WELFARE STATUS OF THE LESSER PRAIRIE CHICKEN IN OKLAHOMA

By

FARRELL F. COPELIN

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INTRODUCTION

Lesser prairie chickens reportedly were abundant on the southern Great Plains when the white man began settling it during the latter part of the 19th century (Duck and Fletcher, 1944). Following settlement, however, their numbers are reported to have begun a decline, which continued until now they are rare in some areas. The decrease was attributed largely to destruction of this bird's grassland habitat by cultivation and by heavy grazing.

Because of the continued decline apparent among lesser prairie chickens in recent years, there has been growing concern among conservationists that this species might soon become extirpated unless special efforts were made to prevent this. Also, sportsmen were interested in seeing this bird increase again to a level suited to sport hunting.

Inasmuch as current numbers and distribution of lesser prairie chickens and their habitat were not well known it was important that this be learned before attempting any intensive program aimed at increasing their number.

The purpose of this investigation was to ascertain the current status of the lesser prairie chicken as to distribution, numbers, and habitat-use. The investigation was initiated September 1, 1955. Field study was carried out during the period from December, 1955 to March, 1958 in western Oklahoma.

METHODS

Locating Lesser Prairie Chickens

The location of lesser prairie chicken flocks was found by interviewing state game rangers, agricultural county agents, Soil Conservation Service personnel and farmers.

In addition, a farm-to-farm survey was employed. Areas to be surveyed by this method were selected on the basis of areas of natural vegetation, and the percentage of the area in permanent grassland pasture. Only those areas which had some shin oak or sand sagebrush, and 50 percent of more of the land in permanent grassland pasture were surveyed intensively. "A Game Type Map of Oklahoma" (Duck and Fletcher, 1943) and one-inch-to-the-mile aerial photographs of each county served as guides to the location of survey areas. The aerial photographs were available in the county offices of the Agricultural Stabilization and Conservation Committees.

One two-mile square area was selected in each type of vegetation occupied by this species for an intensive study of habitat-use, daily and seasonal movements, density, and sex and age composition of the residing population. These areas were selected in the shin oak, sand sagebrush and mixed grass prairie types of vegetation.

Booming Grounds Survey

During the spring of 1956 and of 1957, the males on display grounds in the study areas were counted at least three times during the period from March 1 to April 30.

Booming grounds were found by driving east-west lines, or at a right angle to the wind, from daybreak until about one hour after sunrise in early March. The survey lines were about one-half mile apart. The truck used was stopped every half mile to enable the observer to listen for the possible booming of males.

Each count of males on display grounds was made in the early morning hours between daylight and about one hour after sunrise. The highest number of males which visited each display ground was ascertained. The presence or absence of females was noted also.

Males were distinguished from females by their longer pinnae, brilliant yellow eye brows, noticable air sac, booming, strutting and fighting. Pinnae of the males not only were longer than those of the females, but they were much darker, being almost black. Also, females moved slowly across the display grounds, whereas males usually stayed within a small area of the ground and were alert in their actions.

Investigating Habitat-Use

Observations of habitat-use by lesser prairie chickens were made from a carry-all truck, from a blind and on foot with the aid of a twenty-power spotting scope and 6x30 binoculars. Locations of the birds were recorded on 4-inch to the mile detailed maps of the study areas.

Trapping

Lesser prairie chickens were trapped, when possible, in order to determine their sex, age and weight, and to mark them so they could later be identified individually in the field. Trapping was done in several ways.

Birds that were less than one month old were caught by running after them and catching them by hand.

During the summer months, young-of-year and adults were trapped with a wing-type net in the shin oak study area. The motts in this vegetation type were a favored summer shelter when air temperature exceeded 90° F.

The trap consisted of a one-inch mesh net 60 feet long and 8 feet high, which had a funnel attached midway, and at the bottom of the net. The large net was drooped from the outer branches of the peripheral trees so that the bottom of the net touched the ground.

The birds were driven along the wings of the trap and into the funnel by two men on foot.

During March and April of 1956 and 1957, lesser prairie chickens were trapped in grain fields with drop nets, one of which was 60 feet square and the other 29 feet square. They were baited for trapping by stacking bundled sorghums, with the grain heads exposed, in areas where the chickens had been feeding. A few days later, when the prairie chickens had become accustomed to feeding on the shocks, a net was mounted over the baited feeding area. Trapping was made difficult or impossible if other shocks of feed were nearby, or if there was much grain on the ground in the trapping area.

Markers and Marking Techniques

All trapped birds were banded with numbered metal leg bands. In addition some were marked with colored celluloid bands, aniline dye, or 3/8 inch wide plastic collars in accordance with the technique described by Helm (1955).

The plastic collar was the most useful color marker used. Being high on the body of the birds, the collar was easily seen even in shin oak where leg bands often were difficult to detect. Red, yellow and white were easily distinguished as far as they could be seen. Green was satisfactory, but was not as brilliant as the colors already mentioned. Orange could not be distinguished from red beyond a few yards.

The plastic collar did not interfere with the ability of the males to boom and inflate their air sacs. All the males on display grounds that wore collars boomed, apparently

with no difficulty.

Other Investigational Techniques

Determination of sex of lesser prairie chickens was based on the criteria given by Davison (1935). Estimation of age of birds during the winter was based on the criteria given for Tympanuchus cupido by Lehmann (1941), Petrides (1942), and Ammann (1944).

The age of young birds was ascertained by using the criterion given by Baker (1953). These were based on the chronology of moulting of primary wing feathers of the greater prairie chicken. It was assumed that the moult of the primaries of the greater and lesser prairie chickens proceeded at a similar rate. If this assumption is proved incorrect by future findings, it would be possible to revise the age estimates.

INVESTIGATIONAL AREAS

One two-mile square study area was selected for intensive study of lesser prairie chickens in each of the natural vegetation types known to be occupied by this species in western Oklahoma, viz., Havard or shin oak (Quercus havardii Rydb.), sand sagebrush (Artemisia filifolia Torr.), and mixed grass prairie. Each study area had approximately the same proportions of grassland pasture and cultivated land. For example, grassland comprised 82 percent of the shin oak study area, 84 percent of the sand sagebrush study area, and 94 percent of the mixed grass study area. All three study areas were in Ellis County, Oklahoma.

Location of study areas. Shin oak: S 26, 27, 34, 35, T 18 N, R 24 W. Sand sagebrush: S 26, 27, 34, 35, T 18 N, R 26 W. Mixed grass prairie: S 21, 22, 27, 28, T 23 N, R 26 W.

Shin Oak Study Area

The vegetation of the shin oak study area was dominated by a low-growing oak, called shin oak, which varied in height from about one to two feet. Clumps of taller oak trees were scattered irregularly over the landscape. These clumps or motts usually were very nearly rounded. They varied from a

few feet to fifty yards or more in diameter, and from slightly taller than shin oak to fourteen or more feet in height.

The shin oak was scattered throughout the grassland, just as one species of grass is scattered through a pasture composed of several grass species.

Common grass species were little bluestem (Andropogon scoparius), big bluestem (Andropogon gerardi), switchgrass (Panicum virgatum), sand lovegrass (Eragrostis trichodes), sand bluestem (Andropogon halli), and sideoats grama (Bouteloua curtipendula). Sand sagebrush was scattered sparsely through this vegetation type.

