

THE RE-ESTABLISHMENT OF THE WILD TURKEY
IN PAYNE COUNTY, OKLAHOMA

By

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CHAPTER I

INTRODUCTION

The wild turkey (Meleagris gallopavo) was once found in all or part of 39 of the United States, the southeastern portion of Canada, and the northwest portion of Mexico. With the rise of western civilization and man's destructive powers, the range of the wild turkey was reduced rapidly, and in the early 1950's the wild turkey was found in only 1% of its original range (Edminster, 1954). This reduction was brought about by the loss of habitat due to lumbering, agriculture, and market hunting. Some of the states realized the seriousness of the population decline, and began programs for its survival and restoration.

In Oklahoma the wild turkey was once very abundant, being found over the entire state. According to Nice (1931), the original population of wild turkeys in most of Oklahoma was the Eastern subspecies (M. g. silvestris Vieillot). The Rio Grande subspecies (M. g. intermedia Sennett) was found in the southwestern portion of the state, and Merriam's wild turkey (M. g. merriami Nelson) in the northwest tip of the panhandle. As the human population increased wild turkeys decreased, and by 1900 the wild turkey was found only in the inaccessible southeastern portion of the state (Temple, 1945). By 1925, the wild turkey in Oklahoma was said to be virtually extinct.

The state of Oklahoma made many attempts to stop this steady decline in the wild turkey population. The early attempts were the passage of legislation, in 1915, protecting the wild turkey from hunting, and the release of pen-reared wild turkeys throughout the eastern half of the state. These early attempts failed, and the wild turkey population in Oklahoma continued to decline.

In 1948, a program of re-establishment using the Rio Grande wild turkey was begun in western Oklahoma with the release of 21 turkeys obtained from Texas (Williamson, 1966). This program used birds which were trapped from wild stock rather than pen-reared birds. The Rio Grande wild turkey program was successful, and in 18 years has established a population of about 40,000 birds throughout most of the western half of the state (Williamson, 1966).

Experimental releases were made in central Oklahoma from 1959 to 1965 to determine the possibility of the bird becoming established in an area where annual rainfall exceeds 30 inches (Anon., 1963). Payne County was included in these experimental releases. The purpose of this study was to determine: (1) the population fluctuation of the wild turkey in Payne County, Oklahoma since its initial release in 1959; (2) the factors affecting the wild turkey population in Payne County; and (3) the food selection of the wild turkey within the county.

The primary study area was in Payne County, Oklahoma, but included some portions of Logan, Noble, and Pawnee Counties. Field investigations were conducted from December, 1965, to January, 1967, with the exception of the three summer months of 1966.

It was thought that Payne County probably was near the eastern limit of the potential range for the Rio Grande wild turkey, due to the relatively high rainfall and the change in habitat from the bird's original range in Texas. It was questionable whether the turkey would become established in this new habitat. This study shows that under the present conditions, the Rio Grande wild turkey will survive and reproduce in Payne County, Oklahoma.

A preliminary food analysis was conducted during the study utilizing droppings collected from early fall to late spring and a limited number of crop samples.

CHAPTER II

DESCRIPTION OF THE STUDY AREA

The primary study area, Payne County, is located in north-central Oklahoma. It consists of approximately 442,880 acres (692 square miles) with an average elevation of just under 1,000 feet. The major portion of the county drains to the east-southeast into the Cimarron River with the exception of the northern tip, which drains northeast to the Arkansas River (Figure 1).

The County is located in the "cross-timber" region of the state (Duck and Fletcher, 1943) which is predominately rolling plains and small upland areas of nearly level plains (Figure 2). The plains are cut by timbered ravine and creek systems, creating the "cross-timber" pattern. Stands of oak forest dominate the thin-soiled, rocky, upland areas creating "islands" throughout the grassland. Larger upland forests, interspersed with prairie, are found on the light brown Darnell-Stephenville soils.

The lightly grazed and ungrazed prairies are dominated by tall bunch grasses; big bluestem (Andropogon gerardi), little bluestem (A. scoparius), Indian grass (Sorghastrum nutans), and switch grass (Panicum virgatum). When this grass community is disturbed, plant succession is reduced, and other grasses and forbs become abundant. In these areas, three-awn grasses (Aristida spp.), grama grasses (Bouteloua spp.), bent grasses (Agrostis spp.), dropseed grasses

(Sporobolus spp.), quack grass (Agropyron repens), crabgrass (Digitaria spp.), ragweed (Ambrosia spp.), sunflowers (Helianthus spp.), crotons (Croton spp.), and Euphorbia spp. appear.

The upland timbered areas and oak forests are dominated by post oak (Quercus stellata) and blackjack oak (Q. merilandica). Cedars (Juniperus virginiana) are scattered throughout these oak-forest areas. Along the edges, the understory becomes thick with greenbriers (Smilax spp.), buckbrush (Symphoricarpos orbiculatus), grapes (Vitis spp.), and smaller oaks of the dominant species. The understory beneath the canopy is sparse. The ground cover is primarily fallen leaves with larger bunch grasses and panic grasses appearing in the areas which receive more light.

The timbered creeks and river basins are dominated by large cottonwoods (Populus deltoides), pecans (Carya illinoensis), and elms (Ulmus spp.). The understory is composed of smaller trees of the dominant species, cedars, hackberry (Celtis spp.), chinaberry (Sapindus Drummondii), dogwoods (Cornus florida), and redbuds (Cercis canadensis). The ground cover varies from bare ground to dense vegetation of grasses and forbs.

The climatic conditions of Payne County are typical of north-central Oklahoma. The weather data were recorded at the United States Weather Bureau Reporting Station on the campus of Oklahoma State University, Stillwater, Oklahoma, which is centrally located in Payne County. The county has an average annual growing season of 213 days; an average annual temperature of 60.7 F; and an average annual precipitation of 32.35 inches. The average monthly precipitation and temperature since 1894 are given in Table I.

TABLE I
AVERAGE MONTHLY TEMPERATURE AND PRECIPITATION
FOR STILLWATER, OKLAHOMA

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Temperature (°F.)	38	43	50	61	69	77	83	83	74	64	50	41
Precipitation (inches)	1.3	1.4	2.0	3.0	4.6	4.4	3.1	3.0	3.5	2.7	2.0	1.4

According to the Payne County Program Planning and Resource Development Council (Anon., 1959), about 89.2% of the land in Payne County was in farmland in 1959, with the remaining 10.2% being composed of urban areas, roads, and water (Table II).

