CHAPTER IV.

THE PRAIRIE GROUSE

INTRODUCTION

Nice (1931) lists four members of the prairie grouse family (Tetraonidae) as formerly a resident of Oklahoma. The Greater Prairie Chicken, according to the records of the Game Survey, was once found throughout the prairie sections of the eastern two-thirds of Oklahoma, overlapping here with the eastern extent of the range of the Lesser Prairie Chicken (Tympanuchus pallidicinctus) which occupied most of the western one-third of the state, including the panhandle counties.

The prairie sharp-tailed grouse (Pediocetes phasianellus campestris) is listed in Nice (1931) from specimens and observations from Cimarron county, Oklahoma. It is reported nesting there.

From the same source the Sage hen (Centracercus urophasianus) is recorded by observations south of Waynoka in Woods county, August, 1902; north of Beaver creek in Cimarron county; and from a specimen taken in 1920 it was reported mating and nesting in Cimarron county in 1911 and none seen since 1920. It would appear that these birds are stragglers, since typical Sage hen habitat is nowhere near to Oklahoma.

GREATER PRAIRIE CHICKEN

Tympanuchus cupido americanus

FORMER DISTRIBUTION AND ABUNDANCE

The greater prairie chicken was formerly an abundant resident of the Tallgrass Prairie Game Type of Oklahoma. It appeared to occupy timbered sections only as a marginal condition to the true prairie, and only came to these areas in the fall to feed on the oak mast.

Early travelers reported seeing prairie chickens throughout the greater prairie chicken range and also in association with the Postoak-blackjack Game Type. Latrobe reported immense flocks in the vicinity of farms near Fort Gibson, (November, 1832), Muskogee county. Later (1849) Woodhouse writes that prairie chicken were abundant in the same locality and along the Arkansas river between Fort Smith and Fort Gibson. Cook also reports that they were common around Caddo (1883) in Bryan county. In 1884 Culbertson mentions that prairie chicken were as common as pigeons near Spiro, LeFlore county.

The first estimate of the greater prairie chicken population was made in 1925-26. Cosman estimated about 3,000 birds to be in a refuge in Osage county. The state game ranger made the following estimates: Craig county, 700; Mayes county, 700-800; Nowata county, several bunches; Ottawa county, 1500. Although these estimates were made by guess, they indicate a low population.

Greater prairie chicken populations increased with early settlement. They were found in the entirely timbered areas where large acreages had been closed for farming, but when the country became more thickly settled and agriculture took the place of the natural tall grasses of the prairies and savannah types, the populations began to decrease. This population decrease continued until about 1925 and seemed to remain at a low level for several years, but in the last ten years a slow but definite increase in numbers is noticeable.

PRESENT DISTRIBUTION AND ABUNDANCE

During the period of March 19 to May 7, 1940, a detailed investigation was made of the greater prairie chicken range by the survey workers. Again during the period of April 1 to April 7, 1941, a check was made on some of the more important booming grounds. The original objective of the investigation was to obtain population figures for all of the counties in eastern Oklahoma supporting prairie chickens, but in the preliminary survey it was found that the bulk of the population was confined to northeastern Oklahoma. Since time was an important factor in the work, the southern counties received but little attention. Census work was conducted in twelve of the northeastern counties, including Craig, Mayes, Muskogee, Nowata, Osage, Ottawa, Pawnee, Payne, Rogers, Tulsa, Wagoner and Washington.

The method used for determining the population was adapted from that of Davison (1940 unpublished) on the Lesser Prairie Chicken in western Oklahoma. It consisted of driving the roads around sample areas and locating all of the booming grounds. The

grounds were then visited and a count made of the cocks. Hens were also counted when they happened to be present.

A total of 36 sample areas were censused during the study which covered 184 square miles of prairie chicken range. Forty-seven grounds were found, upon which 364 male birds were counted. An additional 128 females and 94 of sex undetermined were also counted, which brings the total number of birds seen to 586 or 4.6 per cent of the total estimated population. The average number of males per ground was found to be 8.6 and ranged from 5.3 to 12.7.

The total number of square miles of range in the twelve counties amounted to 4943. Including, in addition, portions of Okmulgee, McIntosh and Delaware counties, there are probably slightly over 5000 square miles in all in this section of the state.

From these samples a male population of 7,599 birds is estimated as compared to a female population of 5,056 or a total of 12,655 in all. It should be emphasized that the female figure is tentative since it was calculated on a arbitrarily established sex ratio of 150 males to 100 females. It is approximately that figured for the Lesser Prairie Chicken by Davison.

The following table presents these figures in tabular form for 1940.

LIMITING FACTORS

As with most other game species of the state, the human use of the land by converting natural prairies to agricultural lands constitutes the greatest limiting factor on greater prairie chicken populations. The potential population under management is limited by the amount of unbroken prairie left in the state. Then here the degree of use in grazing, burning and mowing is of great importance. Other than cultivation which is not controllable due to the general high agricultural value of the prairie soils, such factors as fire, weather, poaching, predators, natural cycle, overgrazing, drouth, disease, parasites, food and cover and land use conditions all contribute to a fluctuating population.

