

WINTER BANDING OF OKLAHOMA CROWS¹

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IT SOMETIMES happens that unexpected by-products or minor aspects of investigative work become as important as the principal results. These may have direct application to the problem undergoing study or they may have a bearing on some related matter that has long been in need of an answer. Such was the case with an "unscheduled" Crow-banding enterprise carried out by the junior author while engaged in conducting experiments in the control of Crows (*Corvus brachyrhynchos*) in Oklahoma during the winter of 1935-36.

The experimental work in Crow control consisted, among other things, of an appraisal of trapping as a control measure (Aldous, 1936). Several traps of the "Australian" type having lateral dimensions of 10 to 12 feet were constructed.² When baited with carrion and properly attended to, these were capable of retaining alive large numbers, and under favorable conditions, were useful in reducing local Crow populations.

Despite a strenuous demand on the part of local farmers and sportsmen that all Crows caught should have their necks wrung, an appreciable number (714) were banded and released. The returns from these have contributed new information on Crow movements in and out of Oklahoma. Not only do these data have a direct bearing on problems associated with crop damage but, what is of equal importance, they show the relation of winter Crow control in Oklahoma to the welfare of the upland game and insectivorous birds in that state and the waterfowl that breed to the north. It is this "by-product" of the Crow control studies that furnishes the subject matter of this paper.

BANDING PROCEDURE

In the course of the Crow control work one trap was built and operated near Chickasha in Grady County and three others near Norman in Cleveland County. All the birds caught in the Norman traps were released in that vicinity, but most of those caught at Chickasha were removed to distant points where they would be less likely to become victims of certain other control experiments that were being carried out in that area. Accordingly, of the 714 crows banded, 486 were released near Norman, 95 near Oklahoma City, 48 near Chickasha, 35 near Shawnee, 34 near Ardmore, and 16 near Tabler. Oklahoma City, the most northerly of these points, is about 124 miles

¹ A brief discussion of the results obtained from a part of these returns (125) appeared in a revised edition of U. S. Department of Agriculture Farmers' Bulletin 1102, issued in June 1939.

² Those interested will find a description and drawings of an "Australian" Crow trap in *Wildlife Research and Management Leaflet BS-27*, entitled "A Cage Trap Useful in the Control of White-necked Ravens." Copies of this leaflet may be obtained on request from the Fish and Wildlife Service, Department of the Interior, Washington, D. C.

north of Ardmore, the most southerly point of release; while Shawnee, the most easterly point, is about 61 miles east and a little north of Chickasha, the point of origin of all transported birds.

Banding started on December 5, 1935, and was conducted at intervals until March 10, 1936, when 11 Crows constituted the final catch. During that period 21 groups of Crows were banded and released, the catches ranging from a few birds to 177 captured at Norman on January 27. Notwithstanding the fact that release of the birds extended over an appreciable period (more than 3 months), the recapture of individual Crows strongly indicated that this group of birds was quite sedentary during the banding period. Of the 486 Crows banded at Norman, 2 reentered a trap 7 times; 4, 5 times; 4, 4 times; 9, 3 times; 16, 2 times, and 75, once. Subsequent returns from the banded Crows further emphasize the relatively stationary nature of these birds during the winter. Consequently, despite the extended banding period and the release of birds at several points, returns from the birds may be discussed to advantage as having originated with a definite group of wintering birds. This idea is embodied in the map (Figure 1) on which the focal point of the radiating lines indicating movement is registered at Norman, Okla., where about 68 per cent of the banded birds were released. In computing the distances traveled by the birds (a subject discussed later), measurements were made from the exact point of release.

RETURNS

From the 714 Crows banded, 143 returns have so far been received. Figure 1 presents, in addition to the points of recovery, a general indication of the season of the year during which the birds were killed. Recoveries represented by the larger black dots are those made between the first of April and the end of August, a period that may be looked upon as the breeding and rearing season of bird life generally in North America and the period in which problems of Crow predation might arise. The smaller circles mark recoveries made between the first of September and the end of March, a time of year not generally associated with Crow depredations on other birds.

Of the 65 Crows recovered during the breeding and rearing season (April 1 to August 31), 49 (75 per cent) were killed in the Prairie Provinces of Canada. The dates and localities of numerous other returns recorded in the states north of Oklahoma (some indicated by black dots and others by circles) give evidence of the fact that many others of this group of wintering Oklahoma Crows may also have been on their way to or from Canadian breeding grounds when they were killed.

