population is only partially exposed. Likewise, replacements have to move only short distances to take over vacated territories. These two factors, coupled with the difficulty of finding dead birds and mammals, could explain the conflicting reports about wildlife losses. In my personal experience the findings of heavy losses on the 2500-acre area have been disputed in local papers. Substantial citizens have reported that they treated 10- or 30-acre field and saw no dead birds and still see live ones.

Some mention also should be made of the immeasurable effects of sublethal amounts of insecticide. One example: a number of birds have been found before death by hearing them squawk in unnatural notes or by seeing them make ineffectual efforts to fly. One such mockingbird was penned over-night and flew away apparently normal the next morning. In the wild its actions would have attracted predators and the sublethal dose probably would have led to its death.

CONCLUSIONS

Heavy loss of wildlife results from the application of two pounds per acre of heptachlor.

There is considerable doubt about the validity of claims of economic damage caused by the ants. Health hazards of the ant have been exaggerated. Little is known about the economic and health losses caused by the large-scale application of insecticides. Neither is much known about the beneficial relations of fire ants to other insects or the harmful results of killing large numbers of other insects with insecticides.

The present so-called "eradication" program is in fact a spot control program. Until more facts are available, I question the wisdom of the program.

STUDIES ON THE EFFECT OF THE IMPORTED FIRE ANT CONTROL PROGRAM ON WILDLIFE IN LOUISIANA

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The effect the imported fire ant control program (mainly treatment with 2 pounds of active heptachlor per acre) is having on wildlife in Louisiana is being studied by the Agricultural Experiment Station through the Forestry School. The investigation is carried out under a contract with the United States Fish and Wildlife Service. Other fire ant studies at the University are being conducted by the Entomological Division of the Agricultural Experiment Station. Personnel of the Louisiana Wild Life and Fisheries Commission are also investigating the effects of the program on wildlife.

The study reported on in this manuscript has been under way since February, 1958. It is incomplete, therefore few conclusions can be made.

ACADIA—ST. LANDRY PARISHES AREA

Location and Description

This study area is located on the prairie terrace in south-central Louisiana. The soil which is light to dark brown silty loam has an impervious clay subsoil a few inches below the surface. During rainy weather water remains in most depressions. Major land uses are the production of pasture, rice, sweet potatoes, and cotton. Farms are small and intensively utilized. Little cover is available to wildlife.

Size and Treatment

A 6,000 acre block of land was treated largely from the air but some fields were treated with ground equipment. All applications were at the rate of 2 pounds of active heptachlor per acre.

Wildlife Mortality

Two areas were checked for wildlife mortality. Seven wildlife students searched a 300 acre area 3 days after treatment. The students walked abreast across fields at varying distances apart depending upon the height and density of cover. Since cover was scarce, large areas were searched quickly. Later, fence rows and ditch banks were thoroughly checked.

The following dead animals were found: 3 savannah sparrows, 3 meadowlarks, 1 sharp shinned hawk, 3 clumps of unidentified feathers, 6 rabbits, 3 rice rats, 2 house mice, 2 dogs, 1 green sunfish and 8 crayfish. In subsequent visits another meadowlark, 1 killdeer, and 2 savannah sparrows were found dead. Four residents of the area lost 72 domestic ducks. Several farmers reported the loss of a few small fish in farm ponds.

A second area comprising about 400 acres of open farmland was searched 10 days after treatment by 7 wildlife students. The survey was conducted in the same manner previously described. The following mortality was observed: 1 robin, 1 savannah sparrow, 1 meadowlark, 1 unidentified clump of feathers, 3 green sunfish, 1 minnow, 1 catfish, 9 crayfish, 2 common water snakes and 1 cottonmouth moccasin.

The results of earthworm sampling on this area are discussed later.

WEST BATON ROUGE PARISH AREA

Location and Description

The second study area of about 250 acres is located on former overflow lands of the Mississippi River about 3 miles west of Baton Rouge. The soil which is a gray fine clay becomes extremely hard in dry weather. Major farm practices are cattle and cane production.

The study area which was in improved pastures contained 2 brushy fence rows, 2 small brushy drainage ditches and 1 major drainage ditch. Soon after treatment part of the acreage was cut for hay or seed and then the entire area was intensively grazed.

Size and Treatment

The treated area comprised a block of about 21,000 acres. Most of the heptachlor was distributed from the air but the banks of the major drainage ditch were treated with ground equipment. Active heptachlor was applied at the rate of 2 pounds per acre. The aerial treatment which was completed on the study are about noon on May 24 was followed by a heavy rain at 4:30 p. m.