PRAIRIE FIRES

Prairie fires which occur at nesting time are extremely destructive to eggs and young. Unlike the bobwhite quail, this species shows less tendency to renest after such a disturbance. However, it appears that most burning catches only the early nesters, yet excellent nesting cover is destroyed for subsequent nesting and brooding. Generally over the prairie chicken range there is a growing appreciation of better grassland management, which excludes burning. Despite the general expert opinion against burning, some economic factors appear to encourage

TABLE VIII

SUMMARY OF GREATER PRAIRIE CHICKEN CENSUS DATA BY COUNTIES

County	Sq. Miles Censused	Total Number Grounds	Male Birds Counted	Av. No. Males per Ground	Sq. Mi. of Range	POPULATION		
						M	F	Total
Craig	16	12	106	9.5	170	2009	1339	3348
Mayes	13	7	54	7.7	337	808	538	1346
Muskogee	16				416	42	28	70
Nowata	13	6	32	5.3	500	1017	672	1689
Osage	52	13	93	7.1	1000	1775	1183	2958
Ottawa	4				190	493	328	821
Pawnee	9				301	106	70	176
Payne	12				356	99	66	165
Rogers	13	4	51	12.7	37	724	482	1206
Tulsa	6				150	42	28	70
Wagoner	12	4	20	10.0	270	340	226	566
Washington	18	1	8	8.0	340	144	96	240
Total	184	47	364*	Average 8.6	4943	7599	5056	12,655

*In addition to the 364 male birds counted, there were 128 F and 94 sex undetermined. Total number birds seen—586.

the practice. Farmers report that when the demand for prairie hay is slack, the buyers penalize the growers on new hay in which the previous year's growth is mixed. For this reason alone, many farmers keep up the practice of spring burning.

WEATHER

The character of the weather during the nesting season appears to be a limiting factor which will vary from year to year. Heavy spring rains and cold weather during nesting and brooding is known to seriously reduce the hatch and survival of young birds. The weather is also associated with food and cover supply and birds should come through the winter in good shape to be able to withstand the demands of breeding.

OVERGRAZING

Overgrazing is an important limiting factor in some areas as it relates to food and cover primarily. Suitable cover for nesting in some areas appears to be important. Although there is a trend toward regulating the number of stock on a given range, there are still extensive areas where overgrazing is the rule.

DROUTH

Even though it was not possible to obtain data on the importance of drouth as a limiting factor, the account from Missouri is worth restating. Large losses of chickens were reported here to have occurred around recently dried water holes in the drouth of 1934, especially on the western prairies almost adjoining Oklahoma. It appeared that the cause of death was the heat and lack of water.

Plate XLII—Prairie fires cause much damage to prairie chicken nests.

POACHING

It is well known that illegal shooting of greater prairie chicken is common in certain sections of northeast Oklahoma. In these areas public sentiment favors such practice on the contention that the chickens in the fall and winter destroy large amounts of feeds. However, even within these areas of most complaint, are many farmers who try to protect the chickens and who resent sportsmen poaching on their lands. After a careful check of farmers' opinions throughout this section, it is believed that sportsmen are more concerned over the destructiveness of prairie chickens to crops than are the farmers themselves.

DISEASE AND PARASITES

No data were obtained on the importance of disease and parasites although in some instances these may be worth consideration. There are dangers from infection from domestic chickens of such disease as blackhead.

LAND USE

Aside from poaching, land use factors as a group are the most important present day consideration. An understanding of these factors is absolutely essential to proper man-

agement of chickens. In general, it can be stated that most of the prairie chickens are found on or associated with lower grade land as compared to the better farm land in Oklahoma. Consequently most of it is more suitable for grazing than for farming, and there is a gradual tendency toward an increase in hay land, sorghums, and legumes, and a decrease in corn production as the soil has become exhausted. All of these tend to better the environment for prairie chickens. The increase in cultivated acreage in Craig county, for example, has been very small since old land is allowed to revert to prairies about as fast as new land is broken. Statistics show that between 1909 and 1929 there has been an increase in the following crops: sorghums grown from grains, soybeans and legumes. Yet the total hay production has been reduced very little. In addition, there has been a marked decrease in corn production from 1909 to 1929. In Mayes county statistics present an ever more encouraging picture since 1934. These figures show a decided increase in sorghum production, a noticeable increase in both tame and wild hay, and a decrease in corn production. All these trends point toward a general improvement in environment which undoubtedly accounts for the steady recovery of chicken numbers in recent years. It is believed the control of illegal shooting should allow for further illustration of this trend.

MANAGEMENT AND RESTORATION

Unlike the lesser prairie chicken in western Oklahoma, the greater prairie chicken now occupies, in at least small scattered and isolated flocks, almost all the range which is even likely to become habitable for the species. For the most part restoration will be confined to attempts at increasing carrying capacity of land already supporting chickens. Exceptions to this are smaller prairie sections in south central Oklahoma in Comanche, Stephens, Garvin, Murray, Carter, Pontotoc and Johnston counties, to name the larger areas. For these latter sections it will be necessary to trap and transolant prairie chicken stock from northeastern Oklahoma. Too, in event of an open season on chickens in northeastern Oklahoma, this south central range may serve as a guarantee against total depletion for the state. Such a project is under consideration of the Game and Fish Commission at the time of writing.

Increasing populations throughout the occupied range, at least until further research should show otherwise, must depend on more moderate use of the existing grass land, better control of illegal shooting, and continuation of the trend of land use toward reversion of worn out land to pasture.