The grouping of the black dots in the southern part of the Prairie Provinces lends statistical evidence of a state of affairs frequently observed by field ornithologists working in that region, namely, the

dense concentration of nesting Crows close to the northern border of agriculture. The shaded area in the northern part of the map indicates, roughly, the coniferous forest region which Crows do not enter in great numbers. When they do appear, it is usually in the vicinity of clearings and settled areas where a semblance of their commonly preferred environment may be found.

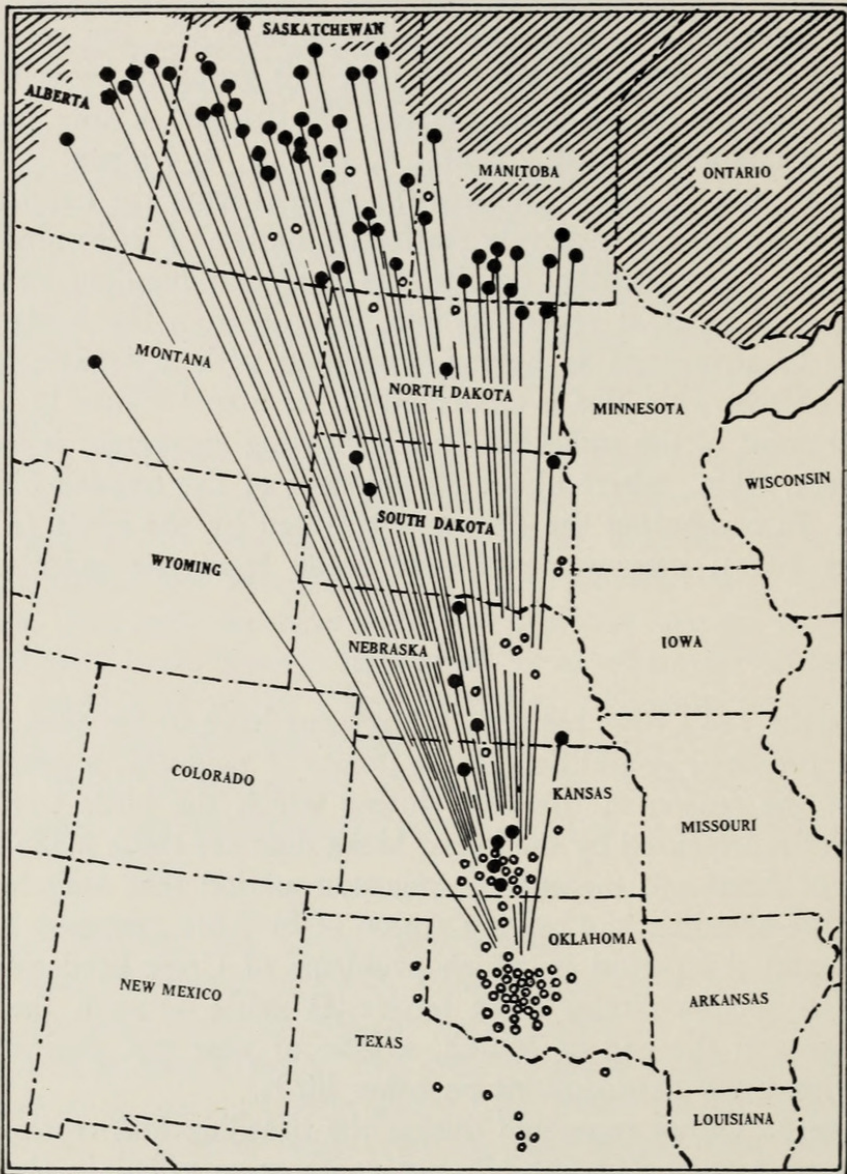


Figure 1. Map showing the recovery points of 143 to 714 Crows banded and released in south-central Oklahoma during the winter of 1935-36. The black dots indicate recoveries made between April 1 and the end of August; the smaller circles, between September 1 and the end of March.