Wildlife Mortality

Daily visits were made to the area for the first 10 days following treatment. The number of investigators varied from two to six. Subsequent visits were made at 1 to 2-week intervals. The following dead adult and nestling birds were found: 39 redwinged blackbirds, 4 brown thrashers, 3 meadowlarks, 4 orchard orioles, 3 white-eyed vireos, 4 yellow-billed cuckoos and 1 barn owl. One skunk and 1 dog were found dead.

Muskrats remained active in bank burrows all summer. There was a partial kill of minnows and crayfish. Live toads and green tree frogs were seen frequently through the summer. Although 1 live cottonmouth and 1 garter snake were observed a few days after treatment, none were found after the fourth day.

Nesting Study

A search was made for bird nests along the fences and ditches. A thorough check on May 14 revealed that few birds had fledged. Results of a nest investigation are presented in Table I.

TABLE I

NESTING SUCCESS IN THE WEST BATON ROUGE STUDY AREA MAY 14, 1958–JULY 15, 1958

	Total Nests	*Empty*		*Eggs—Disappeared*		*Young Disappeared*		*Eggs Deserted*		*Young Deserted*		*Accidentally Destroyed*		*Fledged*	
		No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Redwinged Blackbird	93	44	47.3	18	19.4	1	1.1	13	14.0	12	12.9	4	4.3	1	1.1
Mourning Dove	11	4	. . .	3	. . .	. .	. . .	. .	. . .	. .	. . .	. .	. . .	4	. .
Painted Bunting	1	. .	. . .	. .	. . .	1	100	. .	. . .	. .	. . .	. .	. . .	. .	. .
Orchard Oriole	6	3	. . .	1	. . .	. .	. . .	1	. . .	1	. . .	. .	. . .	. .	. .
Yellow-Billed Cuckoo	3	2	. . .	. .	. . .	. .	. . .	. .	. . .	1	. . .	. .	. . .	. .	. .
Brown Thrasher	3	. .	. . .	. .	. . .	. .	. . .	2	. . .	1	. . .	. .	. . .	. .	. .
White-Eyed Vireo	3	1	33	1	33	. .	. . .	1	33	. .	. . .	. .	. . .	. .	. .
Field Sparrow	3	2	66	. .	. . .	. .	. . .	1	33	. .	. . .	. .	. . .	. .	. .
Green Heron	1	. .	. . .	. .	. . .	. .	. . .	. .	. . .	. .	. . .	. .	. . .	1	100
Cardinal	2	. .	. . .	. .	. . .	. .	. . .	. .	. . .	. .	. . .	. .	. . .	2	100

A total of 93 redwinged blackbird nests were discovered of which 44 (47.3%) were empty. Of the 49 that contained eggs or young, the eggs disappeared in 18 (36.7%); the eggs were deserted in 13 (26.5%); the young were deserted in 12 (24.5%) and 4 (8.2%) were accidentally destroyed. One nest out of 49 (2.0%) produced young birds. Of the 7 dove nests containing eggs, 4 produced young.

The nests of 2 cardinals and 1 green heron produced young. Eleven nests which contained eggs or young of 6 other species were deserted.

Bird Census

Accurate counts could not be made of birds inhabiting dense brushy cover. However, it was possible to make reliable counts of those occupying the more open lands.

As shown in Table II, the redwinged blackbird population decreased from 135 individuals to none in about 60 days. Redwinged blackbirds remained active in areas about 12 miles distant. Meadowlarks dropped from 27 to zero during the same period. At the same time there was a build-up in the dove population from 12 to over 80 birds. Four quail on the area vanished.

Factors which may have contributed to the decline of the first two species were the mowing of part of the area and grazing of the entire area. Grazing was so intense that cattle browsed heavily on willow shoots along the ditches. Approximately 600 cowbirds moved on the area when cattle were introduced

EARTHWORM COUNTS

Earthworm counts were made in Acadia—St. Landry Parishes at monthly intervals in soil samples 5 inches in diameter and 4 inches deep. At each visit 50 samples were collected from 3 treated pastures and 20 were taken from a non-treated pasture. Pre-treatment samples taken in the middle of February were used as a base for comparative purposes.

TABLE II

BIRDS OCCUPYING THE MORE OPEN LANDS IN WEST BATON ROUGE PARISH MAY-JULY, 1958

Date	*Redwinged Blackbird*	*Meadow-lark*	*Mourning Dove*	*Bobwhite Quail*
May 14	127	27	12	2
May 25	135	18	6	4
May 27	103	16	12	1
May 28	118	5	8	1
May 29	72	8	12	0
May 30	50	5	6	0
June 10	7	0	10	0
June 25	5	1	38	0
July 7	5	0	10	0
July 15	0	0	80+	0

The number of earthworms on both treated and non-treated farms decreased but the decrease on treated farms was much greater through July. After that date, the treated farms began to recover while the non-treated field deteriorated.

