showed that they occupied 14 known fall roosting sites within a 1,600-square-mile area until mid-December, when freezing temperatures and snow cover forced them to shift into one to three major winter roosts. The number of known roosting sites may easily double as new ones are located.

In the morning, starlings disperse from the roost on well-defined flight-lines. These flightlines are generally also used by the birds upon returning to the roost in the evening. When the birds are en route to the roost, small flocks gather into huge feeding and preroosting assemblies adjacent to the roost or anywhere along the incoming flightlines. In general, the closer to the roost, the larger the assembly.

During the day, starlings disperse as far as 15-25 miles from the major roosts, depending on food supply and weather. They feed and loaf in many of the 250 feedlots in the area, and there is a regular exchange of birds among lots. Other workers have followed flightlines of starlings and blackbirds returning to a roost in Texas for 52 miles, and have also shown that in California some individuals travel up to 50 miles daily from their roost to reach their feeding grounds. Perhaps the reason for the shorter distance traveled in Colorado is the abundant food supply in the numerous feedlots near the roosts.

Accumulated movement data for the Platte Valley starlings indicated that this population was the most vulnerable to control after it stabilized and began using assembly or "staging" areas near the major winter roosts. Before this time it would have been difficult to attempt control in the many roosting areas contributing birds to individual feedlots, and the results of any control measures would have been difficult to assess because of migration and the constant turnover of starlings at any given location.

It also would have been impractical to attempt control measures at many of the 250 feedlots in the Valley, but because of the interchange of starlings among the feedlots, effective control at the assembly areas would reduce the problem in most lots. In 1964, Denver personnel reduced this Valley population of about 250,000 birds by more than 60 percent by baiting two assembly areas near the major roost with DRC-1339-treated poultry pellets.

Blackbird Movements-South Dakota

Studies at Sand Lake National Wildlife Refuge, Brown County, South Dakota, have shown that northern migrant red-winged blackbirds *(Agelaius phoeniceus)* are primarily responsible for the corn damage there. Most yellow-headed blackbirds *(Xanthocephalus xanthocephalus)*, including summer residents and northern migrants move south before the onset of the greatest damage, and northern grackles *(Quiscalus quiscula)* immigrate into the area just before corn has passed the damage stage. However, both species are found in moderate numbers throughout the damage season and cause some of the damage. Brewer's blackbirds *(Euphagus cyanocephalus)* and brown-headed cowbirds *(Molothrus ater)* are never abundant enough in the area to contribute to the problem.

The breeding areas of the problem redwing population are South Dakota, North Dakota, Saskatchewan, and Alberta. Migrant redwings start arriving at Sand Lake in mid-August, and the population increases rapidly until it reaches a peak in the first week of September. There is then a sharp decline in the population as birds move south until the last flocks leave in mid-October. From the onset to the end of migration there is a steady influx and departure of birds.

The redwings roost throughout the Refuge marshes and, at dawn, depart in all directions on about 40 well-defined flightlines. Observations made by following flocks of birds throughout a day have shown that some flocks move as far as 12 miles from the roost. They spend the greatest amount of time loafing in shelterbelts and then, in descending order of time spent, in cornfields, pastures, weed and stubble fields, and on gravel roads. While feeding in cornfields, many blackbirds in a flock will drop to the ground to eat insects and weed seeds.

The yearly peak redwing populations at Sand Lake since 1960 have fluctuated between 1 and 2 million birds. However, redwing territorial male censuses in North Dakota have indicated that the State may contribute as many as 8 to 10 million birds yearly to the population that damages the corn.

A major objective of banding at Sand Lake was to define the wintering areas of the problem population, under the assumption that reducing the number of birds at their distant winter roosts would be a less formidable task and have more effective results than would control measures at the damage sites.

However, an analysis of winter (December through February) recoveries of birds banded at San Lake during the corn damage season (August 15 to September 15) showed that about half of the redwing recoveries were from Texas, and the remainder from Louisiana, Missouri, Oklahoma, Kansas, Iowa, Nebraska, and South Dakota; the grackle recoveries were from Texas, Louisiana, Arkansas, Mississippi, and Iowa; and all the yellowhead recoveries were from Mexico with the exception of one in Florida. Thus to effectively reduce the problem population, control measures would have to be applied at a minimum of 37 roosts in 11 states in the United States and 5 states in Mexico that contained more than 60 million birds. These figures for known roosts should increase each year as new recoveries are reported and new roosts located. Presently, there are no realistic estimates of the true number of roosts and birds involved, and more important of the degree of control that would have to be attained at winter roosts to show a reduction in corn damage in Brown County.

Winter control is obviously not feasible for alleviating damage to corn in South Dakota. However, because of the birds' ground-feeding habits while feeding in cornfields, effective damage reduction of up to 85 percent has been attained at Sand Lake by ground baiting with a chemical frightening agent.

Conclusions

Obtaining data to determine trends and patterns from banding is a slow process. We have gained knowledge of the local movements and migratory patterns of starlings and of some of the blackbird species for specific areas in the West at some seasons of the year. But a great deal of need information is still lacking for these species for all seasons of the year throughout all 17 western states.