Effects of the Herbicide, 2,4,5-T, on Breeding Bird Populations[1]

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In recent years it has become common practice to kill stands of postoak *(Quercus stellata)*, blackjack oak *(Quercus marilandica)* and other woody species with herbicides. Most commonly used are 2,4-D and 2,4,5-T.

In 1951 more than one million acres were sprayed with these chemicals in the United States (Cottam 1952). The area sprayed has increased each year.

This paper presents data comparing the breeding bird populations on two areas in Creek County, Oklahoma. One area had been sprayed with herbicide and the other was a nonsprayed control area. The variations observed in the breeding populations probably resulted from treatment.

Description and Procedure

Each of the two areas was approximately 20 acres in size. Area I, located in the SE¼ sec. 4, T. 19 N., R. 7 E., had been sprayed with 2,4,5-T in June 1961 and June 1962, and was burned in May 1963. The control area, Area II, was located in the SW¼ sec. 7, T. 19 N., R. 7 E. As far as possible the areas selected were equal in size and similar in the amount and distribution of vegetative associations and water. The plots were more similar in habitat composition before the herbicide application. Vegetation on both study areas was predominantly a postoak *(Quercus stellata)*-blackjack oak *(Quercus marilandica)* tree association with a moderate to heavy growth of tall grasses as ground cover in open areas.

Base maps showing the chief physical features and major plant associations were prepared for each area. Outline maps were reproduced and used on each field trip to record the exact location of each observation. At the close of the observation period records were transferred to a composite map to give the approximate territory of each breeding pair. The counting of birds was based mainly on singing males, assuming the number of unmated males which established territories to be few (Baumgartner and Lawrence, 1953). Observations of nest and family groups were also utilized. Field trips to the areas were made from 16 June through 19 July 1965. Most of the species were in their second nesting during this period. A total of 70 man-hours were spent recording singing males and locating nest sites.

Results and Discussion

On the sprayed plot 66% of the oak trees had been killed by the herbicide. This was determined by applying the Arms' Length Rectangle Method (Rice and Penfound, 1955). Much of the dead timber remained standing but the treated area had much less canopy cover and the ground cover exceeded that in the control area both in height and density.

The relative abundance and distribution of occurrence for each species on the two areas are summarized in Table I. The control area supported 17 species and a total of 140 males per 100 acres as compared to 18 species with a total of 205 males per 100 acres on the sprayed area. The eastern bluebird and the eastern meadowlark were numerous on the treated area but no nests were found on the untreated area. It is probable that the

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habitat bordering the treated was more attractive to the meadowlarks than that bordering the control area. This may have influenced the distribution of the meadowlark and be partially responsible for the difference in total populations (Table I). Bluebird populations were apparently favorably influenced by the herbicide treatment. Many dead hollow snags were observed to afford bluebird nesting sites. The increased nesting sites may be only temporary because of decomposition of dead timber after treatment. Evidence of successful nesting of bluebirds and other species (Table II) was apparent. The scissor-tailed flycatcher, bobwhite, eastern wood pewee and mockingbird were other species encountered on the sprayed and not on the control area. All the species with the exception of the eastern wood pewee tend to nest in open woodlands or woodland borders. This type of habitat was created by the application of the herbiside. The blue-gray gnatcatcher, brown-headed cowbird and mourning dove were fund on both areas but were more numerous on the sprayed area. The Bell's vireo, brown thrasher, summer tanager and yellow-shafted flicker were encountered only on the control area. The lark sparrow was observed only on the control area, during this study, but several had been observed earlier in the sprayed area (Martin, 1965). The yellow-billed cuckoo, Carolina chickadee and cardinal were in greater abundance in the control areas but the differences were not great enough to suggest a decided preference.

TABLE I. ABUNDANCE AND DISTRIBUTION OF BREEDING MALES.

Species	Control Area No. Per 100 Acres	Sprayed Area No. Per 100 Acres
Eastern Meadowlark	---	35
Field Sparrow	25	25
Eastern Bluebird	—	20
Mourning Dove	10	20
Tufted Titmouse	15	10
Bewick's Wren	10	15
Cardinal	10	5
Carolina Chickadee	10	5
Brown-headed Cowbird	5	10
Yellow-billed Cuckoo	10	5
Mockingbird	—	10
Bobwhite	—	10
Blue-gray Gnatcatcher	5	10
Bell's Vireo	5	—
Brown Thrasher	5	—
Scissor-tailed Flycatcher	—	5
Carolina Wren	5	5
Lark Sparrow	5	—
Eastern Wood Pewee	—	5
Summer Tanager	5	—
Yellow-shafted Flicker	5	—
Downy Woodpecker	5	5
Red-bellied Woodpecker	5	5
Total	140	205

The tufted titmouse, Bewick's wren, Carolina wren, field sparrow, downy woodpecker, and red-bellied woodpecker were in equal abundance in each area.

This study is based only on a small area and a small sample of breeding birds. However, distribution and abundance follows closely the results of a year's study of the effects of herbicides on wildlife populations made on six areas totaling 980 acres (Martin, 1965).

TABLE II. SUMMARY OF BREEDING BIRD POPULATIONS

Species	Control Area	Sprayed Area
Eastern Meadowlark		7 P(1 N)
Field Sparrow	5 P	5 P(1 N)(1 Y)
Eastern Bluebird		4 P(1 N)(1 Y)
Mourning Dove	2 P	4 P(2 N)
Tufted Titmouse	3 P(1 Y)	2 P(2 Y)
Bewick's Wren	2 P	3 P(2 Y)
Cardinal	2 P(2 N)	1 P(1 N)
Carolina Chickadee	2 P(1 Y)	1 P(1 Y)
Brown-headed Cowbird	1 P	2 P
Yellow-billed Cuckoo	2 P	1 P
Mockingbird		2 P
Bobwhite		2 P
Blue-gray Gnatcatcher	1 P(2 Y)	2 P(1 N)
Bell's Vireo	1 P	
Brown Thrasher	1 P	
Scissor-tailed Flycatcher		1 P
Carolina Wren	1 P	1 P
Lark Sparrow	1 P(1 N)	
Eastern Wood Pewee		1 P
Summer Tanager	1 P	
Yellow-shafted Flicker	1 P	
Downy Woodpecker	1 P	1 P
Red-bellied Woodpecker	1 P	1 P
Red-winged Blackbird		3 P
Totals	28 P(3 N)(4 Y)	44 P(7 N)(7 Y)

P = Pair of breeding birds, N = Nest found, Y = Young group out of nest

SUMMARY

1. Total populations of nesting birds on 20-acre study areas dominated by postoak-blackjack forest were 17 species and 140 breeding males per 100 acres in the control area compared to 18 species and 205 breeding males in the sprayed area.

2. The sprayed area provided a suitable habitat for significantly more pairs of the following species: eastern bluebird, eastern meadowlark, mockingbird, mourning dove, and bobwhite. The eastern wood pewee, blue-gray gnatcatcher and brown-headed cowbird had higher populations in the treated area than in the control. Populations of Bell's vireo, brown thrasher, cardinal, yellow-billed cuckoo, summer tanager and yellow-shafted flicker were somewhat larger on the control area but the differences could have been the result of factors other than the changes brought about by the use of herbicides.

3. Based on one season's observations the treatment with herbicides had no marked adverse effect upon any nesting species of birds and actually improved the habitat for a few species.

LITERATURE CITED

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