# AN ECOLOGICAL STUDY OF THE BREEDING BIRDS OF AN AREA NEAR CHOTEAU, MONT.

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THE subject of the ecological associations of various forms of life has recently been given considerable attention. Most of the studies that have been made along this line, however, have been of plant life. Such studies of animal life, and particularly of bird life, have been comparatively few. This is probably because animals, and particularly birds, can move about from place to place, and are consequently less closely related to any one ecological association. In the breeding season, however, birds are fairly stationary, remaining in the vicinity of their nests. At this time they are confined to certain associations, which evidently depend on the character of their food and the locality chosen for their nesting sites. Sometimes a given species is confined to a single association and makes up a component part of its life. At other times a species may be found in several different associations, and may be less common in one than another. Occasionally a species nests in one association, but obtains its food largely in another. The study of these associations and the proportionate abundance of the different species of each is not only of great scientific interest, but also has an important bearing on the problem of obtaining an accurate census of our birds, and on the problems of the preservation of wild life.

In forestry, the study of the forest types, which is merely a simpler name for an ecological association of forest trees, is of great importance. In my work with the United States Forest Service in Montana, I was frequently called upon to study and map these types. Through this work I obtained a closer insight into these associations and their relations to other forms of life. In the local lists of birds which I have published for the different parts of Montana where my work has been located, I have attempted to describe the more important associations and list the species breeding in each. I have always hoped, however, for an opportunity to make a deeper study of these associations, showing the proportions of

the different species in each association, and the actual abundance of each species figured on an acreage basis. In the nesting season of 1912, I found such an opportunity. It was not in the mountain forests as I had hoped it would be, but in the vicinity of the little prairie town of Choteau, in Teton County, Montana. Here, with the exception of a short period from May 28 to June 5, I was confined to office work all through the spring and early summer, until August 5, when I finally left for a trip to the mountains. During this time I had my early mornings, evenings, Sundays and holidays free to explore the country in the immediate vicinity of Choteau, in search of birds and birds' nests.

On the southeast side of Choteau was an area, watered by a small stream known as Spring Creek, which I found to be an excellent place for birds. While I often explored other areas in the vicinity, I found this one to be the most accessible, and was on it almost daily throughout the spring and summer. Early in June, after most of the migration was over and when the nesting season for most species was just beginning, I decided to make an ecological study here. I blocked out, roughly, a rectangular area, which by later measurements I found to be about 1400 by 8250 feet, and to contain about 265 acres. On this area I started to determine as closely as I could, the actual number of birds of each species, breeding in each association. I could not very well hope to find all the nests, particularly of the ground nesting birds, but I found that I could get my numbers accurately by noting the number of male birds of a species in song. I found that during the period of early morning song, practically ever male bird was participating. By going over the area carefully each morning, and noting the numbers of birds of each species that were in song I soon had my census of the singing birds. The non-singing birds were most of them conspicuous for other reasons and easily found. It is possible that I may have missed a few birds that nested on the area. A Sharp-tailed Grouse might have had its nest in the cinquefoil brush, as several did in similar places outside the area. A Sora could have nested in one of the cattail sloughs and escaped my notice. It is also possible that there were more nests of the Mallard on the area than I found. With these exceptions I am quite certain that I counted all the nesting birds on the area. Of course I repeatedly

found stragglers and visitors on the area which were not nesting there, but my repeated visits served to show which birds belonged there regularly.

I found five separate ecological associations on the area. These representing most of the commoner ones of the prairie region of this part of Montana. Associations of this region not represented here are the prairie bench, the willow thicket, the rush slough, and the alkaline ponds and lakes. At the time of the study I used a rough sketch map to indicate the location of the various associations, not taking time to measure out and map each one accurately. The following fall I did this work, using a hand compass and pacing the distances, in the same manner in which forest type mapping is done, and divided the area among the different associations as follows.

| | |
|---|---|
| Grass meadow | 172 acres. |
| Cinquefoil brush | 68 " |
| Cottonwood groves | 18 " |
| Stream border | 5 " |
| Cattail sloughs | 2 " |
| Total | 265 acres. |

The grass meadows, as can be seen from the above figures, formed much the largest portion of the area. This association consists of flat stretches along stream valleys, having a rich, moist soil, and covered with a growth of tall, wild grasses and weeds. These are commonly cut over in this region for hay late in August, but never while birds are nesting, because growth is not fast enough to make a heavy crop so early in the year. In spite of the fact that this association covers the largest proportion of all in the area studied, the number of both species and individuals found in it was comparatively small. They are as follows.

| Species. | No. of pairs. | Acreage per pair. |
|---|---|---|
| Western Savannah Sparrow | 12 | 14 |
| Western Meadowlark. | 7 | 25 |
| Bobolink. | 4 | 43 |
| Total | 23 | 7.5 |

In giving the numbers of these species by pairs, I am assuming that every male bird found singing regularly on the area had a mate. This of course might not be the case. It was difficult to observe these birds except when they were singing, and I did not see females of any of the three species, regularly. I found only one nest in this habitat, that of a Western Meadowlark. These birds were not the only ones found in this association, however. Other species, nesting in other associations often obtained food in this one. These other species were Marsh Hawk, Short-eared Owl, Brewer's Blackbird, Thick-billed Red-wing, Cowbird, and Long-billed Curlew. All except the last are treated under other habitats, but the Curlews nested entirely outside the area studied.