TABLE II
LAND USES IN PAYNE COUNTY, OKLAHOMA, 1958

Land Use	Acres	Per Cent
Cropland	115,500	26.1
Pasture	4,100	0.9
Range (native grassland)	193,800	43.8
Woodland grazed	81,600	18.4
Other rural lands not in farms	27,400	6.2
Urban built up areas	19,400	4.4
Water	1,000	0.2
	442,800	100.0

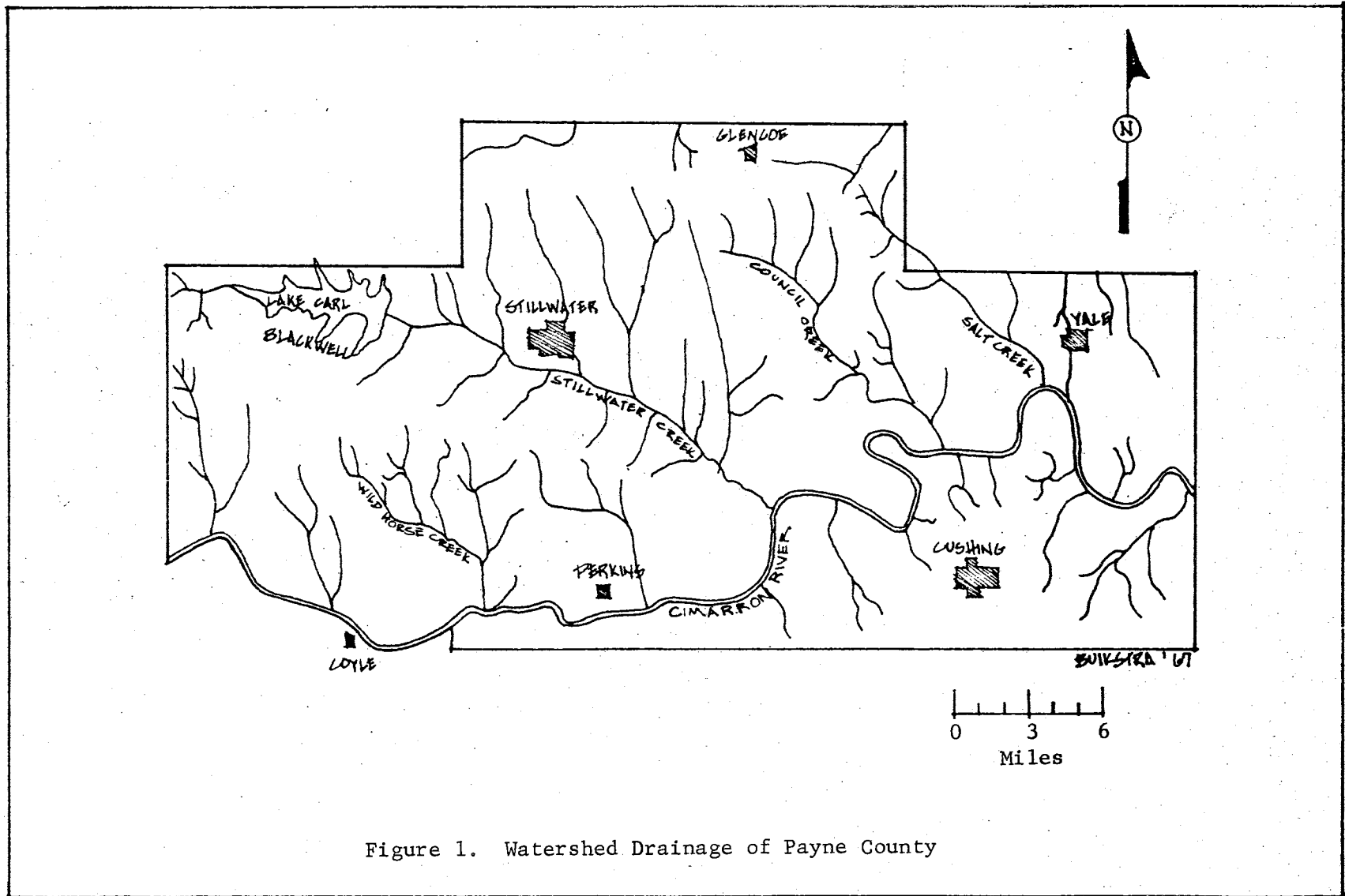


Figure 1. Watershed Drainage of Payne County

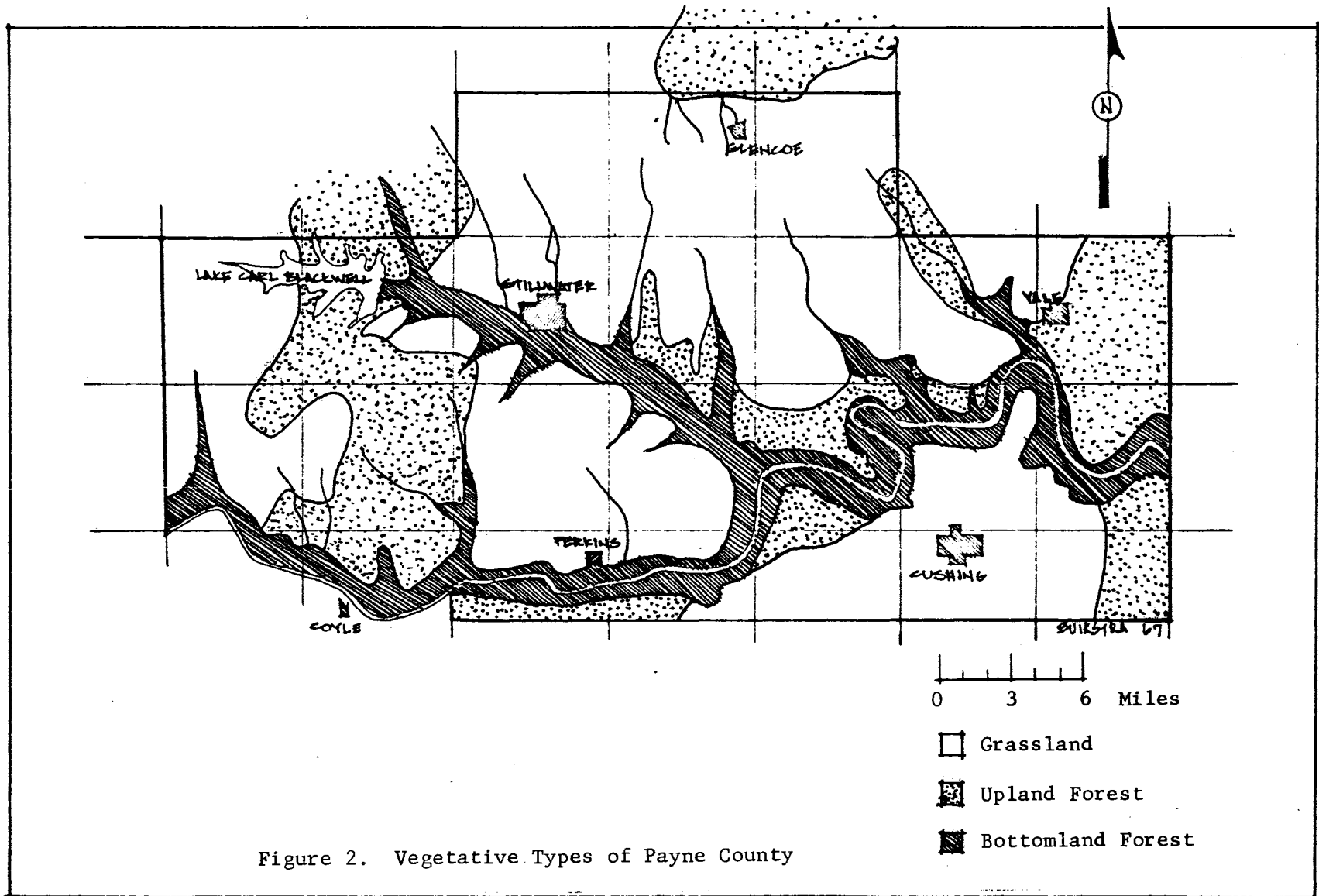


Figure 2. Vegetative Types of Payne County

Pasture for cattle grazing is by far the most important land-use in the county, occupying over 65% of the land area. Cropland comprises about one-fourth of the land-use in the county. Over the last 20 years, cropland has shown a decrease of about 50%, while land used for grazing has increased correspondingly. This trend of land use is expected to continue with a 1,050% increase in improved pasture expected by 1975 (Anon., 1962b).