The grass formed a cover over about 25 to 35 percent of the soil. In addition to the grasses, there were many legumes and other forbs. Common legumes were leadplant (Amorpha canescens) and blue wildindigo (Baptisia australis). Common perennials were queen's delight (Stillingia salicifolia), tall gayfeather (Liatrus scariosa), dayflower (Commelina crispa) and hairy puccoon (Lithospermum carolinense).

Sand Sagebrush Study Area

In this study area the dominant vegetation was sand sagebrush (Artemisia filifolia), which was intermixed with several species of grasses and forbs.

In addition to the sand sagebrush, two other woody plants were present, namely, skunkbush (Rhus trilobata) and sand plum Prunus sp.). These shrubby plants grew to a height of about three feet.

Common grass species were little bluestem (Andropogon scoparius), sand dropseed (Sporobolus cryptandrus) sand paspalum (Paspalum hirsuta), red lovegrass (Eragrostis oxylepis) and aristida (Aristida sp.).

Such forbs as western ragweed (Ambrosia psilostachya), sandlily (Mentzelia stricta) and queen's delight (Stillingia salicifolia) were conspicuous. Many other species were present in more limited numbers.

Mixed Grass Prairie Study Area

The vegetation in the mixed grass study area was comprised predominantly of short, mid and tall grasses; namely, Buffalograss (Buchloe dactyloides), blue grama (Bouteloua gracilis), sideoats grama (Bouteloua curtipendula), little bluestem (Andropogon scoparius) and big bluestem (Andropogon gerardi).

Croton (Croton texensis) and broomweed (Gutierrezia sp.) were conspicuous forbs in the grassland.

Growing in the ravines were sand sagebrush (Artemisia filifolia) sand plum (Prunus sp.), and western ragweed (Ambrosia psilostachya) in addition to the grasses.

RESULTS

Distribution and Numbers

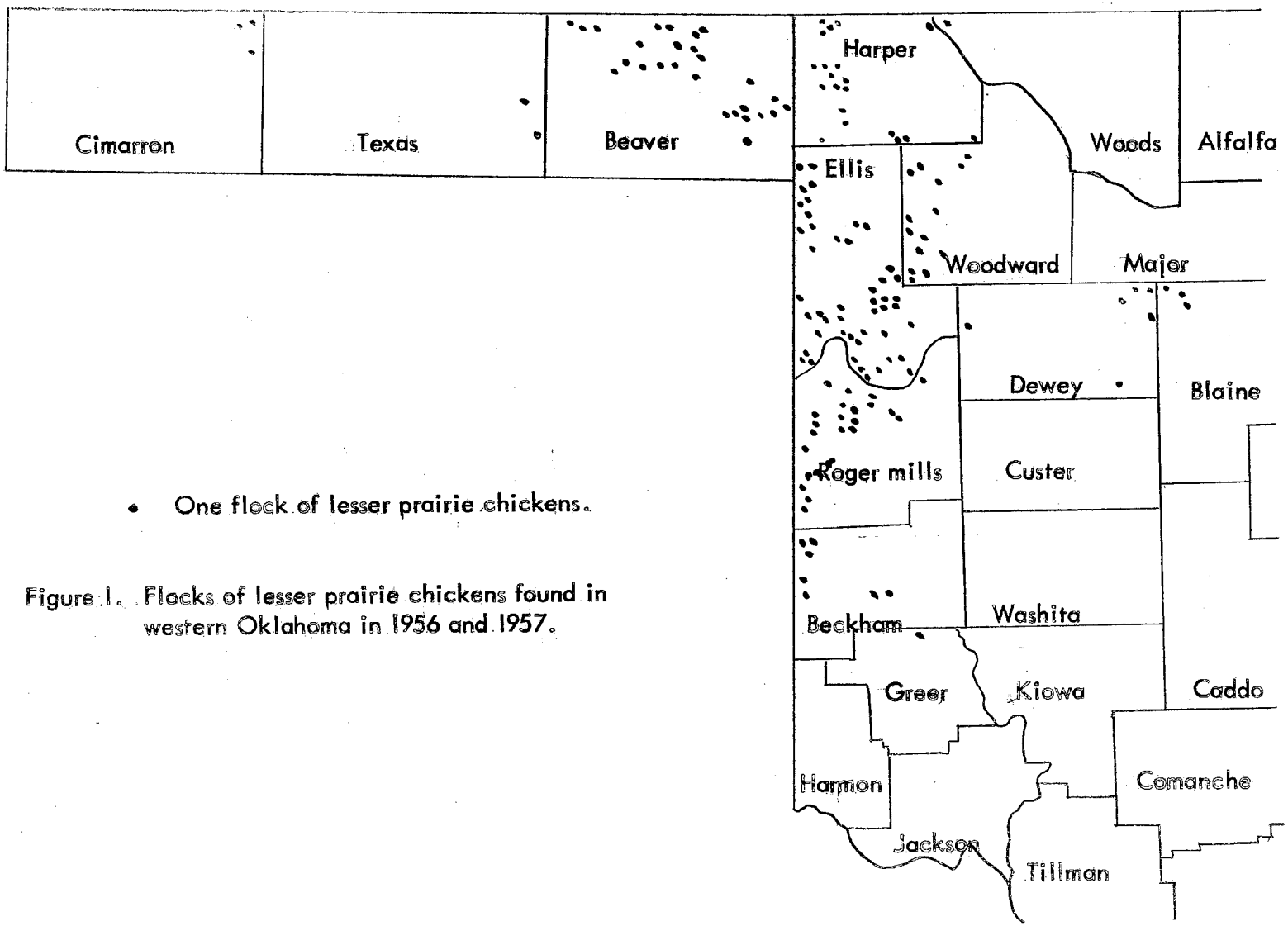
Only a small portion of western Oklahoma could be surveyed during this investigation because of the limited time available. Therefore, efforts were directed toward finding a few flocks of prairie chickens in each county so as to give some indication of the geographical range of this species in Oklahoma.

A total of 151 flocks of lesser prairie chickens were found in the following counties: Beaver, Beckham, Blaine, Cimarron, Dewey, Ellis, Greer, Harper, Roger Mills, Texas, Woods, and Woodward (Fig. 1; Table I).

These 151 flocks were estimated to have been composed of at least 3,110 birds, based on reports of residents in the region. If two limits were given as an estimate, as 50 to 75 birds, the lower figure was used to derive the total number of birds reported. When the estimate was "a few birds," no number was used in the count. (Table I).

Types of Vegetation Occupied

Lesser prairie chickens were found in three major types of vegetation in western Oklahoma; namely, shin oak, sand sagebrush, and mixed grass prairie.



• One flock of lesser prairie chickens.

Figure 1. Flocks of lesser prairie chickens found in western Oklahoma in 1956 and 1957.