The next association in size is that of the cinquefoil brush. This habitat is a peculiar one that I have not seen elsewhere in Montana. It occurs on flat areas, with a moist soil, but less rich than that of the grass meadow association, and usually very rocky, and liable to be somewhat alkaline. The principle vegetation is the Shrubby Cinquefoil (*Dasiophora fruticosa*) which grows in scattered clumps and patches, much in the same way that Sagebrush grows on the plains in other parts of Montana. Between the cinquefoil bushes is a growth of various species of grasses and weeds, and a few other shrubs, such as willows, wild rose, Wolfberry (*Symphoricarpus occidentalis*), Buffalo-berry (*Shepherdia argentea*), and Silver-berry (*Elæagnus argenteus*). Both species and individuals of birds are more numerous in this association than in the grass meadow, probably partly because the shrubs form better concealment for nesting sites. The numbers of species and individuals found in this association on the area studied are as follows:

| Species. | No. of pairs. | Acreage per pair. |
|---|---|---|
| Brewer's Blackbird | 22 | 3 |
| Cowbird | 4 | 17 |
| Western Vesper Sparrow | 4 | 17 |
| Clay-colored Sparrow | 3 | 22 |
| Mallard | 2 | 34 |
| Western Yellow-throat | 1 | 68 |
| Marsh Hawk | 1 | 68 |
| Short-eared Owl. | 1 | 68 |
| Total | 38 | 1.8 |

The large number of Brewer's Blackbirds was partially accounted for by the fact that a colony of thirteen pairs was nesting in the area. These birds did not live entirely in this association, but did much of their feeding in the grass meadow association. After their nesting was over, in July, they gathered into flocks with their young and were frequently found in the cottonwood groves. I have little doubt about the correctness of my count of this species. It was easy to observe all the forty-four individual birds at any time while they were nesting, if the whole brush area was covered thoroughly. This is because of the habit the birds have of protesting at anyone's intrusion near their nests, always keeping together in pairs, and following him about, hovering over his head, or perching conspicuously on the bushes. Whenever I entered the colony, I was always able to count the thirteen pairs of birds. Each pair kept so close together that I was able to count them in that way instead of individually. Ten of the nests of this species were actually found, nine in the colony, and one outside of it.

With the Cowbirds, I found considerable difficulty in getting a correct count. Since they had no fixed nests of their own, and wandered about from day to day, on and off the area, I found that an accurate count was out of the question. They were found most frequently in the cinquefoils, but also fed considerably in the grass meadows, and were occasionally seen in the cottonwoods, where observations showed that they laid their eggs frequently. My estimate of the numbers of this species, is merely the result of my judgment, after observations on the area throughout the nesting season. I believed six pair to be the average numbers found on the entire area during the nesting season, and counted four of these in the cinquefoil brush and two in the cottonwoods. I actually found but two eggs of the species in the cinquefoils, one in the nest of a Brewer's Blackbird, and the other in the nest of a Western Vesper Sparrow.

Both the Vesper and Clay-colored Sparrows were counted by noting the singing of the male birds as was the case with the species nesting in the grass meadows. The females were not commonly seen. One nest of the Vesper Sparrow was found and none of the Clay-colored Sparrow. Both birds of the pair of Western Yellowthroats were seen, and the male was observed in song frequently.

The nest was not found however. This bird I consider rare and unusual in this association, its proper place being in the willow thicket association, where it is fairly abundant.

The Mallards on the area should probably not be expressed as pairs. I found two nests of the species, under the cinquefoil bushes, but observed only the female birds, and then only when I flushed them from their nests. These birds evidently fed principally in the sloughs or along the creek. I have never observed the drake Mallard around the nest, and do not believe he is ever found there. I occasionally saw one or two drakes on a slough not far outside of this area, that may or may not have been mated to the ducks nesting on the area. I believe that the ducks left this area entirely with their broods as soon as the eggs hatched.

The nests belonging to the Marsh Hawks and Short-eared Owls were both found, and a detailed study of each made.[1] These birds lived on a much larger area than that included in this study and a correct proportion of their numbers to those of other species could be better obtained by a study of a much larger area, figuring their numbers on the basis of the square mile rather than the acre. They obtained food largely from the grass meadow association, as well as the cinquefoil brush.