Wheat is the most important crop raised in the county with about 20,000 acres being harvested annually. Barley, oats and sorghums rank next in importance with about 5,000 acres of each being harvested annually. Cotton, corn, and peanuts are also raised, but not in important quantity.

CHAPTER III

METHODS

Field observations were conducted from December, 1965, to June, 1966, and from September, 1966, to January, 1967. The census was made by personal interviews and by field observations of the flocks (Bailey, et al., 1951; Burger, 1954). The landowners and farmers in the area of the release sites were interviewed to determine the movements of the flocks. With this information the different flocks were located by the use of tracks, droppings, and observations.

All population counts made prior to 1966 were obtained by personal interviews with the local farmers and sportsmen, and from the annual game census made by the local game ranger. Thomas, et al. (1966) found that estimates of this type for wild turkey populations were reliable, being significantly close to the actual counts of the population. The author made the 1966 and 1967 population counts by counting the number of individual birds in each winter flock. Counts were made with the aid of a 7x35 field binocular and a 20 X spotting scope.

Recognition of sex was done by observation with a 20 X spotting scope. The males were distinguished from the females by using size, color, and the presence or absence of a beard as criteria (Latham, 1956).

Data on the foods of the wild turkey were obtained by the examination of droppings which were collected during the months of field

observation. Samples were obtained from all flocks in the county; however, the majority of the droppings were obtained from two large flocks due to their accessibility and ease in collecting. Collections were made from under roosts and in feeding areas.

The analysis of droppings was accomplished by a method similar to one described by Dalke, et al. (1942), in which material is listed according to frequency of occurrence:

- (1) Soak droppings for 24 hours.
- (2) Break material apart to form a pulpy solution.
- (3) Run solution through a filtering funnel to drain, then shift to filter paper to absorb the remaining moisture.
- (4) Separate material and identify it under a binocular microscope. Identify plant material to genus when possible, and identify animal material to the Order.

Turkey crops and measurements of individual weight, spur length, and beard length were obtained from a limited number of birds shot during the spring turkey hunt in mid-April, 1966. The food material was separated and identified under a binocular microscope, as was done in the dropping analysis.

CHAPTER IV

RESULTS AND DISCUSSION

Foods of the Wild Turkey in Payne County

The foods of the wild turkey in Payne County were determined primarily from the examination of 377 droppings collected during the study in the area (Tables III and IV). One hundred thirty-six droppings were collected in the fall from September to December, 1966; the 120 winter droppings were collected from January to March, 1966, and during December of 1966; 121 spring samples were collected from March to June, 1966. Ten crop samples were obtained from males harvested during the spring wild turkey hunt in April, 1966 (Table V). These samples were of limited value because the birds, killed shortly after leaving the roost, had done little feeding and five crops were completely void of food.

A food analysis based on droppings has definite limits as a quantitative measure of food preferences. The relative amounts of the food ingested are not adequately represented by this type of analysis (Dalke, et al., 1942). Due to the high degree of maceration and assimilation of the foods during digestion, many of the ingested items are not identifiable in the dropping samples. Those foods which may be identified do not necessarily appear in the frequency and amounts in which they were ingested. This is especially true of fleshy fruits with only one seed, plants with delicate seed coats, and fragile

animals such as butterflies and moths. The advantage of this type of analysis is that individuals are not removed from the population to obtain the required samples. The resulting data reveal a great variety of the food items and their relative importance in the diet of the wild turkey.

TABLE III

PLANT FOOD ITEMS FOUND IN 377 WILD TURKEY DROPPINGS
LISTED BY FREQUENCY OF OCCURRENCE

Groups	Frequency			Total
	Fall	Winter	Spring	
GRASS-LIKE PLANTS				
Gramineae (Vegetation)	2	63	9	74
<u>Cyperus</u>	30	1	20	51
<u>Panicum</u>	40	3		43
<u>Paspalum</u>	33	8		41
<u>Tridens</u>	31			31
<u>Digitaria</u>	23	1	3	27
<u>Sporobolus</u>	26			26
<u>Sorghum</u>	1	10	1	12
<u>Bromus</u>	7		4	11
<u>Triticum</u>		6	4	10
<u>Muhlenbergia</u>	8			8
<u>Poa</u>	2		3	5
<u>Scirpus</u>	1	3	1	5
<u>Setaria</u>	4			4
<u>Carex</u>			2	2
<u>Eragrostis</u>		2		2
<u>Festuca</u>	1			1
<u>Glyceria</u>		1		1
<u>Hordeum</u>	1			1
<u>Juncus</u>	1			1
<u>Sorghastrum</u>	1			1
FORBS				
<u>Polygonum</u>	3	9		12
Leguminosae (Unknown)	3	5	1	9
<u>Ambrosia</u>	5	2		7
Compositae (Unknown)		3	1	4
<u>Rumex</u>	4			4
<u>Croton</u>	1	2		3
<u>Euphorbia</u>	3			3
<u>Anemone</u>	1	1		2

TABLE III (Continued)

Groups	Frequency			Total
	Fall	Winter	Spring	
<u>Cassia</u>			2	2
<u>Helianthus</u>	1	1		2
<u>Oenothera</u>		2		2
<u>Psoralea</u>	2			2
<u>Bidens</u>	1			1
<u>Desmodium</u>	1			1
<u>Geranium</u>	1			1
<u>Lactuca</u>	1			1
WOODY PLANTS				
<u>Celtis</u>	25	13	6	44
<u>Cornus</u>	23	4	1	28
<u>Quercus</u>	4	14	1	19
<u>Vitis</u>	14	1		15
<u>Smilax</u>	6			6
<u>Rubus</u>			4	4
<u>Carya</u>	3			3
<u>Symphoricarpos</u>		3		3
<u>Parthenocissus</u>	2			2
<u>Prunus</u>			2	2
<u>Rhus</u>		2		2
<u>Juglans</u>	1			1
<u>Pinus</u>			1	1

TABLE IV

ANIMAL FOOD ITEMS FOUND IN 377 WILD TURKEY DROPPINGS
LISTED BY FREQUENCY OF OCCURRENCE

Groups	Frequency			Total
	Fall	Winter	Spring	
Orthoptera	16	2	19	37
Coleoptera	11	1	17	29
Diptera	2		3	5
Hymenoptera	3			3
Larvae		2		2
Hemiptera		1		1
Lepidoptera	1			1

TABLE V
FOOD ITEMS FOUND IN 5 CROP SAMPLES LISTED
BY FREQUENCY OF OCCURRENCE

Group	Frequency
PLANT FOODS	
Graminae (Vegetation)	4
Compositae (Vegetation)	4
<u>Sorghum</u>	4
<u>Triticum</u>	3
<u>Quercus</u>	2
<u>Smilax</u>	2
<u>Bromus</u>	1
Leguminosa (Unknown)	1
<u>Claytonia</u>	1
ANIMAL FOODS	
Coleoptera	1
Hymenoptera	1

The most important food group of the wild turkey in Payne County is the grass-like plants. This agrees with the data of Blakey (1944) who found this to be the most important year-around food for the Rio Grande wild turkey in Texas. This was also shown to be a significant food of the Eastern wild turkey throughout its range (Bennett and English, 1941; Dalke, et al., 1946; Glover and Bailey, 1949; Schemnitz, 1956; and Meanley, 1957). Edminster (1954) pointed out that this food group is of still greater value to the Rio Grande wild turkey in the more western parts of its range.