THE POSSIBILITY OF A FUTURE OPEN SEASON

At the present time no one with the interest of preserving the prairie chicken in Oklahoma in any numbers at all can recommend an open season. The only possible justification would be from the farmer's point of view—that of controlling chicken populations on the basis of crop damage. However, in all fairness, it must be stated, however, that it is known from actual observations that some reports of serious crop damage are exaggerated and it appears more often than not that such exaggerations have their source, not in the farmers themselves, but in sportsmen and others. Some of this results from the impression of huge populations caused by seeing the birds in the winter concentrations at which time birds from vast areas may flock together.

If Oklahoma is to have a greater prairie chicken hunting on a sustained basis, several things must be taken into account. First, it is doubtful if this species can ever support a season of the length and regulation of the bobwhite quail now. Even if it should reach far beyond the most optimistic predictions of its reaction to management, the total potential is too small for such unregulated hunting. It will be necessary to combine greater and lesser prairie chicken hunting dates and limit the take to a relatively few hunters and only two or three birds per hunter per season. However, other states have found it economical to handle a certain species whose range is limited in this manner, and there is no reason why such plan should not be at least considered in Oklahoma. Hunting privileges are often determined in these cases by ballot which allows a few hunters from all sections of the state to participate.

By combining greater prairie chicken management with several other species of game and furbearing animals much can be done to prevent the huge investment of sportsmen's funds in a species offering such limited promise as does the prairie chicken.

Greater prairie chicken management combines easily with a land acquisition program, which, as a long time procedure, eventually provides for public owned shooting

preserves. And since open and free shootings appear very definitely to be gradually leaving the picture, such a program of acquiring land is a desirable activity of state game and fish departments in order that the right to hunt and fish always will be the privilege of all classes of license-buying people.

At present it appears that prairie chicken, as well as all other game and furbearing species, would benefit from the establishment of at least three large refuges in northeastern Oklahoma on which the game department had sole word as to land use. One in Craig, one in Osage, and one at the junction of Rogers, Mayes and Wagoner counties would be desirable. These may be purchased with Federal Aid to Wildlife Funds and set up to function as public shooting preserves. As nearly submarginal agricultural land as possible would receive first consideration. Worn out crop land may economically be made to produce a game crop. It is only on such controlled land that habitat, over such wide blocks as is necessary to benefit prairie chicken, may be managed.

LESSER PRAIRIE CHICKEN

Tympanuchus pallidicinctus

HISTORICAL NOTES

Although we have considerable historical data at hand, we have not been able to define clearly the conditions which made for boundaries between this species and the greater prairie chicken. There appears to have been considerable overlapping of the ranges of the two species, but considering that conditions which make for suitable habitat for the greater were diminished, moving west, it seems that there should have been some exacting differences in requirements of the species. The same would appear to be true for the lesser species. Early in the work, evidence pointed to separating the ranges of the two species on basis of soils. Our records show that the greater occupies the tall grass prairies of the tight soils, while the lesser is found on the loose sandy soils supporting a sagebrush or shinnery oak vegetation. This may have been true in the central part of the state formerly, but throughout the western counties, records show that the lesser prairie chicken was just as abundant, if not more so, on the eroded mixed grass tight lands as on the sandy land. However, since the sandy land, even under heavy grazing pressure, continues to support a brush vegetation, the chickens have been able to maintain themselves here.

FORMER DISTRIBUTION

With some thirty literature references to prairie chickens in western Oklahoma, extending from 1792 until 1931, and from interviews of a great many "old timers", we have constructed the accompanying map which shows the approximate former distribution of the lesser prairie chicken and that area or region in which the greater overlapped into the range of the lesser.

Certain historical references indicate that this western occurrence of the greater species was due to the movement of agriculture. However, records show that they were found at least as far west as the marked eastern limits of the lesser prairie chicken. In the vicinity of Canton in Blaine county an early settler tells us of there being two kinds of prairie chicken in early days before settlement. He describes them as the "booming and cooing kind" and the "gobbling kind". Further he says that the booming chickens were found on the uplands while the gobbling ones were found on the sand hills and often called "sandhill" chickens.

From all evidence we have, it appears that the lesser prairie chicken was found generally over western Oklahoma but within the high plains or shortgrass plains they were more or less confined to the sandy stream courses of Quarternary deposits on the north sides of the water courses. Here, cover consisted of heavier vegetation such as shinnery oak or sand-sage.

DECLINE AND HUMAN OCCUPATIONS

Examination of the literature of this species shows that people did not become alarmed concerning the decreasing numbers until about 1909. Recommendations at this time were made by men prominent in game conservation. Dr. Hornaday and Theodore Roosevelt were among those who made statements regarding the condition of prairie chicken in Oklahoma. In 1909 Dr. Hornaday recommended that Oklahoma protect the lesser prairie chicken for a period of ten years. F. S. Barde, a contemporary, and probably better acquainted with the situation, said that a five year closed season would have been better at this time.

From 1895 to 1909 prairie chicken could be shot between August 1 and December 31, with no mention of the number of birds allowed per hunter. This law was passed by

the Territorial Legislature. Statehood came in 1907, and the State Sportsmen's Association and the State Game and Fish Protective Association, with the help of the U. S. Department of Agriculture and the National Audubon Society, presented the Governor and the Legislature in 1909 with a draft for a general fish and game law. A season for taking prairie chicken was fixed as follows: Hunting permitted only from September 1 to November 1 (Sec. 2, Art. 11, Chapt. 19, Session Laws of Oklahoma, 1909). A daily bag limit of 15, or 100 per season, was also provided. This law remained in effect until 1915 when the legislature passed a law prohibiting the hunting of prairie chicken at any time. (Sec. 2, Chapt. 185, Session Laws of 1915).