TABLE I

LOCATION AND NUMBER OF LESSER PRAIRIE CHICKENS IN WESTERN OKLAHOMA REPORTED FOR THE YEARS 1955, 1956, 1957

County	Date Birds Were Seen	Approximate No. of Birds	Location Sec-T-R
Beaver	1956	12 - 15	17- 5-24
		75 - 100	29- 6-24
		25	29- 5-25
		50	6- 5-25
		50 - 75	32- 6-25
		50 - 75	25- 4-26
		25 - 30	11- 3-27
		150 - 175	28- 3-28
		10 - 25	23- 3-26
		50 - 60	7- 5-23
		15 - 18	20- 5-23
		50	13- 6-21
	1957	9 - 10	30- 3-26
		100	26- 6-23
		2	36- 2-26
		30 - 40	28- 3-27
		Few	30- 3-27
		15	30- 3-27
		30 - 40	25- 3-27
		--	17- 4-25
		50 - 100	32- 5-24
		15 - 20	31- 5-24
		4	33- 5-23
		20 - 25	25- 5-22
		8 - 10	35- 5-22
		8 - 10	10- 6-21
		40 - 60	18- 6-22
		6	27- 3-26
		Few	2- 4-28
Beckham	1955	1	6- 8-23
		20	21- 9-26
	1957	Few	29-11-26
		15 - 20	30-11-26
		4	5-10-26
Blaine	1956	1	6-19-13
		11	11-19-13
	1957	2	14-19-13

TABLE I (Continued)

County	Date Birds Were Seen	Approximate No. of Birds	Location Sec-T-R
Cimarron	1955	25	20- 6- 9
	1956	35 - 40	15- 6- 9
		1	15- 5- 9
Dewey	1956	1	2-19-14
		1	4-19-14
	1957	1	12-19-14
		2	22-18-14
		--	13-18-14
Ellis	1955	12	16-24-26
	1956	15	35-23-26
		Few	10-23-26
		Few	10-22-26
		7	25-22-25
		Few	23-22-25
		Few	19-22-24
		Few	15-22-24
		Few	16-22-24
		Few	9-22-24
		50	27-19-26
		30	8-17-26
		Few	9-17-26
		30	17-17-26
		50	5-18-25
		4	33-19-25
		Few	24-19-25
		Few	36-19-25
		2	24-18-25
		20	4-18-23
		3 - 4	31-20-24
		90	7-19-23
		25	4-18-22
		200	17-20-23
		25	10-30-23
		25 - 30	13-20-23
		7	15-24-26
		--	14-17-23
		2 - 6	30-19-25
	1957	20 - 30	21-23-26
		20	27-18-26

TABLE I (Continued)

County	Date Birds Were Seen	Approximate No. of Birds	Location Sec-T-R
Ellis (Con't)	1957	80	26-17-26
		20	33-18-24
		75 - 80	27-18-24
		15	2-16-24
		20	21-18-23
		20	15-17-23
		110	14-19-24
		90	24-19-24
		15	21-19-23
		50 - 100	14-19-23
		9	24-19-24
		--	14-23-26
		7	34-17-24
		--	35-24-26
		7	31-17-23
		10	4-21-26
		8	1-19-24
		1	17-17-24
		--	21-19-26
		--	29-17-24
Greer	1955	1	2- 7-22
Harper	1956	10 - 15	25-27-25
		--	31-28-25
		75 - 100	36-26-25
		10 - 25	24-26-25
		12	19-25-22
		13	29-25-22
		14	27-25-22
		4	36-25-20
		125	26-27-25
Roger Mills	1955	9	15-16-22
	1956	5 - 6	14-15-26
		--	23-15-26
		12 - 15	9-14-26
		--	5-12-26
		--	32-13-26
	1957	12	8-16-25
		15	10-15-24
		2	26-16-24
		15 - 20	20-13-26

TABLE I (Continued)

County	Date Birds Were Seen	Approximate No. of Birds	Location Sec-T-R
Roger Mills (Con't)	1957	5 - 6	21-13-26
		100	32-13-26
		6	34-12-26
		18 - 20	6-15-24
		--	8-15-24
		--	18-15-24
		--	17-15-24
		--	20-15-24
		12 - 14	19-15-24
		2 - 3	11-15-24
		9	14-13-26
		25 - 30	14-17-25
		6	31-16-24
		15	3-15-23
		--	10-15-23
		2 - 3	17-12-26
Texas	1956	20	16- 3-19
	1957	51	14- 2-19
Woods	1957	--	20-29-20
Woodward	1956	40	14-21-22
		--	23-20-22
		20	7-20-22
		3	35-24-22
		1	25-24-22
	1957	25	9-24-20
		50 - 60	16-24-20
		12	3-24-20
		--	8-22-21
		--	15-21-21
		2	20-22-22
		3	29-22-22
		6	35-22-22
		50 - 75	23-21

Two features were common to all three types of vegetation. They were first of all prairies. In addition all three types had some woody shrubs, especially shin oak, sand sagebrush, sand plum and skunkbush.

Seasonal Habitat-Use

Fall and Winter. Grassland apparently is the basic type of habitat of lesser prairie chickens, since it is there that they spend almost all of their time throughout the year. Apparently, they leave the grassland only during the winter months when they feed in cultivated grain fields, usually sorghum fields. Sorghum fields occur throughout most of the known range of the lesser prairie chicken in Oklahoma, but they may be eight or ten miles apart in some areas.

The movement of lesser prairie chickens from the grassland appears to be associated with low food availability in the pastures. Following the severe drought in the summer of 1956, when grass and weed seed production was low, prairie chickens began feeding in cultivated grain fields early in December. During the winter of 1957-'58, however, when weeds were very abundant in the pastures and nearly all of them produced seed, some flocks apparently spent the entire winter in the grassland pastures, never going to the grain fields to feed. There was an abundance of green plant sprouts during the winter of 1957-'58, whereas these were almost entirely absent during the previous winter.

Once the prairie chickens began feeding in sorghum fields or at cattle feeding stations they usually continued to do so throughout the winter. The usual feeding time was early morning and late afternoon. On cloudy or snowy days, however, they often spent the entire day near the feed, sitting in a crouched position and feeding, intermittently.

The height and density of grass apparently influenced the winter location of lesser prairie chickens. In the shin oak study area where there were three pastures near a grain field, each of which had grass of a different height, the prairie chickens showed a decided preference for the pasture which had been lightly grazed and had tall grass. They were seen in this pasture 15 times. They were never seen using the overgrazed pasture, where the grass had been grazed almost to the ground.

A preference was shown for taller grass and weedy cover also in the mixed grass prairie study area. There, where the grassland was quite open as compared with that in the other study areas, the prairie chickens spent much of their time in the taller grass and weedy cover (predominately ragweed, Ambrosia psilostachya) in the draws.

Another component of the fall and winter habitat is the booming ground, also called display, strutting, gobbling or courtship ground. Booming activities of the males on these grounds may occur throughout the fall and winter, but it is most vigorous during September and October.

Spring. The booming grounds apparently are centers of activity during the spring. The males were on or near these grounds almost all the time from early March until early May. Hens visited the grounds during late March and throughout most of April.

The most common visible character of booming grounds is their sparse vegetation. In the shin oak and mixed grass types of vegetation booming grounds were found on hills or ridges. In the sand sagebrush type of vegetation booming grounds were on knolls, nearly level ground, or even in a slight depression, where the sagebrush was sparse and grass was short.

The sparce vegetation on the booming grounds permitted "the possibility to see and be seen, to hear and be heard...." (Hamerstrom, Mattson and Hamerstrom, 1957).