The grass seeds of Panicum, Paspalum, Tridens, Sporobolus, and Digitaria occurred primarily during the fall months in Payne County. The seeds of Cyperus were also important during this period. Green vegetation made up the bulk of the winter diet. Although these leaves

could not be identified to genus (Dalke, et al., 1942), it is thought that most of them were green winter wheat (Triticum spp.). The wild turkeys were observed feeding almost entirely in the wheat fields during this period of the year. In spring the green leaves of new plants were abundant in the samples collected, and the seeds of Cyperus were again found in large amounts. Increased utilization of new green vegetation was also shown by the crop samples obtained during this period.

Woody plants were of primary importance during the fall and winter months. Celtis, Cornus, Vitis, and Quercus were the principal genera utilized. Acorns, which are a valuable winter food item of the wild turkey in much of its range (Bennett and English, 1941; Dalke, et al., 1946; Bailey, et al., 1951; Arner, 1954; Meanley, 1957), were not important in the diet of the wild turkey in Payne County. During the two winters of collection mast production in Payne County was very poor, the majority of acorns produced being wormy. The low availability of mast probably influenced the frequency of occurrence of Quercus in the samples.

Forbs were not abundant in dropping samples; however, the flowers of early-blooming Compositae appeared frequently in crop samples. Dalke, et al., (1942) and Bailey, et al., (1951) found that forbs were insignificant in the wild turkey's diet. Meanley (1957) found Polygonum, a forb occurring with the highest frequency in the samples from Payne County, to be important to the wild turkey in Arkansas.

The animal material in the dropping samples fluctuated with the availability of insects, being high in the spring and fall, and low

during the winter months. Coleoptera (beetles) and Orthoptera (grasshoppers and crickets) were the most abundant groups found. Lepidopterans (butterflies and moths) were eaten in relatively large amounts in the fall of the year; however, they were not recognized in any droppings.

The food list for Payne County is incomplete due to the small sample size obtained and the reliance on droppings rather than crops. However, the list does give an indication of the more important food groups of the wild turkey in the area and some of the items within these groups.

Population Variations

Surviving early residents of Payne County can recall finding wild turkeys in wooded areas within the county about 70 years ago. After more than 50 years of extinction, the wild turkey was returned to Payne County in 1959 through the experimental-release program of the Oklahoma Department of Wildlife Conservation. Both the Eastern and Rio Grande varieties of wild turkey have been utilized in these releases. Although the original population of wild turkey in Payne County belonged to the Eastern variety, it has received less attention than the Rio Grande wild turkey in the re-establishment program because the latter variety has been established so successfully in the western counties of Oklahoma.

Data on wild turkey releases in Payne County were obtained from records of the Oklahoma Department of Wildlife Conservation.

The Eastern Wild Turkey

A total of 38 pen-reared Eastern wild turkeys were released at three different sites during the two years of experimental stocking in Payne County (Table VI, Figure 3). These releases were made in an effort to establish a flock of "wild" Eastern turkeys (Anon., 1962a; Anon., 1963). This wild population was to be utilized later as a foundation flock in a live-trapping and transplanting program as has been conducted with the Rio Grande variety in western Oklahoma.

Release 1. In the fall of 1963, seven males and seven females were released in an area dominated by prairie, with timbered ravine systems crossing it (Sec 18 T19N R5E). After their release, the birds moved south to the Cimarron River bottomland (Figure 4) and ranged throughout the heavy timber. Residents along the river reported occasional sightings of four or five turkeys ranging in the area for a short time after the release. These reports diminished with time, and in the 1966-1967 census none of the wild turkeys could be located.

Release 2. Six males and four females were released in the fall of 1963 (Sec 25 T20N R4E) 5 miles north of the first release site. The release site was in cross-timber prairie west of the forested area of the upper Salt Creek drainage. After their release, the birds moved east into this forested area (Figure 4) and were seldom seen thereafter.

In the winter of 1965-66, the population was estimated to be about 8-12 birds. Because the Eastern wild turkey is so secretive and difficult to census by the method used for the Rio Grande wild turkey (James and Preston, 1959), only an estimate was made and an accurate

TABLE VI
SUMMARY OF EASTERN WILD TURKEY RELEASES

Release No.	County	Date	Number Males	Number Females	Location
1.	Payne	10/63	7	7	Sec 18 T19N R5E
2.	Payne	10/63	6	4	Sec 25 T20N R4E
3.	Payne	10/64	7	7	Sec 1 T19N R4E

TABLE VII
SUMMARY OF RIO GRANDE WILD TURKEY RELEASES

Release No.	County	Date	Number Males	Number Females	Location
1.	Payne	12/59	7	7	Sec 6 T17N R1E
2.	Noble	1/63	2	2	Sec 24 T20N R1E
3.	Payne	1/63	3	4	Sec 3 T20N R3E
4.	Payne	1/63	3	4	Sec 25 T20N R3E
5.	Payne	12/63	1	4	Sec 26 T19N R4E
6.	Payne	2/64	2	4	Sec 4 T19N R1E
7.	Payne	2/64	2	4	Sec 19 T19N R1E
8.	Payne	2/64	1	0	Sec 7 T20N R2E
9.	Payne	1/65	2	4	Sec 33 T19N R3E