In 1929 the legislature provided a law (Sec 4834, Oklahoma Statutes 1931) which gave the game and fish commission power to declare open seasons on deer, wild turkey, or prairie chicken when and if such game became so numerous in any county or counties as to endanger private property or farm crops.

With this authority the game and fish commission, in June, 1929, declared an open season on prairie chicken as follows:

> "It appearing to the State Game and Fish Commission of Oklahoma that prairie chicken have become numerous in Ellis, Roger Mills and Beckham counties, and that part of Harper county west of State Highway No. 14 to the Harper county line and south of Highway 11, as to endanger and damage crops; that the proper season for shooting such game is required by Section 5, H. B. 261;
>
> "It is therefore ordered by the State Game and Fish Commission of Oklahome that an open season for shooting of prairie chicken is declared in the above described territory beginning at 6:00 A. M. of the 13th day of September, 1929. That during said period resident hunters possessing hunting licenses may hunt prairie chickens and kill not exceeding six (6) per day, and such hunters shall not have in their possession at any time more than twelve (12) prairie chickens."

Concerning the above declared open season, the Oklahoma Game and Fish departmental Bulletin made this brief comment in its September, 1929 edition:

> "Everyone visited the chicken country in chicken season but Chairman Harris. Roads were muddy, rain during the early part of the pilgrimage, weather was cool, coats needed, grub scarce, sleeping places scarcer, profanity the common expressive diction, few chickens killed, everyone undergoing unusual hardships—yet everyone reports a good time."

Two years later, in 1931, another open season was declared in prairie chicken. This was a three-day season, on September 15, 16 and 17, 1931, in Beckham, Roger Mills, Harper and Beaver counties, and that part of Woodward county lying west of State Highway No. 33, and that part of Ellis county lying north of Federal Highway No. 60. The bag limit was fixed at five per day and only residents of the state permitted to hunt, as in the 1929 season.

In commenting on the 1931 season the Departmental Bulletin had this to say:

> "The open season on prairie chickens was all that was anticipated. A check-up shows that there were not nearly as many hunters who took advantage of the open season as in 1929 when the season was last opened, also that those who did go out this year were not disappointed, as the chickens were plentiful. Very few complaints came into the office concerning depredations to farm property, and all in all, the departmental executives and rangers were proud of the fine sportsmanship displayed by Oklahoma citizens who enjoyed the three-day open season."

The last open season on prairie chicken was in 1933, when a three-day season was declared for October 2, 3 and 4, 1933, in the counties of Beckham, Roger Mills, Ellis, Woodward, Harper, Beaver and that part of Texas county south and east of State Highway No. 54. Resident hunters only were allowed to hunt, and permitted to take not more than five per day, nor more than ten during the season. No comment from the state game and fish department is available for this season. However, Davison (1940) had this to say:

> "An open season adjacent to the study area in the fall of 1933 was followed by a great decrease in numbers within the area."

The above statement is based on interpretation of the census figures from sixteen square miles of the Davison Ranch in Ellis county.

It is doubtful if the closed and open seasons and their resulting influence was clearly appreciated by the game interested people of the state. It should be clearly pointed out that a closed season will not always cancel that factor or group of factors which affected the decrease. An investigation of the land development of western Oklahoma leads us to believe that at the time the closed seasons were legislated, they possibly had no effect whatsoever in turning the downward trend of lesser chicken populations. In fact, historical information indicates that the closed seasons came after the chicken had already suffered such a decrease in habitat as well as in population that the protection from shooting did very little to bring back the chickens.

A tremendous change in prairie chicken habitat and environment occurred between 1900 and 1910. Furthering this effect was World War I which placed practically all land into cultivation that was flat enough to be tilled. Another influence, probably secondary in important, but first chronologically, was the establishment of permanent cattle ranches in the area, which started about 1870.

At one time practically every quarter section of prairie chicken range in western Oklahoma supported a family, even if for only a few months. Many of these people, particularly on the poorer soils, left the country shortly after the land opened, but the greatest movement has occurred during the depression post war period and during the drouth years. From 1930 to 1940 over 70,000 people left this area. Much of this land is returning to grassland, and unless some unpredicted change occurs in the governmental land use policy, we can expect a gradual change to grassland economy to develop here, with, of course a return of lesser prairie chicken numbers. This is happening now in certain areas where soil conservation districts are active.

The decreasing chicken supply fairly well correlates with the periods of human influx and farm land development. However, the mere examination of the land itself will clearly show that the chickens' absence over the majority of the former range may be explained by the fact that the conditions which largely supported chickens are no longer there. Further, under the present economic conditions, there is no reason and no hope for attempting restoration over most of this land. Its value as a crop producer will not premit the drastic change necessary for maintaining chicken populations. Our interest in chicken restoration must be concerned with that land unfit for cultivation, and which can be economically returned to grass land for cattle raising and for game. Fortunately, under moderate and intelligent grazing use, most of this poor land will support good chicken numbers.