Nesting and brood rearing activities are carried out by the hens in grass cover that is about eight inches high or higher. Three nests were found in the shin oak and mixed grass prairie study areas in 1956. Each was situated between two or three clumps of grass, little bluestem, sand dropseed, or Aristida, which remained from the previous years' growth.

One nest was found May 27, 1956 in the shin oak study area. It was about 880 yards from the nearest booming ground. It may be significant that it was as near to the booming ground as it could be, and still be situated in grass cover that was about 10 inches high or higher. The pasture in

which the booming ground was located was more heavily grazed than the pasture where the nest was placed, and grass cover was shorter.

Two nests were found in the mixed grass prairie study area June 6, 1956. These nests, which were about 220 yards from the nearest display ground, were in grass that was about 12 inches high, wereas the surrounding grass cover was only two to four inches high. This grass was not, however, as dense as the grass in an unused public right-of-way between the nesting sites and the display ground.

Hens with young less than one month old usually were found in grass cover one foot high or higher. In the mixed grass prairie study area two broods, which were estimated to be about two weeks old, were found. One brood was in the aforementioned unused public right of way. The other hen and brood were in good vegetative cover, mostly grass and sand sagebrush, a few yards from a draw or ravine. One brood consisting of three-week-old chicks and a hen were found in ten-inch grass cover on the shin oak study area.

Summer. During the summer, lesser prairie chickens were found only in the pastures and never in grain fields. In the cooler parts of the day, early morning and late afternoon, they were in the grass in all three study areas, i.e., in the grass and not necessarily among shrubs or trees. During the hotter part of the day, they moved under oak motts in the shin oak study area, and under clumps of sand

sagebrush, ragweeds and sand plum in the mixed grass prairie study area.

There was a very noticable difference in the habitat-use of lesser prairie chickens in the shin oak study area in 1956 and 1957. In 1956 the "shin high" oaks and the taller oaks in the motts were sparsely foliated. The under-parts of the motts were not foliated, so air passed freely underneath. Rainfall during the first eight months of 1956 was 2.99 inches below normal, and the ground was very dry. The average maximum temperature at Arnett (10 miles away) during June, July and August, 1956 was 94.2°, 96.3° and 98.5° F. respectively. In 1956, the prairie chickens used the motts quite often. They usually rested in motts whose canopy furnished good shade, but which were sparsely vegetated near the ground.

In 1957 the oak plants were densely foliated. Rainfall during the first eight months of 1957 was 7.23 inches above normal, and the soil usually was moist. During the months of June, July and August, 1957 the monthly average maximum temperatures were 86.2°, 97.1° and 95.0° F. respectively, which generally was below those of 1956. In 1957, during the summer months, prairie chickens were not found in the motts as often as they were in 1956. Where they did rest under motts, they selected short densely foliated ones which provided an abundance of under cover in contrast to the tall motts which lacked undergrowth. It is possible that the lower temperatures and higher soil moisture content available in 1957

permitted the birds to select resting niches which would have been uncomfortably hot in 1956.

In September, 1956, when the hot part of the day was about 75° to 90° F., as compared to 100° to 110° F. in July and August, lesser prairie chickens were found in the shin oak study area in the shade of sand sagebrush plants during the hot part of the day. This suggests that the more open canopy which provided less shade was acceptable when temperatures were lower. (Climatological Data. 1956 and 1957).

Booming Ground Survey

For both seasons of observation the highest density of lesser prairie chickens occurred in the mixed grass prairie study area. There were 8.67 males per square mile there in 1956, and 5.00 males per square mile in 1957. The second highest density occurred in the shin oak study area, 4.00 males per square mile in 1956 and 3.50 males per square mile in 1957. The lowest density occurred in the sand sagebrush study area. There the density was 1.75 males per square mile in 1956, and 1.50 males per square mile in 1957. (Table II).

In 1940 and 1941 Duck (1942) found a higher density in the shin oak type of vegetation than in the sand sagebrush type, which is in keeping with the results of this survey. Duck found an average of 9.92 males per square mile in 1940, and 8.7 males per square mile in 1941 in the shin oak type. He found only 3.0 males per square mile in 1940, and 4.5

males per square mile in 1941 in the sand sagebrush type. However, Duck makes no mention of the mixed grass type, where the highest density may now occur.

TABLE II

COMPARATIVE DENSITIES OF MALE LESSER PRAIRIE CHICKENS IN THREE TYPES OF VEGETATION IN WESTERN OKLAHOMA, 1956 and 1957.

Type of Vegetation	No. of Display Grounds	Males per Display Ground		Males per Square Mile	
		1956	1957	1956	1957
Mixed grass prairie	3	8,9,9	8,9,3	8.67	5.00
Shin oak	1	16	14	4.00	3.50
Sand sagebrush	1	7	6	1.75	1.50

The density of lesser prairie chickens now apparently is much lower than it was in the 1930's in the vicinity of the shin oak study area. The density of male lesser prairie chickens in 1957 (3.50 per square mile) was only about 21 percent as great as the lowest density recorded in the 1930's (16.625 per square mile), and only about nine percent as great as the highest density recorded in the 1930's (37.875 per square mile) (Fig. 2).

Davison (1940) censused these birds in a four-mile square area (16 sections) from 1932 to 1939, excepting 1937. The census was continued in the same four-mile square plot in 1940 (Duck, 1942) and 1946 (Anon., 1946). Part of the