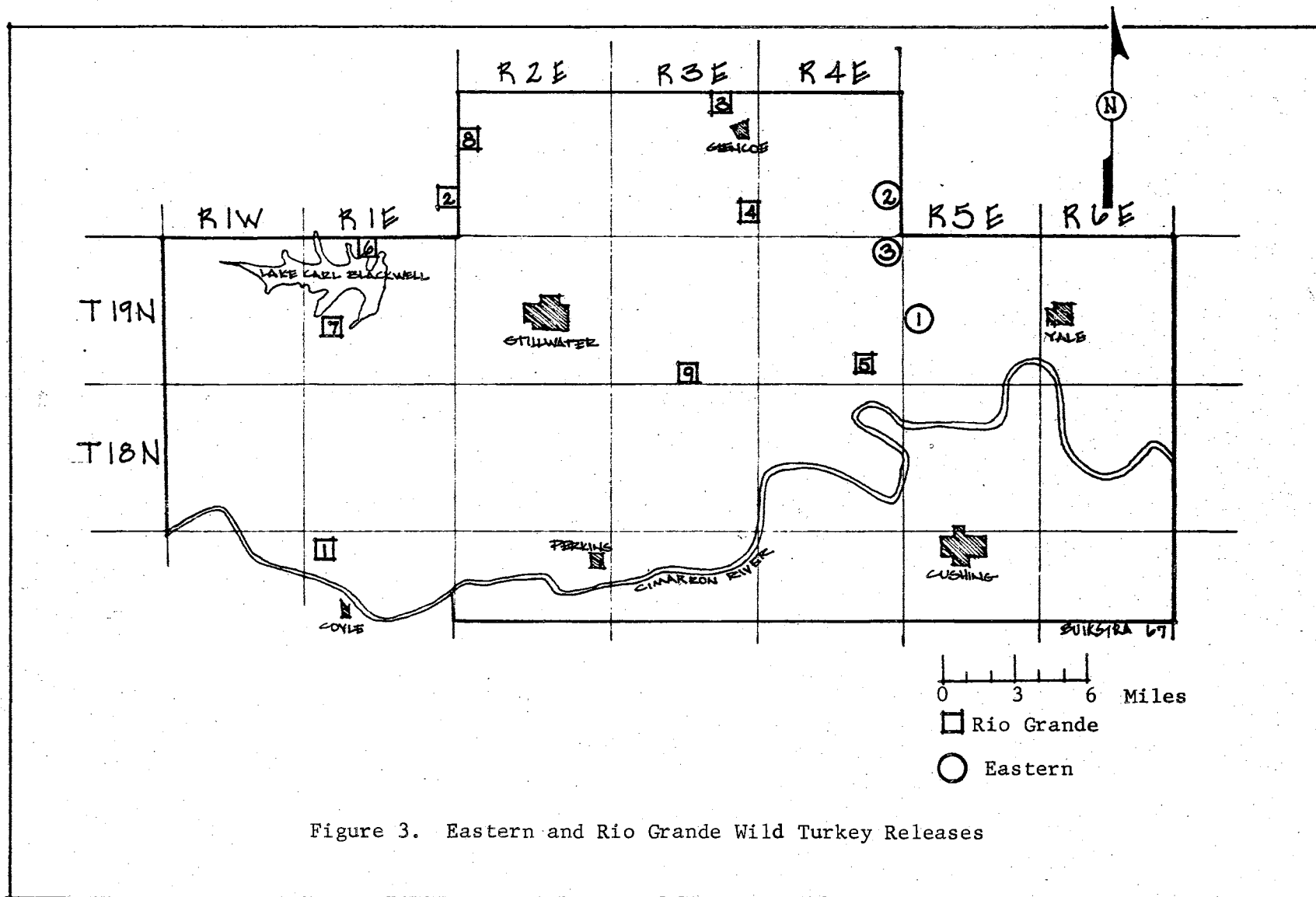


Figure 3. Eastern and Rio Grande Wild Turkey Releases

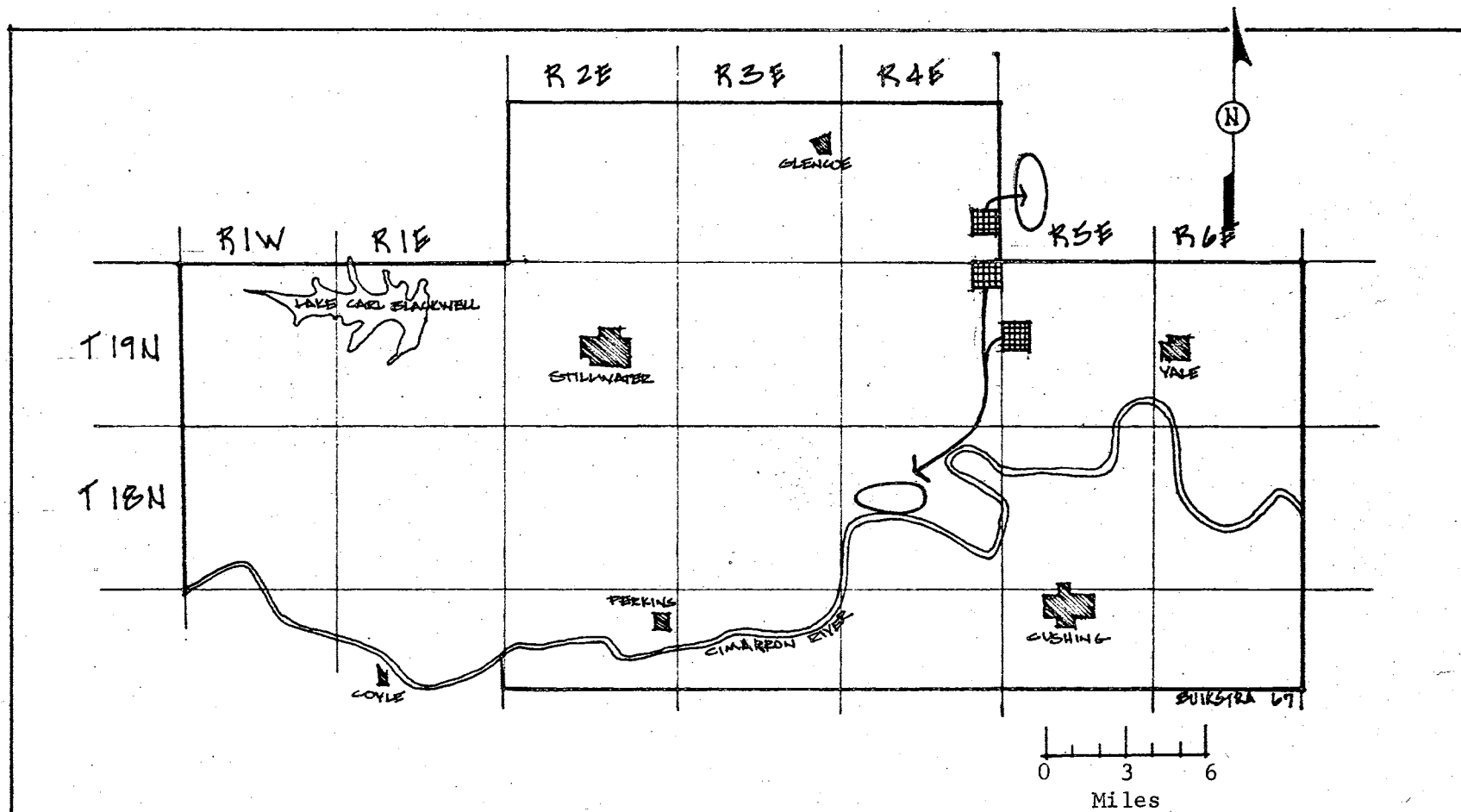


Figure 4. Eastern Wild Turkey Movements

count of the population was not obtained. In the 1966-67 census the flock was not located.

Release 3. In the fall of 1964, 14 birds were released in an area dominated by prairie (Sec 1 T19N R4E). This flock moved south to the Cimarron River as did the first one released (Figure 4).

The only birds located along the Cimarron River in the winter of 1965-1966 were seven turkeys north of Ripley, Oklahoma (Sec 16 T18N R4E), which were being fed by one of the landowners. These birds are presumed to be the survivors of the first and third Eastern turkey releases, which were last known to be ranging along the Cimarron River. In January, 1966, two of these birds disappeared. Since the 1967 spring breeding season none of the turkeys has been located, and they are presumed to have been exterminated.

The experimental program for the Eastern wild turkey was not successful in Payne County. The turkey flocks were not able to establish themselves. In the 1966-1967 census, no Eastern turkeys were found in Payne County or in the upper Salt Creek area of Pawnee County.