A sample of earthworms collected in July and analyzed by the Patuxent Research Laboratory, U.S.F.&W.S., contained significant amounts of heptachlor. These contaminated worms may constitute a hazard for woodcock, snipe, other shorebirds and ground feeding birds.

TABLE III

NUMBER OF EARTHWORMS COLLECTED IN 1958 ON FOUR FARMS IN ACADIA—ST. LANDRY PARISHES, LOUISIANA

	Pre-Treatment	*Post-Treatment*							
Date	*2/15/58*	*3/28/58*	*4/12/58*	*4/27/58*	*6/30/58*	*7/10/58*	*8/4/58*	*9/20/58*	*9/27/58*
	No. Samples	*No. Worms*	*No. Worms*	*No. Worms*	*No. Worms*	*No. Worms*	*No. Worms*	*No. Worms*	*No. Worms*
L. Daugereau's Farm	20	10	28	7	0	2	8	6	8
Average Number Worms Per Plot	..	0.5	1.4	0.35	0	0.1	0.4	0.3	0.4
Change in Percent	..	..	+180	–30	–100	–80	–20	–40	–20
D. Collighan's Farm	15	105	53	23	9	21	23	21	33
Average Number Worms Per Plot	..	7.0	3.53	1.53	0.60	1.4	1.5	1.4	2.2
Change in Percent	..	..	–49.5	–78.1	–91.4	–80.0	–78.6	–80.0	–68.6
A. Daugereau's Farm	15	107	Not Treated	Not Treated	38	7	46	19	51
Average Number Worms Per Plot	..	7.1	..	..	2.53	0.5	3.1	1.3	3.4
Change in Percent	..	..	..	..	–64.5	–93.0	–56.3	–81.7	–52.1
TOTAL	50	222	81	30	47	30	77	46	92
Average Number Worms Per Plot	..	4.44	2.31	0.86	0.94	0.6	1.5	0.9	1.8
Change in Percent	..	..	–47.97	–80.63	–78.83	–86.5	–65.3	–79.5	–59.1
Check Farm (Not Treated)									
R. Fruge's Farm	20	49	85	19	27	30	No Check	5	17
Average Number Worms Per Plot	..	2.45	4.25	0.95	1.35	1.5	No Check	.25	0.9
Change in Percent	..	..	+73.5	–61.2	–44.9	–38.8	..	–90.0	–64.0

FUTURE PLANS

The earthworm counts and analysis of samples for heptachlor will be continued in 1959. Samples will be collected in one additional community that has had similar treatment for fire ants.

Bird censuses and nesting studies will be continued on the same areas to determine the 1959 breeding population and nesting success. Mammal populations will be checked on treated areas.

An attempt will be made to confine woodcock in captivity and feed them earthworms from treated fields. Woodcock and other game species from treated areas will be sent to the Patuxent Research Laboratory for heptachlor analysis. Woodcock censuses will be made in treated fields and compared with similar data obtained in previous woodcock studies.

SUMMARY

1. The initial wildlife mortality following the application of 2 pounds of active heptachlor per acre was high.

2. Nestling mortality was severe.

3. Redwinged blackbirds and meadowlarks were reduced to zero on one study area.

4. Several specimens of animals and birds found dead on the study areas and that were submitted to the Patuxent Research Laboratory, U.S.F.&W.S., contained heptachlor.

5. Earthworms which are the chief food of woodcock contained heptachlor 5 months after treatment. These worms may constitute a hazard to ground feeding birds.

A PRELIMINARY PROGRESS REPORT OF FIRE ANT ERADICATION PROGRAM CONCORDIA PARISH, LOUISIANA, JUNE, 1958

By JOHN D. NEWSOM
Louisiana Wild Life and Fisheries Commission

INTRODUCTION

This study was undertaken by the Louisiana Wild Life and Fisheries Commission because it was felt that insufficient information was available as to both the immediate and long range effects on wildlife of the widespread use of highly toxic insecticides such as the chlorinated hydrocarbons. When it was learned that such a program was to be initiated in Concordia Parish in the summer of 1958, this evaluation study was promptly devised and work begun on it immediately.

This is only a preliminary report prepared to show progress from the beginning of the study through July 10, 1958. It is impossible to supply a precise evaluation of total population changes; however, this study should supply valuable indices of trends in population numbers which should be carefully considered in assessing the sum total effects of the ant eradication program. The study was hampered by the following factors:

1. Lack of previous experience regarding the pattern and degree of direct mortality of game and non-game birds, mammals, fish, amphibians, and the vertebrate and invertebrate organisms supplying food for fish and frogs.

2. Lack of notification of time and area of proposed treatment sufficiently in advance of treatment date to allow a thorough survey and an index of populations on control areas, etc.

3. The advanced growth of vegetation on the area made finding of dead animals on the area extremely difficult. Tall vegetation also cut down the average sighting distance of animals on the night census.