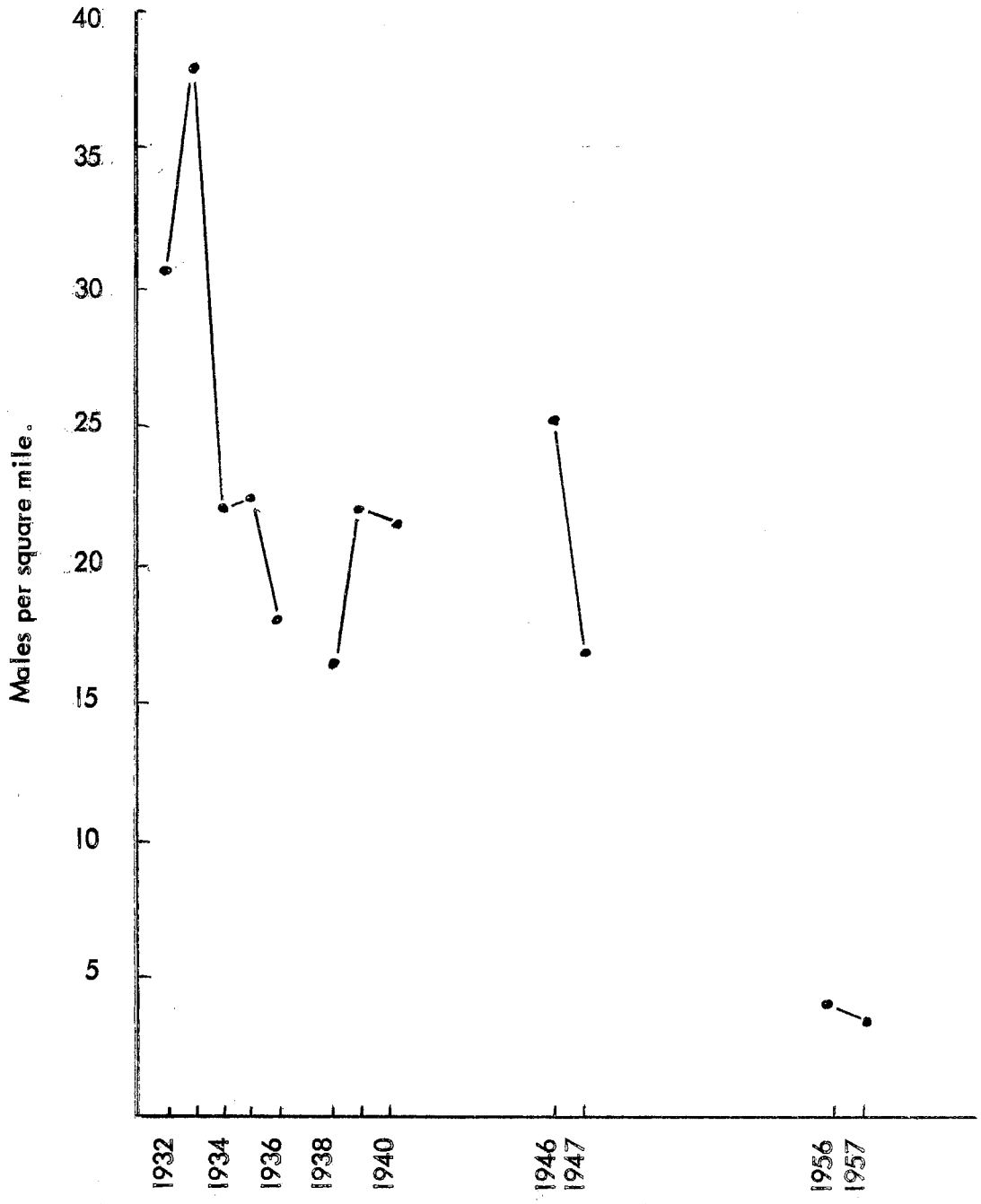


Figure 2. Census of male lesser prairie chickens on spring booming grounds in one area in Ellis County, Oklahoma, 1932 to 1957. The census was taken by Davison from 1932 to 1939, by Duck in 1940, by Oklahoma Game and Fish Department personnel in 1946, by Jones in 1947, and by Copelin in 1956 and 1957.

same plot was included in a 1947 survey of 10 sections of land (Jones, 1947). The two-mile square plot (4 sections) used in this investigation adjoined the west side of the Davison plot. It is recognized that these data, which were not taken from the same plot, are not exactly comparable. Nevertheless, they suggest a general trend of decline in lesser prairie chicken numbers.

It may be that the lesser prairie chicken population is "cyclic" like that of the greater prairie chicken (Hamerstrom and Hamerstrom, 1955). If so, the lesser chicken population may have been in the low phase of the cycle in the late 1930's, 1936 to 1938, and in 1946 and 1957. Hamerstrom and Hamerstrom (1955) found that greater prairie chicken numbers reached a low phase in a cycle in 1946 or 1947 in one area in Wisconsin.

The total number of males on booming grounds in each study area varied throughout the spring period of use (Figs. 3 & 4). These grounds were visited by the greatest number of males earlier in the season in the shin oak study area than in the two other areas, March 10 - 20 in the shin oak type, March 23 - April 11 in the sand sagebrush type, and April 9 - 21 in the mixed grass prairie type.

The booming ground in the shin oak study area, which had 16 males in 1956, covered about 0.8 of an acre. The three booming grounds in the mixed grass prairie study area, which had 8, 9 and 9 males in 1956, were about the same size as the booming ground in the shin oak type. The booming

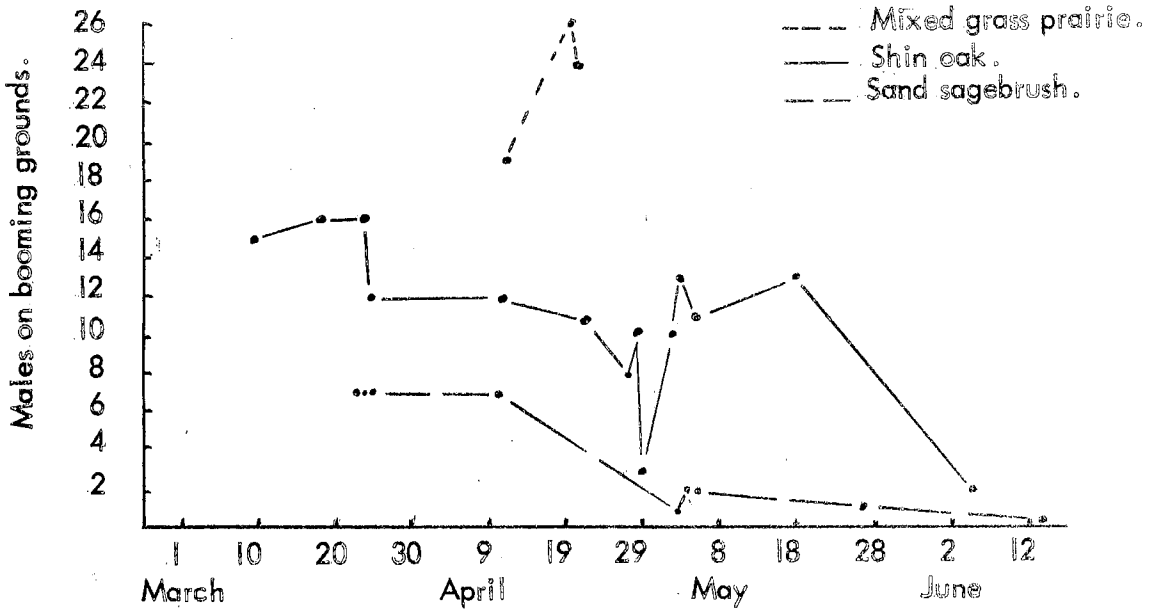


Figure 3. Males on spring booming grounds in three study areas in Ellis County, Oklahoma, 1956.