PRESENT POPULATION AND DISTRIBUTION

This species lends itself well to census techniques. Davison (1940) describes the habits of cocks in gathering on "gobbling" grounds from March until early June, for the

TABLE IX

SHOWING LAND USE COMPOSITION OF CENSUS PLOTS

Plot Number	Pasture Shinnery or Sage	Old Fields	Land in Cultivation
	(Acres)	(Acres)	(Acres)
1	1,807	513	240
2	1,829	198	533
3	2,328	0	232
4	2,353	207	0
5	2,450	40	70
6	1,745	678	137
7	1,548	140	872
8	2,348	92	120
9	2,392	80	88
10	2,395	75	90
Totals	21,195	2,382	2,023

Pasture ..... 82.7 percent
Cultivation 9.3
Oil Fields 7.9

courting and mating activities. Individual cocks appear to use the same grounds throughout the season and probably from season to season throughout the life of the cock. These grounds are easy to locate and fairly easy to count, and hence give a fairly easy method of census in comparison of methods used on other species. Knowing the sex ratio it is possible to get fairly accurate population trends for large areas by a sampling method. We have found this method extremely valuable for our work of the wildlife survey. Insofar as we have been able to determine, there appears to be fewer variables involved in this method than with other methods with which we have had experience. The only factors influencing the accuracy of calculation of total populations appears to be the sex ratio. According to Davison's figures (1940) there seems to be some variation in sex proportions from year to year, and in sufficient degree as to make the knowing of this factor necessary for calculations of this sort. Davison's figures were determined from the examination of young birds and are likely to show a change during the breeding season. Too, as with all sampling census techniques, there is the important problem of correct application of the figures, or interpretation of the habitat.

PROCEDURE OF CENSUS

The first step in the census was to establish the extent of occupied lesser prairie chicken range. This was done through interviews with local game rangers, farmers, ranchers and sportsmen. Along with this, a game cover type map was prepared which, of course, simplified determination of the range considerably.

Ten sample census plots were selected, consisting of four square miles each. It is believed that a larger plot would have made the samples more indicative of the actual populations, but wider variety of habitat conditions were available for sampling this way. In future work it is recommended that plots of sixteen sections be used.

During the spring census in 1940 the selected plots were visited on the afternoon before each census and after information from aerial photo sheets and other sources were placed on a map. Gobbling grounds

TABLE X

THE LESSER PRAIRIE CHICKEN POPULATION IN OKLAHOMA

COUNTY	CAPACITY POPULATIONS			EVENLY DISTRIBUTED BUT BELOW CAPACITY			Potential Range Scattered Flocks		TOTALS	
	Square Miles	* Density	Popu-lations	Square Miles	* Density	Popu-lations	Square Miles	Popu-lations	Total Range	Ttl. Popu-lations
Ellis	99	36	3,564	239	14	3,346	332	590	670	7,500
Roger Mills	59	24	1,416	384	3	1,152	87	0	530	2,568
Woodward	0	0	0	198	10	1,980	285	500	577	2,950
Woodward	0	0	0	94	5	470				
Harper	0	0	0	171	5	855	105	0	276	855
Beaver	0	0	0	59	5	295	637	150	696	445
Beckham	0	0	0	76	3	228	202	0	278	228
Texas	0	0	0	0	0	0	128	0	128	0
Dewey	0	0	0	12	14	168	105	100	117	268
Alfalfa	0	0	0	0	0	0	114	0	114	0
Grant	0	0	0	0	0	0	13	0	13	0
Cimarron	0	0	0	0	0	0	385	50	385	50
Woods	0	0	0	0	0	0	178	50	178	50
Harmon	0	0	0	0	0	0	69	0	69	0
Jackson	0	0	0	0	0	0	70	0	70	0
Greer	0	0	0	0	0	0	80	0	80	0
Major	0	0	0	0	0	0	30	0	30	0
	158	31	4,980	1,233	6	8,494	2,820	1,440	4,211	14,914

Perc. Area ..... 3.7 Perc. Area .....29.2 Perc. Area 66.9
Perc. Birds .....33.3 Perc. Birds .....56.9 Perc. Birds ..... 9.6 Av. Density 3.5
Density .....31 Density ..... 6 Density 0.5

* Birds per square mile.

were often located at this time, as well as tracks, droppings and other signs.

On the morning of the count the workers arrived on the plot to be checked before sunrise and, as the first sound of gobbling, began driving parallel trips across the plot on each section, depending on the presence of fences. Each ground was accurately placed on a map and the number of cocks counted. Grounds were visited on an average of three times each and observations made with the aid of twenty-power binoculars, which made cocks and hens easily distinguishable. All counts were made from a car, which permitted close examination of the grounds. Notes were kept separately by the two workers and compared at the end of the morning count.

When the results from all of the census plots was at hand the data was projected throughout the entire chicken range for the conditions which the samples represented, and populations calculated. This information is summarized in Table No. X and both present occupied and potential range is listed. The accompanying map diagramatically expresses this same information. Examination of this map shows that 36.8 per cent of the prairie chicken population is inhabiting 10.6 per cent of the total range. This does not include the Davison Ranch area which occupies only 2.3 per cent of the chicken range and supports 23.2 of the population.

MISCELLANEOUS INFORMATION ON GOBBLING GROUNDS

No specific attempt was made to determine gobbling ground requirements of these birds, but some information was accumulated which may be of value. Almost always the cocks of the lesser prairie chicken were found gobbling either on the sparsely vegetated top of low flat and rolling hills or on the broad sides of more pronounced terrain. Hills covered with tall shinnery were not used. Preference was shown to open grass land.

From twenty-six grounds for which data are available, we find that the average distance from water was 0.7 of a mile. From farm dwellings it was 1.3 miles and from cultivated fields it was .95 miles. This indicates that the chicken may be somewhat more tolerant of human presence than is commonly believed, at least regarding gobbling grounds. However, we have no records of this species using gobbling grounds after cultivation, as has been reported for the greater species in northeastern Oklahoma.