Of the 7 recoveries from Alberta, the most northwesterly one was recorded near Camrose, southeast of Edmonton. This bird had traveled about 1,435 miles from its point of release at Norman, Okla. Another, shot near Strathmore, Alberta, had traveled westwardly through

16 degrees of longitude, and its point of recovery is on a meridian that, southwardly, passes west of Great Salt Lake, Utah. Of the 35 retrieved in Saskatchewan, 30 were recovered during spring and summer and the remaining 5 were shot in the fall, indicating that some of these birds are late in leaving their breeding ground. The most northerly of all these returns is that of a Crow shot at Meadow Lake, Saskatchewan, a point due west of Prince Albert Park at nearly 54° north latitude and fully 350 miles north of the Canadian border. This bird, which had been released at Ardmore, Okla., had traveled about 1,480 miles from its winter home, the longest migration recorded for any of these Oklahoma Crows. Several others, traveling nearly as far, were recovered at points east and southeast of Prince Albert. All but one of the 13 recoveries made in Manitoba were recorded in spring and summer. This group includes the most eastwardly of the Canadian returns; yet the most easterly one is that of a Crow shot at Beauséjour, northeast of Winnipeg, a little more than one degree of longitude east of the point of banding. Besides the pronounced northerly migration of these Crows to their breeding grounds near the limits of agriculture, it is evident that there is a definite drift to the west, a tendency also shown by many other species of migratory birds traversing this plains area.

Of the returns from states north of Oklahoma, mention may be made of the single bird shot at White Sulphur Springs, Montana, the most westerly point within the United States at which one of these Crows was collected. The bird was taken in the middle of June and probably was breeding in the vicinity. Three of the 5 Crows recovered in North Dakota were collected in the breeding season, and the other two, shot in the fall, may have been on their way south from northerly points. Of the 5 collected in South Dakota, one each was taken in April, May, and June and may have been local breeders; one was collected in March, and the fifth in December, apparently a late traveler from the north. Of the 9 collected in Nebraska, 5 were taken during fall, winter, or early spring, 3 in April, and one in May. Of the 21 Crows recovered in Kansas, 16 were shot in the nonbreeding season and only 5 during April, May, and June.

It will be noted that of the 143 returns recorded *not one was recovered in the state of Oklahoma during the "breeding and rearing season."* The 38 Crows recovered in that state were collected between the third of November and the end of March. Twenty-two of these were taken early in the spring following their banding (1936); some of the others survived as long as $3\frac{1}{2}$ years. It is likely that many of these Crows captured in Oklahoma during winters subsequent to the one in which they were banded had made journeys to the north to breed. A similar statement may be made regarding the 9 wintering Crows collected in Texas, each one of which had lived through at least one breeding season between the time of banding and its recovery. That these birds

had bred in the north and on subsequent southward journeys had passed beyond the vicinity of their banding is a plausible assumption.

The period and the extent of migration of these Oklahoma birds are revealed by the average distances traveled by the birds recovered in the respective months. These data are set forth in Table 1. In addition to information on the distances traveled, note is made of the number of returns and the states in which the birds were collected.

TABLE 1

RETURNS OF BANDED CROWS LISTED BY MONTHS, THE AVERAGE DISTANCE TRAVELED BY EACH MONTHLY GROUP, AND THE STATES IN WHICH THE RECOVERIES WERE MADE

Month	Number of returns	Average distance in miles from point of release	Locality of recoveries by states
January	13	97	Oklahoma, 8; Kansas, 2; Texas, 2; Nebraska, 1.
February	18	98	Oklahoma, 10; Kansas, 4; Texas, 4.
March	27	210	Oklahoma, 13; Kansas, 7; Texas, 1; Nebraska, 4; South Dakota, 1; Manitoba, 1.
April	16	940	Kansas, 2; Nebraska, 3; South Dakota, 1; Saskatchewan, 7; Manitoba, 1; Alberta, 2.
May	21	1,046	Kansas, 1; Nebraska, 1; South Dakota, 1; North Dakota, 2; Manitoba, 4; Saskatchewan, 11; Alberta, 1.
June	23	1,055	Kansas, 2; South Dakota, 1; North Dakota, 1; Montana, 1; Manitoba, 5; Saskatchewan, 11; Alberta, 2.
July	5	1,234	Manitoba, 2; Saskatchewan, 1; Alberta, 2.
August	0	No data	No returns.
September	4	1,123	North Dakota, 1; Saskatchewan, 3.
October	2	973	North Dakota, 1; Saskatchewan, 1.
November	3	67	Oklahoma, 3.
December	11	264	Oklahoma, 4; Texas, 2; Kansas, 3; South Dakota, 1; Saskatchewan, 1.