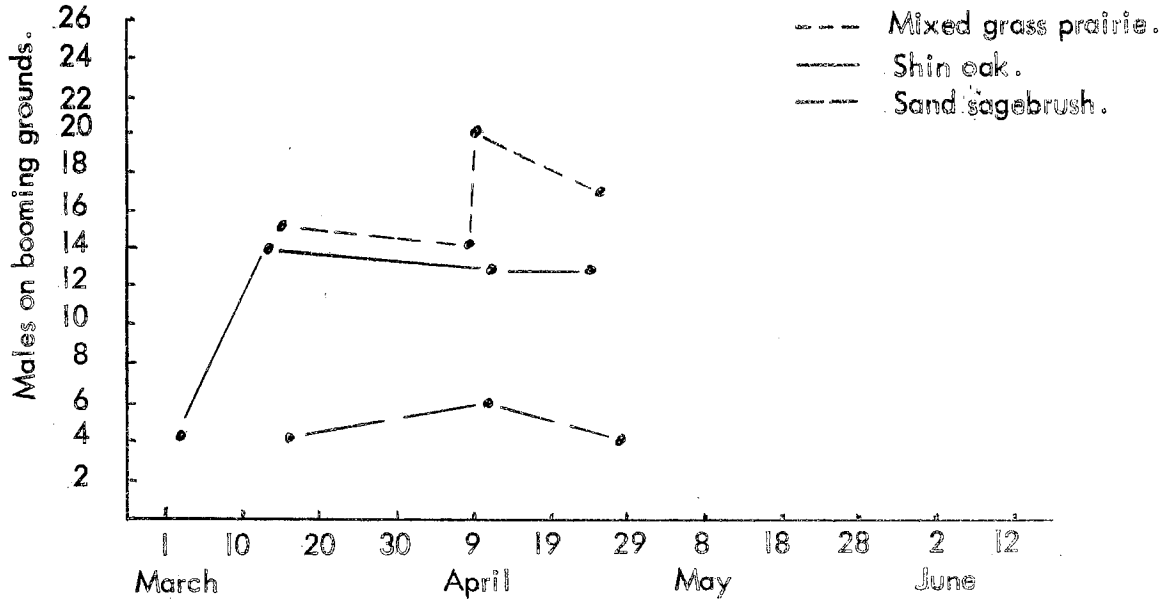


Figure 4. Males on spring booming grounds in three study areas in Ellis County, Oklahoma, 1957.

ground in the sand sagebrush study area had only 7 males in 1956. This booming ground covered only about 0.4 of an acre.

Brood Survey

Brood Size. The number of young per brood in 1956 ranged from four to eight, and averaged 6.17, based on the observations of six broods (Table III). In 1957 the number of young per brood again ranged from four to eight, but averaged 7.22, based on the counts of nine broods (Table IV).

TABLE III

OBSERVED BROOD SIZE OF NINE BROODS OF LESSER PRAIRIE CHICKENS SEEN IN THE SHIN OAK STUDY AREA, ELLIS COUNTY, OKLAHOMA, LATE SUMMER, 1956

Brood	Date	Number of Young
1	Aug. 9	6
2	Aug. 9	7
3	Aug. 10	4
4	Aug. 15	unknown
5	Aug. 16	unknown
6	Aug. 16	5
7	Aug. 16	8*
8	Aug. 23	7*
9	Aug. 24	unknown

Average number in six broods: 6.17

* Uncertain

TABLE IV

NUMBER OF YOUNG LESSER PRAIRIE CHICKENS IN BROODS AT DIFFERENT AGE LEVELS AND ESTIMATED HATCHING DATES. SHIN OAK STUDY AREA, ELLIS COUNTY, OKLAHOMA, SUMMER, 1957

Brood	Date	Number of Young	Age in Weeks	Hatched
1	July 12	8		
	Aug. 13	6	10	
	Aug. 15	7	10	June 6
2	July 12	8		
	July 13	8	7	May 25
	Aug. 13	4		
	Aug. 27	8		
3	July 13	3*	8	May 18
	Aug. 27	8		
4	July 17	8	5**	
	Aug. 27	8		
5	July 17	8	8**	
6***	July 29	7		
7	July 29	6*	9	May 27
8	July 29	5*	8	June 3
9	Aug. 13	5*	11**	
10	Aug. 14	8	10**	
11	Aug. 15	4*	10	June 6
12	Aug. 15	6	11**	
13	Aug. 19	4	10**	

* Minimum number in brood, there may have been more which were not seen in the dense vegetation.

** Age estimated on basis of the size of birds; all other age figures were based on the stage of moult of primary wing feathers.

*** Reported by Alvin Dixon.

Davison (1940), who studied lesser prairie chickens in the same vicinity in the 1930's found 7.5 young per brood in 1932, 6.47 in 1933, 5.46 in 1934 and 5.17 in 1935 (Table V).

TABLE V

THE AVERAGE NUMBER OF LESSER PRAIRIE CHICKENS PER BROOD IN ONE LOCALITY IN ELLIS COUNTY, OKLAHOMA IN THE 1930's and 1950's.

Investigator	Date	No. of broods	Average number per brood
Davison*	1932	15	7.50
"	1933	51	6.47
"	1934	75	5.46
"	1935	35	5.17
Copelin	1956	6	6.17
"	1957	9	7.22

* Davison, 1940

Survival of Young Birds. Survival of young birds was investigated in 1957 in the shin oak study area.

Young birds from five to fourteen and one-half weeks of age showed good survival (Table IV). Brood No. 1 lost only one bird from the time the birds were five to the time they were ten weeks of age. Brood No. 2 remained at eight birds from seven to thirteen and one-half weeks of age. Brood No. 3 had eight birds at fourteen and one-half weeks of age. Brood No. 4 had eight birds on two dates that were six weeks apart, at ages estimated at five and eleven weeks. Brood No. 10 had eight birds when the young were estimated to be older than ten weeks of age.

The survival rate of lesser prairie chickens from five to fourteen and one-half weeks of age compares favorably with that of the Attwater's prairie chicken, as recorded by Lehmann (1941). He stated ".... it appears that juvenile mortality is heaviest during the first four weeks and comparatively light thereafter."

The hatching dates of six broods were ascertained by the stage of moult of the primary wing feathers. The hatching dates were calculated to extend from May 18 to June 6 (Table IV).

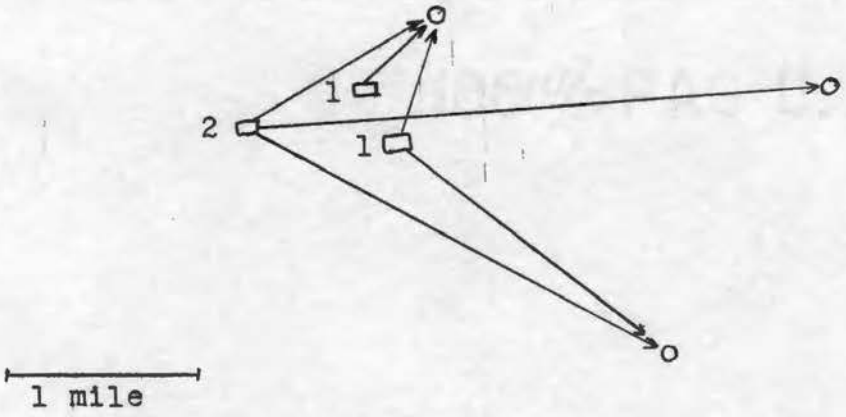
Movements of Banded Birds

Seasonal movements of 12 adult birds were observed. Movements of eight broods were observed during the summers of 1956 and 1957.

Two of the seasonal movements recorded were from a winter feeding station in a grain sorghum field to display grounds in the shin oak study area. One bird moved about one and three-fourths miles; the other three and three-fourths miles.

Six seasonal movements in the shin oak study area were from summer trap-sites of broods to spring display grounds. There was a tendency among birds of the same brood to go to nearby, but different, display grounds. For example, at one trapping site, birds of two broods were trapped. Three of these banded birds were seen the following spring, and all were on different display grounds. At another trapping

station, members of one brood were trapped. Two of these, which were banded, were found the following spring, each on a different display ground. (Fig. 5).



⟶ Movement of one bird.

▭ Trapping stations, August, 1956; the number indicates the number of broods at the station.

o Booming ground, spring, 1957.

Fig. 5. Movements of young-of-year lesser prairie chickens from summer range in 1956 to booming grounds in 1957. Shin oak study area, Ellis County, Oklahoma.