The Rio Grande Wild Turkey

Although the first Rio Grande wild turkey release was made in late 1959, it was not until 1963 that the program of re-establishment became significant. A total of 56 wild turkeys have been released in nine locations in the Payne County area (Table VII, Figure 3). The population variations of these flocks are shown in Table VIII, and Figure 5, and their locations on Figure 6 and Figure 7.

Release 1. In 1959 the first attempt was made to re-establish the wild turkey in Payne County. Seven males and seven females were released north of Coyle, Oklahoma (Sec 6 T17N R1E) along the Cimarron River. The habitat type of the release area is predominantly rough, bottomland forest, being crossed by numerous ravine systems. This flock, according to the local residents, reached a population of about 30 birds early in 1962.

In the spring of 1962, the flock moved south 5 to 10 miles into Logan County into a higher area dominated by prairie and post oak-blackjack oak forests. They have remained in Logan County and have not returned to the original release area.

Release 2. Two males and two females were released on the Payne County-Noble County line (Sec 24 T20N R1E) early in 1963. The vegetation is dominated by post oak-blackjack oak forest with grassland well distributed throughout. The flock reached a population of about 100 individuals in the 1966-1967 census.

An additional flock was located in an area of prairie and upland forest 3 miles south of the original site of Release No. 2 during the 1966-1967 census. It is presumed that this new flock originated from individuals of Release No. 2, and from their reproduction in the summer of 1966. About 67 wild turkeys were located in the wintering area of the original flock and 33 in the new flock. The estimated population of Flock No. 2, 100 individuals (Table VIII), is the combined total of these two groups.

Release 3. This release was also made on the Payne County-Noble County line (Sec 3 T20N R3E) early in 1963. Three males and four females were released. The release site was originally dominated by

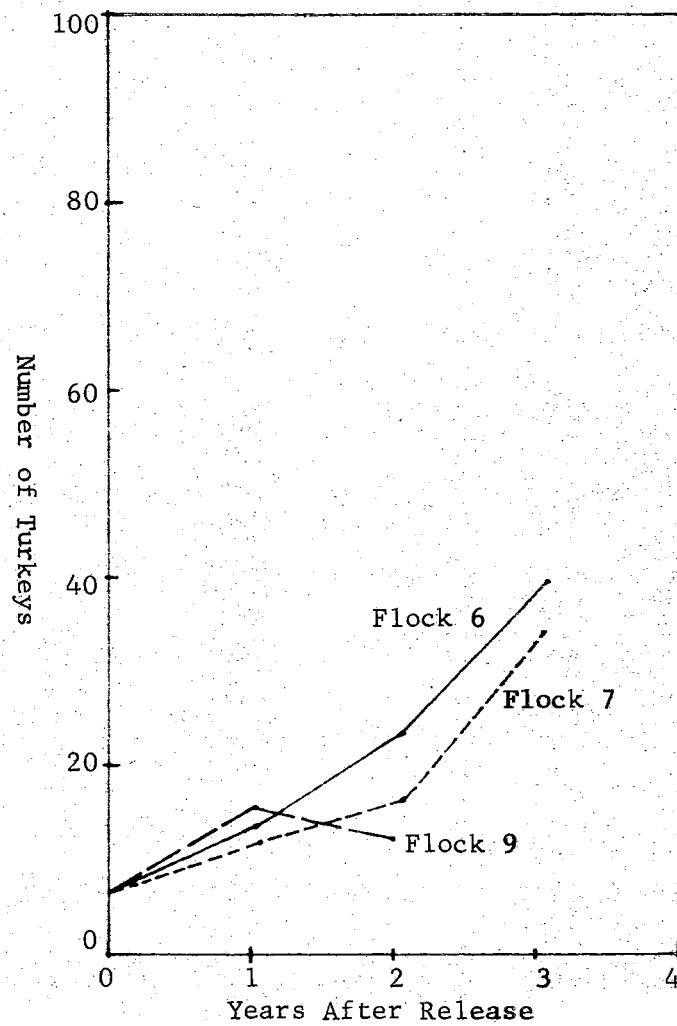
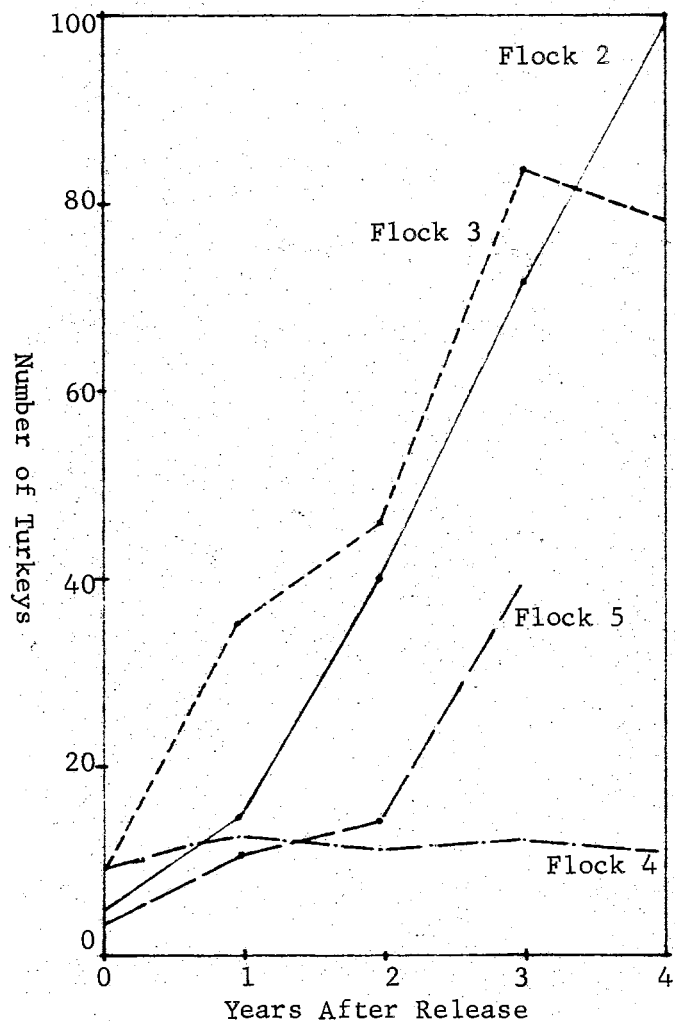


Figure 5. Graphic Presentation of the Changes in Winter Flock Size over a Four-Year Period