SEASONAL DISTRIBUTION OF RETURNS

During the years covered by these returns the general northward exodus from Oklahoma, as indicated both by the average mileage traveled and by the states in which the birds were recovered, takes place before April 1. Even at that date one bird had reached Manitoba. Before the end of April, 10 of the 16 birds recovered during that month had found their way into Canada, and the average distance traveled by all the birds recovered in April was great enough to extend from the point of release to beyond the Canadian border. Because of the limited number of returns, the southward movement of the birds is not so clearly set forth. Although these banding data do not disclose

the fact, field observation indicates a marked influx of Crows into Oklahoma in October. The returns do show, however, the presence of the birds in that state in November and December. In the latter month returns were received not only from the winter Crow range in Kansas, Oklahoma, and Texas, but also one from South Dakota and another from Saskatchewan.

The paucity of recovery records for the second half of the calendar year is at present unexplained. Despite the increase in shooting that one might expect in October and November, the returns for the six months, July to December, inclusive, were materially less than for the first six months in *each* of the three years for which there are complete data. The returns for each of these years, given in semiannual totals, are as follows: 1936, 56 and 20; 1937, 44 and 3; and 1938, 10 and 2. At the time of this writing, returns for 1939 are available for only the first 6 months, a total of 8.

MORTALITY RATES

The rapid decrease in the number of returns during the years following the release of the birds gives evidence of the gun pressure under which these birds exist. The yearly totals of 76, 47, 12, and 8 (first 6 months) for the years 1936 to 1939, inclusive, lead one to believe that relatively few of these birds live more than four years in this plains area where they are subject to gunfire throughout their migration route and on their breeding grounds and to the devastating toll of bombing while in their winter roosts in Oklahoma. In the $3\frac{1}{2}$ years immediately following the release of the 714 banded Crows, 143, or slightly more than 20 per cent, of them have been reported killed. The returns for the calendar year immediately following banding amounted to about 10.5 per cent of the birds banded, a percentage somewhat less than that of the returns usually obtained from waterfowl shot during the first season following banding. It is possible that the number of returns for these Crows might have been greater were it not for the fact that, in their winter home, many are killed in bombings under conditions not conducive to the recovery of bands.

DISCUSSION

If the 143 returns so far obtained from the banding of 714 wintering Crows in Oklahoma reflect the general habits of the species in that state, it is evident that problems of control or management of this bird must be approached with the realization that it is highly migratory. Wintering individuals quite evidently are not summer residents. They are, however, breeders far to the north, many of them raising their young in the Prairie Provinces of Canada where there appears to be a concentration close to the northern border of agriculture. There also is evidence that those birds that survive the migration to and from the

breeding grounds will return to the general area of the previous winter's sojourn.

On these premises certain deductions may be made having a bearing on the economics of the Crow in Oklahoma and on the merits of Crow control in that state.

Considering first the matter of Crow control for the protection of late-maturing crops, particularly grain sorghums, it is logical to conclude that a reduction in the number of Crows from November to the end of March would have its effect on the individuals that not only are present throughout this period but which, if they survived, would return to the state in subsequent winters. Without attempting at this time to pass on the economy of winter Crow control for crop protection in Oklahoma, there is little question but that such control will have both immediate and later effects on the particular individuals concerned with these depredations. Whether the progeny of surviving individuals take the same migratory route as that of the adults and help swell the numbers frequenting winter roosts could not be determined by this banding program. If such is the case, the benefits of winter control for the purpose of crop protection may have even more far-reaching effects.

Crow control for the benefit of upland game or insectivorous birds often is advocated. According to the evidence brought forth in this banding work, a winter campaign of Crow control in Oklahoma would have little or no effect on the welfare of these groups of birds breeding and raising their young in that state. Not one of the winter-banded Crows was recovered in Oklahoma between April 1 and August 31; this clearly indicates, when considered in connection with the localities of the returns obtained during the breeding season, that the winter Crows of Oklahoma are not its summer corvine residents. That the summer Crows of Oklahoma may be the winter residents of Texas seems a plausible assumption. In that event, winter Crow control in the latter state would have some effect on the relatively sparse summer Crow population of Oklahoma, although the preponderant population of Texas Crow roosts is likely also to be comprised of more northerly raised birds.