The shortest of these movements from the summer trapping site to the spring display ground was one mile. The longest movement was three miles. The average length of the six movements was about two miles. These movements were to the nearest display grounds.

In the mixed grass prairie study area the movements of four banded birds were observed. These movements were each

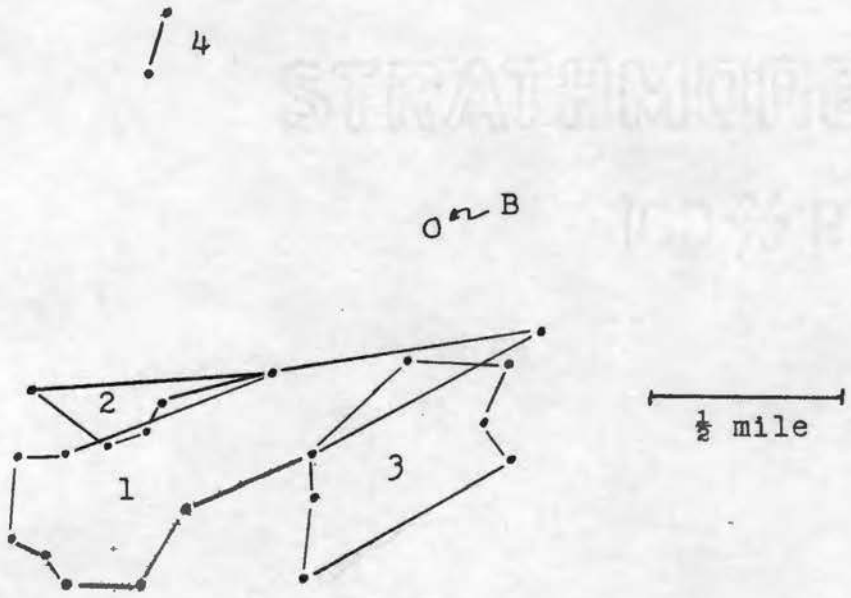
one mile in extent from a winter feeding station to the spring display grounds. Three of the banded birds were on one display ground, the other banded bird was on a different ground.

The movements of four broods of prairie chicken in the shin oak study area during the summer of 1956 covered, on the average, about 265 acres. During the summer of 1957, however, four broods were seen that seemed to move very little.

The movements of four groups of juvenile lesser prairie chickens were observed in the shin oak study area during the period from July 31 to September 7, 1956. These birds were about eight weeks of age when they were first observed. Most of the members of each group were banded, (Fig. 6) and in such a way that the groups could be distinguished individually. Group No. 1 was composed of birds from two broods. On the basis of the stage of their moulting it appeared that one brood was about one week older than the other. Groups No. 2 and 4 were thought to be brood units. Group No. 3 probably was composed of two broods.

Group No. 1 was seen at 13 different motts. The greatest distance between two motts which were points of observation was 1.43 miles. Group No. 2 was seen at five different motts, the most distant two of which were about 0.65 of a mile apart. Group No. 3 was seen at seven different motts. The greatest distance between two motts which were points of observation was about 0.75 of a mile. Group No. 4 was seen twice at

points about 300 yards apart. (Fig. 6).



B Booming ground.

. Points of observation of marked birds

Figure 6. Observations of four groups of immature lesser prairie chickens, shin oak study area. July 31 to September 7, 1956.

During the summer of 1957 the movements of four broods were observed during the period from July 12 to August 27. These birds averaged about six weeks of age when they were first observed in mid-July (Table IV). Their observed movements were much shorter than the movements of those birds observed in 1956. Brood No. 1 was observed five times, two times at one mott, and three times at one mott about 295 yards away. Brood No. 2 was seen twice at one mott, and three times at another mott about 290 yards away. Brood

No. 4 was seen twice at one mott. It is possible that better habitat conditions in 1957 permitted the birds to move about less for their necessities.

Sex Ratio of Young Trapped Birds

There was a perponderance of males among the birds trapped during this investigation. On the basis of 31 young birds trapped during the summer of 1956 the ratio was 121:100 (males to females). In 1957 the sex ratio of young birds was 91:100, based on the examination of 21 birds. Davison (1940) found a sex ratio among lesser prairie chickens of 140:100 in 1933; 146:100 in 1934; and 163:100 in 1935.

Weight of Prairie Chickens in Winter

Twenty-two lesser prairie chickens were weighed during the period from December 28, 1956 to April 9, 1957. Of these, 17 males had an average weight of 29.54 ounces. The average weight of five females was 26.22 ounces (Table VI).

These males averaged 1.88 ounces heavier than the twenty males, and the females averaged 1.67 ounces heavier than the females weighed by Davison (1935).

Lee (1950) weighed 700 lesser prairie chickens in November, 1949 in New Mexico. He found that the average weight of the adults was 1.57 pounds (25.12 ounces), and the average weight of immature birds was 1.58 pounds (25.28 ounces).

TABLE VI

WEIGHTS OF LESSER PRAIRIE CHICKENS TRAPPED IN THREE STUDY AREAS IN ELLIS COUNTY, OKLAHOMA; DECEMBER 28, 1956 TO APRIL 9, 1957

Date	Study Area	Weight of Males in Ounces	Weight of Females in Ounces
12/28/56	Sand Sagebrush	26.38 29.74 30.86 26.86 27.34	
12/29/56	Sand Sagebrush		25.10 23.18
3/13/57	Shin Oak	32.30 29.90 29.90 31.66	27.34 30.70
3/16/57	Mixed Grass Prairie	29.58 29.10	
4/ 9/57	Mixed Grass Prairie	28.78 29.10 29.74 31.66 28.14 30.70	24.78
	Average Weight	29.54	26.22

Grass Management and Lesser Prairie Chicken Welfare

In some respects it now appears that the critical survival period of the lesser prairie chicken has passed. During the first half of this century vast acreages of the lesser prairie chicken range were cultivated. Farmers eventually learned, however, that the deep, sandy soils, which formerly

were held in place by the shin oak and grasses, could not be prevented from blowing while they were being cultivated. Moreover, the productivity of cultivated crops in these sandy soils was very low.

Much of this land has now been restored to grassland, and more is being revegetated to permanent grassland annually. According to figures provided by the Agricultural Stabilization and Conservation Committee of Ellis County the acreages in grassland in that county have been increased from 447,557 in 1941, to 450,179 acres in 1946, to 478,135 acres in 1956.

Grassland management, which was very poor during the 1950's, can hardly be anything but improved in future years. Prairie chickens survived in low numbers on ranges where cattle were wintered on sagebrush or bailed shin oak leaves and concentrated feeds after the grasses were grazed as close to the ground as they could be used.

In some areas grassland management reportedly has been significantly improved during the past 10 to 15 years through the efforts of the Soil Conservation Service of the U.S.D.A. This educational program will be continued, and perhaps the welfare of the lesser prairie chicken will be enhanced accordingly.

CONCLUSIONS

The lesser prairie chicken apparently still is widely distributed in western Oklahoma. It occurs in at least 15 counties. Population density, however, appears to be lower than it was during the 1930's and 1940's at the time previous population inventories were made.