Practically all of the open water referred to above is that found in the large circular metal water tanks in pastures. These mills are usually left running and large pools form around the tanks. The overflow is often of sufficient stability as to establish various stages of hydrophytic succession.

In 1933 and 1934 around 400 lesser prairie chicken were netted in Ellis county and moved to other parts of the state. In most cases these birds were liberated in what is considered to be typical greater chicken habitat. In addition, little of the range was in a condition to support chickens in any numbers. The majority of these releases were checked and no evidence found that pointed to survival except upon two areas in western Oklahoma in former lesser range where establishments were made.

LIMITING FACTORS

Already discussed in this report is the influence of human settlement on the lesser prairie chicken habitat. Excessive land use is such a common practice in western Oklahoma and such a variable one that securing of adequate data regarding various degrees of usage is very difficult and involves years of study. On the whole, we believe that the changes in environment due to settlement have created the principal limiting factor. All other important causes of loss discussed below have been greatly influenced by the reduction of food and cover brought about by overgrazing, burning and cultivation.

PREDATION

Only incidental observations were made on predation. Of the damage done by hawks, two species seem primarily responsible. These are the Cooper's hawk and the prairie sharp-skinned hawk. These two species are fast of wing and capable of catching either prairie chicken or quail. It appears that either of these hawks could cause serious losses on coveys of prairie chicken, enough in fact to possibly warrant control locally.

Many time marsh hawks have been observed flying over the gobbling grounds. The birds were flush at once and return shortly, often before the hawk had left the vicinity. At no time has this hawk, or any of the related larger hawks, been observed

attempting to catch a cock on the gobbling grounds.

Crows and ravens are numerous in the lesser prairie chicken range and may do enough damage to warrant control measures. Davison reports the finding of prairie chicken egg remains in the stomachs of three young birds, either crows or ravens. During 1935 when cover was poor, Davison also listed the destruction of many nests by crows or ravens. He suggests location of the nests and then destruction, systematically, of the young and adults, if possible, during the following nesting season.

Coyotes have several times been observed passing a gobbling ground in the early morning without paying any attention to the gobbling cocks, and the cocks likewise gave no heed to the coyotes. Coyotes are very numerous in this region and bear watching as to depredation they may cause during the nesting season. Poultry raisers in this vicinity often lose as much as fifty per cent of their flocks from coyote depredations.

Some snakes are of such abundance as to be important as a predator in destruction of eggs and newly hatched chicks. The bullsnake is particularly common and has, on several occasions, been found to contain in its stomach the remains of young quail and prairie chicken.

Other suspected predators of prairie chicken nests and young are the opossum, skunk and terrapin. Various species of rodents, such as ground squirrel, pack rats, and kangaroo rats, may in some cases be classed as actual predators, but in most cases, are considered as competitors in the prairie chicken habitat.

WEATHER

Drouth has a decided influence in prairie chicken populations by causing a reduction of food and cover. We have no records of addled eggs due to lack of moisture or high temperature, and doubt the importance of loss to this cause.

Heavy summer rains can possibly cause losses among the young birds. The heaviest rains since settlement occurred during the summer of 1941, and many hens were reported to be seen without young, when ordinarily young are usually observed.

BURNING

The use of fire in game management is coming to be recognized as beneficial when controlled. Under light grazing pressure in the chicken territory, burning is undoubtedly of value in the developmnet of game foods, but such a small proportion of this land is moderately used that the use of fire should be discouraged entirely until better land use is practiced. Burning has always been practiced in this region to destroy the old grass, letting the new spring growth be made more readily available for the cattle and also to stop the budding of the shinnery oak species. These buds are reported as being poisonous to cattle. Recent recommendations in range use here favor removing the cattle from shinnery pastures, during the budding season, which results in better grass growth. Also very few of the pastures can stand burning at any time. Davison recommends that burning be delayed until April 10, so as not to interfere with prairie chicken nesting.

ILLEGAL SHOOTING

The extent of illegal shooting is not well known, but there is evidence to indicate that the take from this source may be considerable. Probably the greatest loss occurs during the quail hunting season. Game rangers are unable to patrol the large areas of country here, where there are few roads. Farmers encourage shooting of the prairie chicken in many localities. In fact, some require hunters to shoot the prairie chicken to pay for the quail shooting rights. This is because of the supposed damage the chickens do to the shocked head-feed in the field.

OTHER MORTALITY

Davison says that the greatest loss of birds occurs during the first few weeks of the life of the young birds, which we believe is true regarding all ground nesting birds in this area. There is little evidence to indicate the cause of the loss. However, it might be due to weather, predators or poor range conditions. In any event, under the present cover and food conditions, the loss is probably a natural one and will not be eliminated until better environmental conditions are supplied for the prairie chickens.

We believe that, providing sufficient effort is made and proper cooperation of land use agencies obtained, the lesser prairie chicken can be made to occupy a place in the game picture of western Oklahoma. This statement is made in the face of much difference of opinion as far as the sportsman is concerned.

The program of restoration of this species is coupled with research, education and administration. The first of these—research —should include not only investigation into the life history, requirements and limiting factors of the prairie chicken, but should also check into the means and methods of administering the results of the research on the chicken. It should include studies on disease, predation, requirements of food and cover at all life stages, daily and seasonal limits of movement, effects of grazing and burning on nests, young and adults, and establishment of satisfactory methods of census for various seasons of the year.