The control of Crows in Oklahoma during the winter is often considered a conservation measure by reason of benefits accruing to waterfowl nesting far to the north. These banding records have definitely shown that many (possibly a great majority) of the winter Crows of Oklahoma do nest and spend the spring and summer months in close proximity to the northern border of agriculture where, in favorable environments, waterfowl still are common nesters. Kalmbach earlier came to the conclusion that in this relatively narrow strip the Crow is a hazard of marked importance to nesting waterfowl even though the continental aspects of Crow pressure on the duck supply may not

be so alarming (Kalmbach, 1937). In referring to the merits of Crow control at winter roosts to the south aimed to improve waterfowl conditions farther north, he ventured to remark (page 35) that the benefits "are, in turn, less direct, since only a part of the birds present at these roosts (number at present unknown) actually enter the problem of Crow-waterfowl relationships on the breeding grounds." By that is meant that, although Crows are exceedingly abundant in the pothole and lake country at the border of agriculture, many of them in that very area, live in and obtain food from agricultural environments. What part of the Canadian Crows are pursuing the role of persistent duck-egg stealers and what have habits not greatly different from those of Crows in this country is not known. In any event control in Oklahoma would have its effect spread over the Crow population of a wide area in the southern part of the Prairie Provinces, an effect that would be diluted not only by the extent of the area, but also by the fact that only a part of the Crows nesting therein enter the problem of Crow-waterfowl relationships. In the light of these considerations and in view of the even more impelling fact that Crows in destructive abundance are present on possibly only a sixth of the duck-nesting area of Canada and Alaska, Crow control in the roosts of Oklahoma must be looked upon as having possible benefits to a part of the waterfowl in one, the central, flyway; its effect on the continental supply of waterfowl must be greatly discounted.

These, briefly, are the points of discussion most likely to arise from a consideration of the data obtained from this banding project. There are, however, others and, lest they be entirely overlooked, let it be remembered that in western Canada, where Indian corn is displaced largely by small grains, where there are no late-maturing sorghums to be attacked, where Crows are present mainly during the seasonal period of insect prevalence, and where little is seen of the enormous gatherings that characterize its winter home, the Crow presents a markedly different economic problem. Much is heard among certain groups of the Crow's depredations on other bird life; there are many others, however, who have observed and are grateful for the work done by the Crow on insect life. They, too, have an interest in control policies aimed to administer wildlife so as to render the greatest good to the greatest number. Of all those directly concerned they in fact may be the most vitally involved.

Strange though it may seem, there are, even in Oklahoma, certain sections grown largely to wheat and oats where Crow control is not considered a pressing problem.

SUMMARY

The banding of 714 Crows in south central Oklahoma during the winter of 1935-36 has yielded, during the three and one-half years

following their release, 143 returns, slightly more than 20 per cent of the birds banded.

Analysis of these returns shows that, of the 65 Crows recovered during the breeding and rearing season (April 1 to August 31), 49 (75 per cent) were killed in the Prairie Provinces of Canada. The dates and locations of numerous other returns recorded in the states north of Oklahoma indicate that many others of this group of Crows may have been on their way to or from Canadian breeding grounds. During this same period of the year not one of the winter-banded Crows was recovered in Oklahoma, clearly indicating that winter Crow control in Oklahoma can have little or no effect on nesting upland game or insectivorous birds of that state.

Although winter Crow control in Oklahoma is destined to remove some birds that would enter the problem of Crow-waterfowl relationships in the Canadian provinces, the effect of this control is certain to be much "diluted" if the results are to be judged in a continental perspective. This comes about because only a portion of the Crows nesting in Canada can be classed as duck-egg predators, and because the Crow, in what might be termed destructive abundance, occupies possibly only a sixth of the duck-nesting area of Canada and Alaska.

As a protective measure for late-maturing crops, particularly grain sorghums, winter Crow control in Oklahoma may be looked upon as fairly selective with respect to the removal of the very individuals involved in these depredations. Not only is this winter population quite sedentary during that season but the banding returns have shown that birds which survive are likely to return to the same general region in subsequent winters.

The rapid decrease in the number of recoveries noted in successive years following banding leads to the belief that relatively few of these birds live for more than 4 years in this plains area where they are subject to gunfire throughout their migration route and on their breeding ground and to the severe toll of bombing in their winter roosts in Oklahoma.

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