Lesser prairie chicken habitat consists primarily of broad expanses of permanent grassland prairie. Apparently, prairie chickens leave grassland areas only during some years, when they seek additional food in cultivated grain fields during winter.

The current range of this species appears to be closely coincident with areas which support shrubby vegetation, primarily shin oak (Quercus havardii) and sand sagebrush (Artemisia filifolia). Prairie chickens use these shrubby plants in the spring for food, while the plants are budding, and for shade during the hot summer months. Shin oak acorns are used for food during fall and winter.

Grass, eight to ten inches high or higher, appears to be one of the most important components of good lesser prairie chicken habitat. Grass of this height is used for roosting and resting activities during the winter, and for nesting and brood rearing activities in spring and summer.

Booming grounds appear to be centers of activities for flocks of lesser prairie chickens throughout the year. Males may stay on or near these grounds during every month of the year. The activities of females are not well known. Hens visit the booming grounds primarily in late March and throughout most of April, during the mating season.

On the basis of these two years work, it appears that high rainfall, and the consequent luxuriant vegetative growth, produce conditions conducive to good survival of young birds.

SUMMARY

A total of 151 flocks of lesser prairie chickens were found in 12 counties in western Oklahoma. These 151 flocks were estimated to have been composed of at least 3,110 birds. The lesser prairie chicken occupies three major types of vegetation in western Oklahoma, namely, shin oak, sand sagebrush, and mixed grass prairie. Grassland is the basic type of habitat of lesser prairie chickens. Apparently, they leave the grassland only during the winter months when they are in search of additional food.

Grass cover, about eight to ten inches high or higher, is an important component of lesser prairie chicken habitat for resting and roosting in fall and winter, and for nesting and brood rearing activities in the spring.

Display grounds may be used during every month of the year. The periods of greatest activity on the display grounds, however, are in early fall and during late winter and spring. The display grounds usually are sparsely vegetated. They may be on a hill or ridge, on nearly level ground, or even in a depression.

Shrubby plants, such as shin oak and sand sagebrush, often are common where prairie chickens occur. Prairie chickens often are found in the shade of these shrubby plants during

the summer when the air temperature is about 90° F. or higher.

The highest density of males on spring display grounds was found in the mixed grass prairie study area, 8.67 in 1956 and 5.00 in 1957. The second highest density was found in the shin oak study area, 4.00 males per square mile in 1956, 3.50 in 1957. The lowest density was found in the sand sagebrush study area, 1.75 males per square mile in 1956, and 1.50 in 1957.

The density of male prairie chickens per square mile in the vicinity of the shin oak study area was 37.875 in 1933, 16.625 in 1938, and only 3.50 in 1957 (Fig. 4).

The average number of young per brood in 1956 was 6.17. It was 7.22 in 1957. Survival of young birds from four to fourteen and one-half weeks of age was very good. Only one bird was observed missing from three broods during this growth period.

Seasonal movements of 12 lesser prairie chickens revealed maximum movements of three and three-fourths miles from a winter feeding ground to a spring display ground.

Observations of summer movements of young lesser prairie chickens in four broods indicated the birds of each brood used, on the average, about a 265 acre area in 1956. Four broods observed in 1957 were found several times at four separate oak motts. Two of the broods, however, did move short distances. One brood moved 290 yards, the other 295 yards, indicating much less movement of broods than occurred in 1956.

The sex ratio of 31 young birds found during the summer of 1956 was 121:100 (males to females). In 1957 the sex ratio of 21 young birds was 91:100.

Seventeen males trapped during the winter of 1956-'57 weighed an average of 29.54 ounces. Five females trapped during the same period of time averaged 26.22 ounces. (Table VI).

Except for overgrazing, land-use practices generally are becoming more favorable to the welfare of the lesser prairie chicken. The range it inhabits is not well suited to cultivation because its soils are either too sandy or too shallow for sustained productive tillage. The current trend is toward establishing more acres to permanent grassland.

MANAGEMENT IMPLICATIONS

Geographical Range and Habitat

The entire geographical range of the lesser prairie chicken in Oklahoma is not known. This range should be determined, as nearly as possible, in order that the different habitat types this species occupies can be observed, and some evaluation can be made as to the possibility of expanding the present inhabited range through a program of transplanting broodstock. Only when the present distribution is known, and the habitat of the prairie chicken is better understood, can the need of a transplanting program be determined.

Further habitat-use studies will be needed in conjunction with the general observations of occupied types of vegetation.

Booming Ground Surveys

Spring booming grounds surveys should be continued in each of the types of vegetation occupied by this species. A knowledge of the annual fluctuations in prairie chicken numbers is important for at least one good reason. This knowledge is basic to the prediction of future population densities. This, in turn, may permit better evaluation of the factors responsible for increases and decreases in the population, and aid in predicting when a huntable population

might be present.

It is well known that the greater prairie chicken population is "cyclic" -- its numbers increase and decrease periodically, reaching highs about every 10 years (Hamerstrom and Hamerstrom, 1955). There is evidence to indicate that the lesser prairie chicken population may be cyclic also (Fig. 2). However, only through continued display grounds surveys can this be determined.

Brood Surveys

The number of young prairie chickens per brood during the summer months may eventually serve as an index to fall and spring populations. It may be noted in Table V that the number of young per brood decreased from 1932 to 1935. It may further be noted in Fig. 2 that the spring population declined from 1933 to 1936, corresponding to the decline in brood sizes. Continued brood surveys may reveal whether or not a decrease in the number of young per brood is always followed by a decrease in the spring population density, and if the converse of this situation is true.

Brood surveys may be of significance, also, from the standpoint of determining the cause of population increases and decreases. It was observed during this investigation that habitat-use by young prairie chickens differed greatly during a dry year, when vegetative cover was sparse, and a wet year, when vegetative cover was very dense. It was

further found that the number of young per brood was greater during the year when vegetative cover was luxuriant, than when it was sparse.

Brush Control

Throughout most of the known range of the lesser prairie chicken, woody shrubs are prominent components of the vegetation. These shrubs, predominately sand sagebrush and shin oak, are used by prairie chickens for shelter. From an agricultural point of view it appears to be desirable to reduce greatly these shrubby species in the grasslands. This usually is followed by a considerable increase in grass production, reportedly up to a four-fold increase. Methods already have been developed for attempting the control of shin oak.

Since these woody shrubs are frequently used by lesser prairie chickens for shelter, it would be highly desirable to preserve patches of this woody cover for the birds' use. On the basis of this study, it appears that the preservation of motts within a half mile radius of the booming grounds would provide shelter for the young.

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VITA

Farrell F. Copelin

candidate for the degree of

Master of Science

Thesis: WELFARE STATUS OF THE LESSER PRAIRIE CHICKEN IN OKLAHOMA

Major: Wildlife Conservation

Biographical and Other Items:

Born: October 3, 1933 at Gracemont, Oklahoma

Undergraduate Study: Oklahoma State University, 1951; Cameron State Agricultural College, 1952-1953; Oklahoma State University, 1953-1955.

Graduate Study: Oklahoma State University, 1955-1958.

Experience: Employed by the Oklahoma Department of Wildlife Conservation during the summer of 1955.

Member of the Wildlife Society and O.S.U. Wildlife Society.

Date of Final Examination: May 9 , 1958