The cottonwood grove association was even more densely populated with birds than the cinquefoil brush. This association occurs on flat areas along streams, in a soil quite similar to that of the cinquefoil brush association. In fact my observations show that the cottonwood grove is slowly encroaching upon the cinquefoil brush, the cottonwood trees seeding in under the shade of the cinquefoils, growing up through them, and ultimately crowding them out. This process forms an interesting ecological succession. The principal tree of the cottonwood groves in this part of Montana is the Narrow-leaved Cottonwood (*Populus angustifolia.*) It occurs both as grown trees, averaging fifty or sixty feet in height. and as younger trees forming a second layer under the older ones. The ground cover is largely tall shade loving herbs, and occasionally thick tangles of vines. The species found in the eighteen acres of this association were as follows.

[1] See Condor, Vol. XV, pp. 99 to 104 and 121 to 125.

| Species. | No. of pairs. | Acres per pair. |
|---|---|---|
| Western Robin | 8 | 2.25 |
| Magpie | 4 | 4.50 |
| Yellow Warbler | 4 | 4.50 |
| Least Flycatcher | 4 | 4.50 |
| Western Wood Pewee | 3 | 6.00 |
| Western Goldfinch | 3 | 6.00 |
| Cowbird | 2 | 9.00 |
| Red-shafted Flicker | 1 | 18.00 |
| Western Chipping Sparrow | 1 | 18.00 |
| Cedar Waxwing | 1 | 18.00 |
| Black-headed Grosbeak | 1 | 18.00 |
| Western Nighthawk | 1 | 18.00 |
| Western Crow | 1 | 18.00 |
| Total | 34 | 0.53 |

These figures show that the Robin is by far the most abundant bird of this association. I believe that my count of this species on the area is absolutely correct, for not only did I find the eight male birds, singing in their respective corners of the cottonwood grove each morning, but I also observed all eight of the females regularly, and found all of the eight nests. The Robin may have been a little more abundant on this particular area than it usually is in this habitat, but my observations in other places go to show that it is regularly the most abundant nesting bird of the cottonwood groves in all parts of Montana that I have visited.

The Magpie is an earlier nester than any of the other species. Its nests were easily found because of their bulk and conspicuousness and as all four were thus found, there is no doubt about the count being correct. These birds, however, left the area, after the nesting was over, which was before most of the other species were nesting. If they had not done so, perhaps the other species would not have nested so abundantly.

The next three species were all easily found because of the singing of the male birds, and I have little doubt about the correctness of the count. I found two nests of the Yellow Warbler, two of

the Least Flycatcher and one of the Western Wood Pewee. The Goldfinches evidently did not begin nesting until late in July, just before I left for the mountains and I found no nests. During June there were often more than three pairs on the area, there being a small band of birds roving about the vicinity that were evidently not mated. By July, however, the birds had evidently chosen mates and I was able to find the three pairs regularly.

Concerning the Cowbirds, the same remarks are true here as in the cinquefoil brush association. I found more eggs of this species in the cottonwoods, but did not observe the birds themselves there so frequently. I found nine eggs of this species in nests of this association; four in nests of the Yellow Warbler, two in a nest of the Chipping Sparrow, and one each in nests of the Least Flycatcher, Cedar Waxwing and Black-headed Grosbeak.

Of the remaining six species, I found the nests of all except the Nighthawk, so have undoubtedly a correct count of them. The Chipping Sparrow and Black-headed Grosbeak are usually rare in this association, the former being common only in the evergreen forests of the mountains in this region. The latter belongs more properly to the willow brush association, where it is much commoner than in cottonwood groves. The Cedar Waxwing often occurs in greater numbers in this association than my count of one pair would indicate, but since this species varies in abundance from year to year, and is very irregular in occurrence and nesting, my count per acre would no doubt be accurate if applied to a larger area.

I am not quite sure that the Nighthawks nested in this association. I found them there all through the latter part of June and all of July, and observed both birds, resting and sleeping on the horizontal limbs of the cottonwoods. I have never found a nest of this species in this association, however, but have always found them on the prairie benches, or in the mountains along barren ridge-tops. Why they frequented the cottonwoods so much unless they nested there, I cannot say, for there were no prairie benches within half a mile. These birds had certain favorite spots on the cottonwood limbs on which to rest, and after I had learned where these were I could locate both birds any day that I wished to. They were certainly mated, for their plumage showed that they were male and female, and I had observed courtship early in the season,

when another rival male was in the vicinity for a few days. I once observed a similar case of Nighthawks staying in a cottonwood grove through the breeding season, at Bozeman, Mont., and in that case saw the two young with the parents in August. I was then informed by a person whose information I had usually found to be unreliable, that Nighthawks often laid their eggs in a hollow spot on the upper surface of a horizontal cottonwood limb. Thinking this might possibly be the case with my Choteau birds, I climbed the trees, and examined the favorite perching places of these birds, but found nothing. There was a curious warfare between these Nighthawks and the Western Wood Pewees inhabiting this grove. The Nighthawks were fond of the same sort of horizontal limbs for perches that the Pewees chose for nesting sites, and whenever a Nighthawk attempted to alight on a limb near one of the Pewee's nests, the male Pewee drove it off with a ferocity that showed his relationship to the Kingbird.