Without education of the public, and particularly the landowner who is in daily contact with the prairie chicken on his property, there can be little hope for the recovery for this species in Oklahoma. This education must include the showing to the landowner the value of the prairie chicken to him. There is at hand sufficient information to enable us to start immediately some transplanting of the species from areas of abundance to areas of scarcity. Although this may not result in an immediate pronounced increase in population, it will be invaluable to aiding the natural recovery of the birds throughout their prospective range, and, being a program of definite action, will be more tangible and easily understood by the average critical sportsman. This procedure will serve as education for the sportsman.

All of these requisites for the restoration of lesser prairie chicken were embodied in the program of transplantation and investigation submitted as a Pittman-Robertson project initiated July 1, 1942.

RECOMMENDATIONS

Basic recommendations for the lesser prairie chicken are similar to those made for the greater prairie chicken. They entail research, transplantation and large area refuge management. Needless to say, some progress has already been made toward restocking areas of recovered grass lands by trapping the stock from the areas of capacity populations.

Moderate grass land use outside of lands operated for game production by the state deserves even more emphasis throughout the lesser chicken range than that of the greater. Most of the soils here are light sandy soils surject to severe wind erosion when the protective vegetation covering is removed. Fortunately, larger ranch holders within the lesser prairie chicken range are improving their grazing methods and a considerable amount of range has shown excellent recovery since 1939. Too, land use is progressing gradually toward larger holdings, all of which benefits the prairie chicken.

Plate XLIII—Lesser prairie chicken nest—Ellis county.

MISCELLANEOUS INFORMATION ON PRAIRIE CHICKEN RESTORATION

Information on restocking habitat formerly occupied by prairie chicken, or on stock-

Plate XLIV—Field workers building prairie chicken net used in transplanting of stock.

ing areas outside their natural range, shows the following:

Either greater or lesser chicken, when introduced outside their former range, are not likely to become established. During 1933 and 1934, some 400 lesser prairie chicken were moved from Ellis county to former range of the greater prairie chicken in eastern Oklahoma. Subsequent investigation showed not one instance of survival or establishment.

Better results have been had when stocking within natural range, when plantings are made in lots of fifty or more. Mortality is normally high in this type of work and larger releases insure a greater number of birds to survive.

Techniques, based on Davison's methods, have been worked out permitting trapping of upwards of 200 to 300 lesser prairie chicken a season. However, trapping methods for capturing large numbers of greater prairie chicken have not worked out and there is need of research here.

To date, prairie chickens have not been successfully reared under hatchery methods.

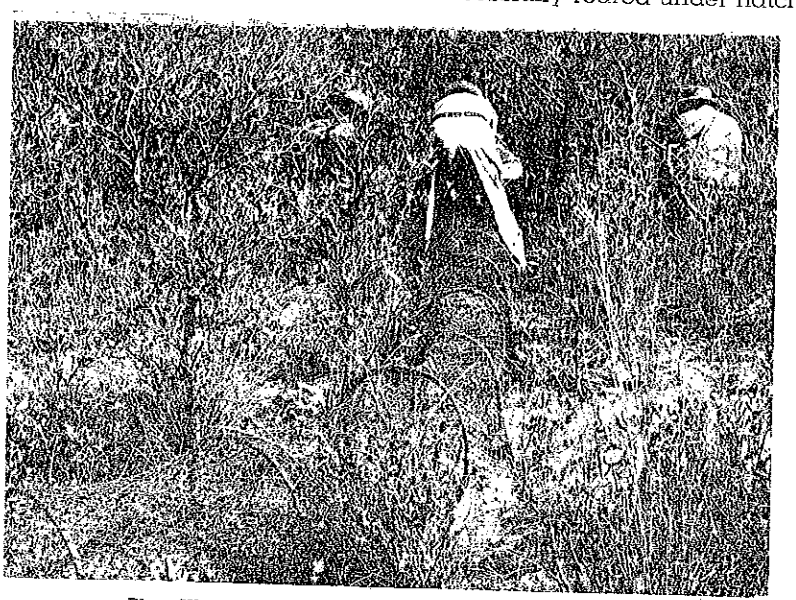

Plate XLV—Setting up net for capture of prairie chicken.

Information is needed on the chemistry of their natural food so these requirements may be duplicated in commercial foods.

Successful stocking with lesser prairie chicken resulted from the work of 1942 and 1943. Some 200 birds were trapped during the summer in Ellis county and released in regions formerly occupied by this species. Recovery of the grass lands from drouth influence permitted a good survival and establishment of this stock in Cimarron, Harper and Woods counties.

more intensive, greater detail is allowed in the treatment with this species. If the present trend of reverting old broken land to grass land pastures continues, western Oklahoma can support around 72,000 birds in the future. A safe hunting take would allow for around 24,000 birds a season on this basis. The greater prairie chicken population for which relative conclusive information is not available, should, with management, come to occupy its northeastern range at an average density of 10 birds per square mile. This

Plate XLVI– Locating prairie chicken broods for netting.

FUTURE FOR PRAIRIE CHICKEN IN OKLAHOMA

It is not expected that future investigations will permit the same restorations treatment of both species of prairie chicken in Oklahoma. However, it is convenient to consider them together as game species.

Neither species by itself will likely ever be able to support an open season because of the limited amount of range they can occupy singly. We can be more hopeful when both species are taken into consideration. The accompanying table (Table XI) shows approximately 27,500 as the population in 1941, of which almost 15,000 were lesser and 12,500 were greater chickens. Since the census with the lesser chicken was would make for a total population of around 49,500 birds, which would allow a hunting take of 16,500 birds a season.