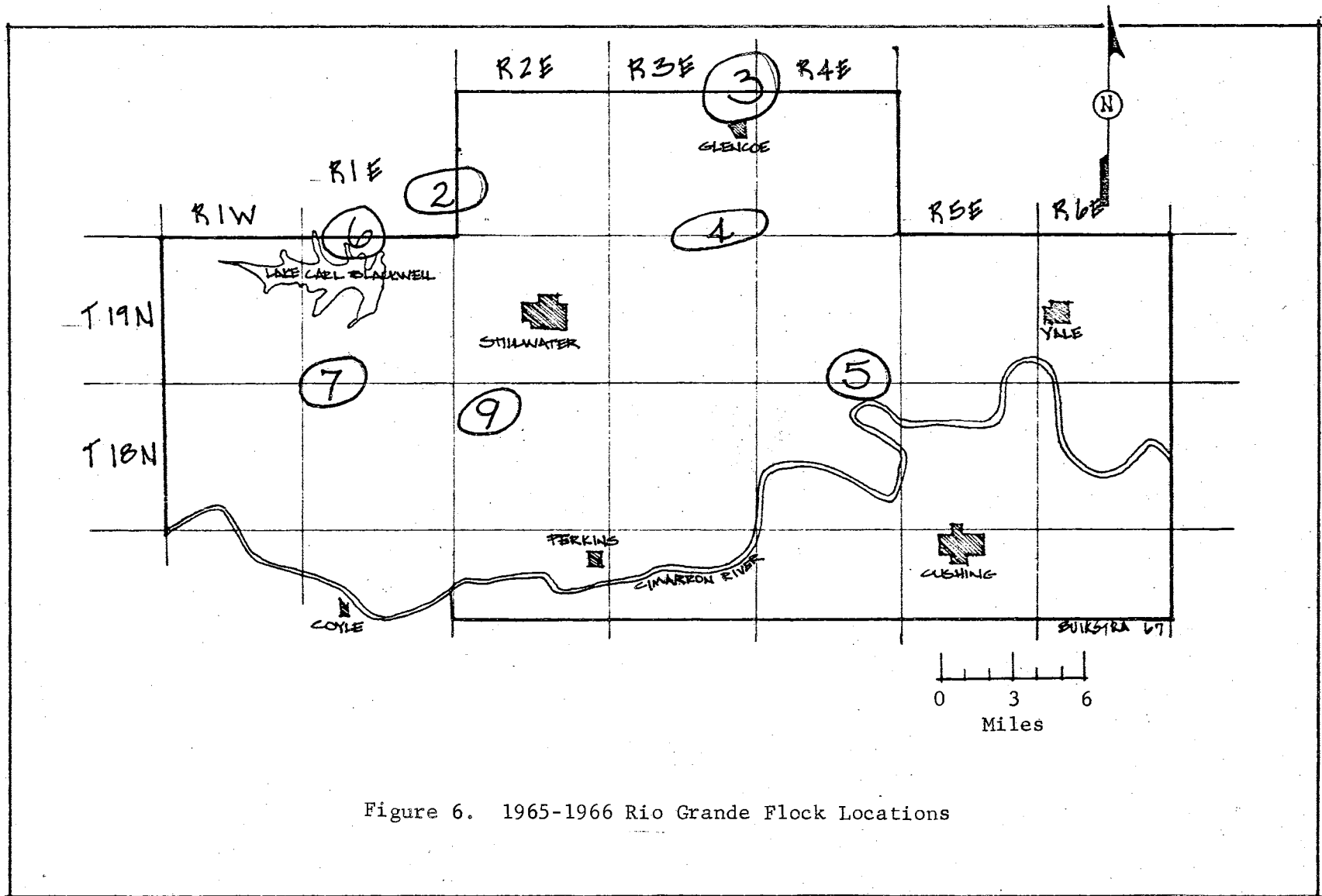


Figure 6. 1965-1966 Rio Grande Flock Locations

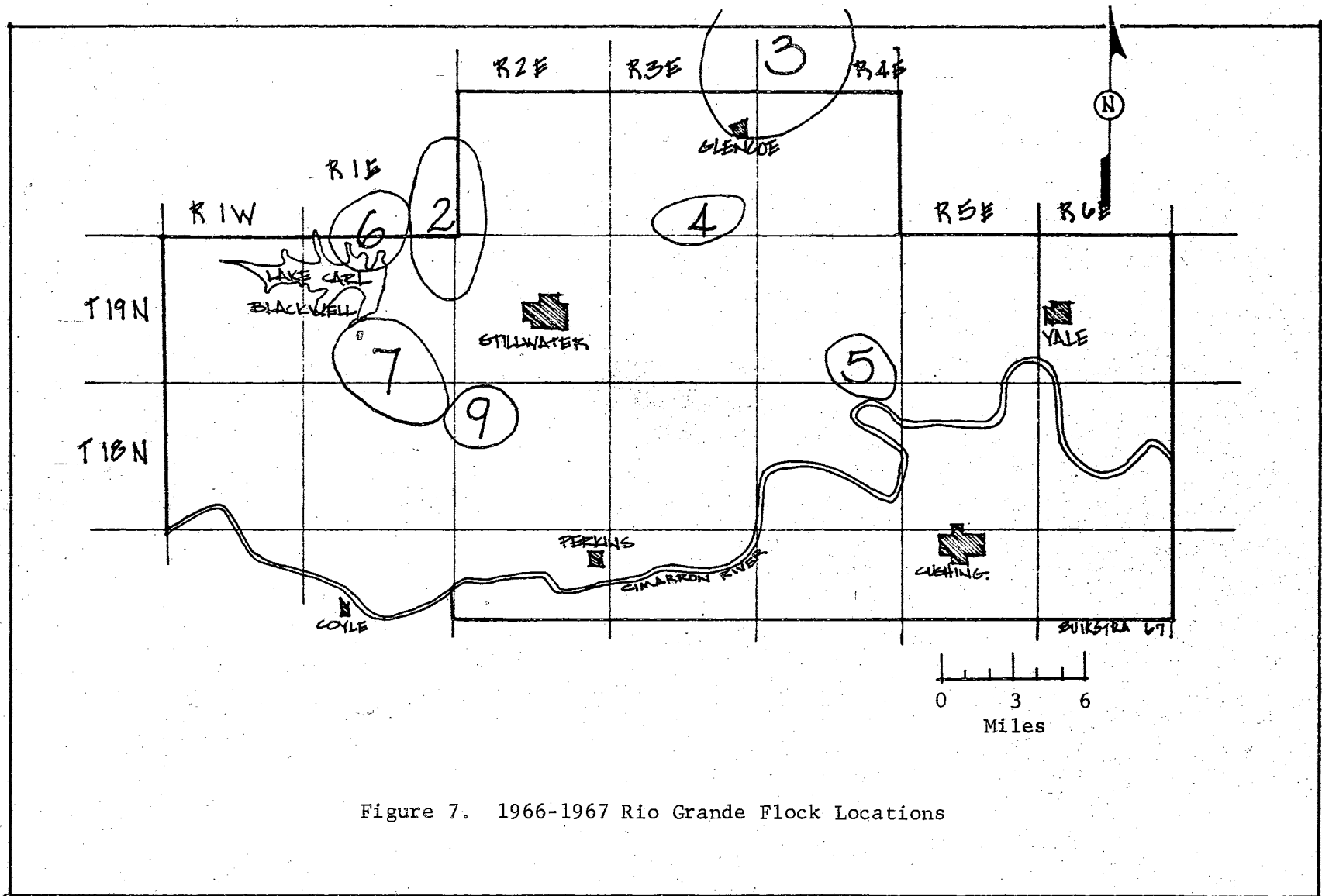


Figure 7. 1966-1967 Rio Grande Flock Locations

mixed prairie and forest, similar to that of Release Site No. 2, but in 1964 some landowners in Payne County began removing upland forest to increase the amount of grassland. By late in 1966 the Payne County area had been cleared of forest and converted to grass. After this modification of the habitat, the flock shifted northward into adjoining forested portions of Noble County.