Because I found certain birds nesting on the area, whose presence was due to the stream which crossed it, I found it best to add another association, the stream border. Perhaps this association could have been more easily figured in terms of length of the stream, but for the sake of uniformity in comparison with the other associations, I figured it as closely as I could in acres. This association consists mainly of the banks of the stream, a typical prairie stream, with deep pools and shallow rapids but no very swift places. It was bordered by occasional stony bars, and by steep clay banks three or four feet high. The banks were mostly grass grown, but there were a few clumps of young cottonwoods, buffalo berry bushes, and birches (*Betula fontinalis*). The birds found nesting along the stream border were as follows.

| Species. | No. of pairs. | Acreage per pair. |
|---|---|---|
| Spotted Sandpiper | 4 | 1.25 |
| Kingbird | 4 | 1.25 |
| Killdeer | 2 | 2.5 |
| Kingfisher | 1 | 5 |
| Total | 11 | 0.45 |

The Spotted Sandpipers nested on the stony bars along the edge of the stream, and I located three of the four nests. The Kill-

deers evidently nested in similar places, but I did not succeed in finding the nests. There was no doubt but that the nests were there, for each pair of birds was to be found regularly in a certain spot, protesting at my presence. The Kingfisher's nest was plainly visible in the steep clay bank of the creek. The Kingfishers themselves, evidently did not live entirely within the area in question, but fished the stream up and down for a considerable distance both above and below the area.

In other parts of Montana I had always classed the Kingbird as a member of the cottonwood grove association. Here however, these birds depart from their ordinary habit, and build their nests in bushes bordering the streams. I found all four nests, and not one was at an elevation of more than four feet. All were on the bank of the stream, and two were built so that they overhung the water, one of them only about three feet above the surface, and almost on a level with the bank. This nest was beside a pool in which the boys of Choteau go swimming. Several of the boys informed me that a nest had been in that particular spot for several years. This information was supplied at different times by different individuals, so I have no doubt that it is correct.

The cattail slough association consisted of two small sloughs, with water in them about eighteen inches deep, and grown thickly with cattails, I found but two species in this association. They are as follows.

| Species | No. of pairs. | Acreage per pair. |
|---|---|---|
| Thick-billed Red-wing | 5 | 0.4 |
| Bittern | 1 | 2.0 |
| Total | 6 | 0.67 |

I found all five nests of the Red-wings, one in one slough, and four in the other. The actual number of adult birds was less than ten, for the Red-wings showed evident signs of polygamy. The single nest in the first slough was guarded by a pair of birds, but the other four nests, though I saw all four females, evidently had but two males.

Whether the Bittern nested or not I could not be quite certain. I saw but one bird, which pumped every evening from one or the

other of the two sloughs, or occasionally from a third slough outside the area. I rather suspected that there was a Bittern's nest in the larger slough, with the four Red-wings, but I failed to find it.

Summing up the five different associations, we have 112 pairs of birds nesting on the area of 265 acres, making an average of 2.36 acres per pair. This however does not cover all of the birds found on the area during that time. Others went there occasionally and often stayed for several days. There were of course, many migrants in spring, and some of these remained during the first half of June. Other birds, evidently not migrants, that occurred more or less frequently, are as follows. A male Red-eyed Vireo stayed in the cottonwoods and sang for several days, late in June. He was not there long enough to have had a mate and nested. A Warbling Vireo that had a nest somewhere in the shade trees in Choteau, occasionally visited the cottonwoods. A Cooper's Hawk appeared one evening in July. I found it devouring the remains of a young Brewer's Blackbird. On May 25 a pair of Bronzed Grackles appeared. They were evidently mated and might have nested on the area, but I had not at that time determined to make an ecological study, and believing that they would jeopardize the safety of other nesting birds on the area, I collected them both. This is the only pair of these birds I have ever seen in this region, which must be at about the western limit of their range.

There may be some question concerning the value of such a study as I have presented. The figures given represent only the conditions on a small area, and more extensive studies will be necessary to prove whether or not they will hold true if applied to a larger tract. I hope to make further studies along this line, provided the opportunity is again presented. A census of breeding birds could probably be most accurately obtained by studies of associations on an acreage basis, supplemented by studies of a whole region, which would give the proportion of the area of the region covered by each association. The methods of work which I have used will probably be of some value to others who wish to make similar studies in the future, but they can undoubtedly be improved upon.