These figures show that the two species must be combined in hunting consideration, since a total take of around 40,500 birds appears to be about the best figures the state can realize. Obviously the sale of special licenses for taking prairie chicken would have to be limited to around 10,000 licenses allowing four birds per hunter. Hunting may be allowed however, when the one-third possible take reaches around half of this number.

Any open season should be closely patrolled by rangers and definite sections designated for hunting, leaving sizable areas closed for protection.

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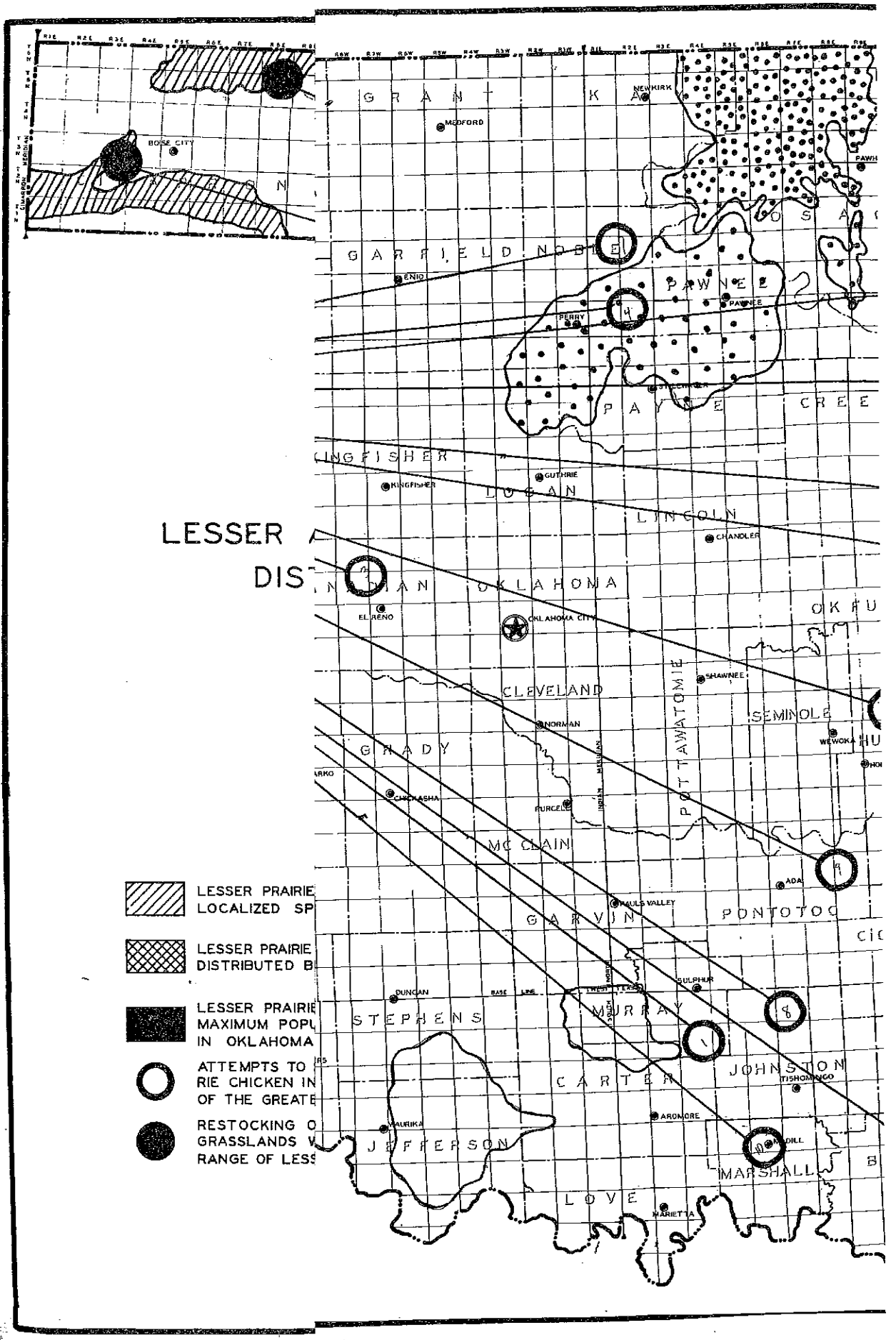

TABLE XI

PRESENT AND POTENTIAL POPULATION FOR PRAIRIE CHICKEN IN OKLAHOMA

Condition of Classification	Number of Birds	Density Birds per sq. mile	Square Miles	Percent of Area	Increase of Density by Management	Total Potential Population
Capacity Populations	4,980	31	158	3.7	31	4,980
Evenly Distributed Populations—low	8,494	6	1,233	29.2	20	24,664
Potential Range	1,440	0.5	2,820	66.9	15	42,300
				Potential Population		71,944
Lesser Chicken	14,914			Allow 1/3 for hunting take—		23,981
					10	
Greater Chicken	12,655	2	4,943	Potential Population		49,430
				Allow 1/3 for hunting take—		16,476
Total Present Population	27,569	Total range 9,154				121,374
Allow 1/3 for Hunting	9,189 or 2,000 licenses at 4 birds each			Total 1/3 take allowable for hunting		40,457 birds or 10,000 licenses at 4 birds each

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— By —

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State of Oklahoma

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