TABLE VIII

SUMMARY OF WINTER CENSUS INFORMATION FOR THE RIO GRANDE
WILD TURKEY FLOCKS RELEASED IN PAYNE COUNTY

Flock Number	1959- 1960	1960- 1961	1961- 1962	1962- 1963	1963- 1964	1964- 1965	1965- 1966	1966- 1967
1.	14	26	30	-	-	-	-	-
2.				4	15	40	71	100
3.				7	36	45	83	77
4.				6	13	15	12	10
5.					5	11	17	39
6.					6	14	25	41
7.					6	12	17	35
8.					1	-	-	-
9.						6	16	12
Total	14	26	30	17	82	143	241	314

This flock did exceptionally well and increased to a population of 83 birds in the winter of 1965-1966. During the spring turkey hunt of 1966, 37 of the 83 individuals (44.6% of the population) were

harvested (Table XI). The 1966-1967 census revealed a reduction in the population; only 77 birds were found in the wintering flock.

Release 4. This group of three males and four females, released in early 1963, was placed in a habitat type of prairie interspersed with upland forest (Sec 25 T20N R3E). The upland forest has been completely removed since 1963, and prairie grasses have become the dominant vegetation of the area.

The future of this flock is questionable. It attained a population of 15 individuals after two breeding seasons. Since then, however, the population has shown a steady decline. The majority of the individuals are adults of two years or more in age, which indicates poor reproductive success in 1965 and 1966.

Release 5. Late in 1963, five birds, one male and four females, were released in the central portion of the county (Sec 16 T19N R4E) in an area of varied vegetative types. Numerous creeks and ravines cross this portion of the county creating a rough topography. Islands of upland forest dominate the crests of the hills and prairie dominates the slopes between the upland forest and the bottomland. The flood plains of the area are almost entirely cultivated and planted either to winter wheat or alfalfa.

Since the release in 1963, the flock has shown a steady increase, attaining a population of 39 individuals by the time of the 1966-1967 census. In each winter census, the number of birds within the flock has approximately doubled. Although the rate of increase is slower than that of Flocks No. 2 and No. 3 (Table IX), it is sufficiently high to indicate the successful establishment of the wild turkey in the area.

TABLE IX

ANNUAL RATES OF INCREASE OR DECREASE IN THE SIZE OF WINTER FLOCKS
OF RIO GRANDE TURKEYS RELEASED IN PAYNE COUNTY

Flock No.	Release No.	1 Year		2 Years		3 Years		4 Years	
		Number	Rate of Change	Number	Rate of Change	Number	Rate of Change	Number	Rate of Change
2.	4	15	275%	40	167%	71	78%	100	41%
3.	7	36	414%	45	25%	83	84%	77	- 7%
4.	7	13	86%	15	15%	12	-20%	10	-17%
5.	5	11	120%	17	55%	39	129%	-	-
6.	6	14	133%	25	79%	41	64%	-	-
7.	6	12	100%	17	42%	35	106%	-	-
9.	6	16	167%	12	-25%	-	-	-	-
Average		16.9	185%	24.4	51%	46.8	74%	62.3	6%

Release 6. This release of two males and four females was made on the north side of Lake Carl Blackwell (Sec 4 T19N R1E) early in 1964. The habitat type is predominantly upland forest and prairie. In all other habitats in which releases were made some fields of small grain occur. However, in this area the land is used for live-stock production, and no crops are raised.

The flock has become established, having made a steady increase in numbers similar to that of Flock No. 5 (Table IX). In the 1966-1967 census, the population count in the area was 41 individuals. These birds were dispersed in four small groups over an area of about 5,800 acres. The individual groups showed daily fluctuation in numbers, indicating a mixing among the groups; however, the combined count for the area remained constant throughout the census. This combined total was used as the population size of Flock No. 6 in the 1966-1967 census (Table VIII).

Release 7. Two males and four females were released on the south side of Lake Carl Blackwell (Sec 19 T19N R1E) simultaneously with Release No. 6. The habitat of this area is typical post oak-blackjack oak forest mixed with prairie. The flock has established its range close to the release area and has shown a steady increase in numbers.

Portions of the range of this flock are greatly disturbed by human activity. The shoreline of the lake is utilized for recreational purposes, and two state highways pass through the middle of it. Even with this human disturbance in the area, the flock has shown no tendency to move away, and has remained relatively unnoticed by the people using the area.

Release 8. This release consisted of one male bird put into an area which had females present but apparently no male (Sec 7 T19N R2E). The result of this release is not known as no new flocks occurred. These birds possibly became a part of Release No. 2, located 2 miles to the south.

Release 9. This group of two males and four females was released early in 1965 in an area along Stillwater Creek dominated by bottomland forest (Sec 33 T19N R3E). A large amount of the flood plain in this area contains winter wheat and alfalfa.

The flock remained in the area of its release during the summer of 1965. Reproduction was successful, for a number of hens were seen with young, and a population of 14 birds was estimated by the landowners late in the summer of 1965. In the fall and early winter of 1965, the turkeys disappeared from this area and have not been seen there since.

In the late winter of 1965-1966, a new flock was located 7 miles west of the site of Release No. 9 (Sec 30 T19N R2E). It is presumed that this flock was composed of birds from Release No. 9 which had moved to a new area. This second site is dominated by mixed post oak-blackjack oak forest and prairie.

The prospects for the survival of this wild turkey flock are not good. In the 1965-1966 census the flock contained 16 birds. During the 1966 spring hunting season, at least seven turkeys were removed from this flock (Table XI). The 1966-1967 census revealed only 12 individuals. Only three young birds were produced in the summer of 1966.

TABLE X
 SUMMARY OF SEX COMPOSITION OF WINTER FLOCKS
 OF RIO GRANDE WILD TURKEYS IN PAYNE COUNTY

Flock No.	1965-1966		1966-1967	
	Male	Female	Male	Female
2.	37	34	48	52
3.	39	44	18	59
4.	5	7	3	7
5.	7	10	17	22
6.	15	10	18	23
7.	8	9	17	18
9.	7	9	3	9
Total	118	123	124	190

TABLE XI
 ESTIMATED HARVEST DURING THE FIRST OPEN SEASON
 ON MALES IN THE SPRING OF 1966

Flock No.	Males	Females	Pop. Remaining
2.	7	0	64
3.	35	2	46
4.	0	0	12
5.	2	0	15
6.	2	0	23
7.	0	0	17
9.	5	2	9
Total	51	4	186

Of the nine releases of Rio Grande wild turkeys, six have resulted in the establishment of wild populations. One of these releases (No. 1) has established a flock in Logan County, and five in Payne County. The success of the other two releases, No. 4 and No. 9, is in doubt at this time, due to low population size and apparent lack of reproduction.

Birds ranging from one to three years in age were collected in the spring hunt of 1966. The individual birds appeared to be in good physical condition. The weight, beard length, and spur length for the harvested birds are presented in Table XII. These turkeys were harvested from Flock No. 3. Other birds taken from Flocks No. 2 and No. 9 showed about the same condition, but no measurements were taken of these birds.

The Rio Grande wild turkey re-establishment program in Payne County has been very successful. The 42 wild turkeys released since 1963 have increased to a total population of 314 individuals in 4 years, plus a harvest of 55 turkeys which was taken in the spring of 1966. This rate of population increase is not as rapid as that of western Oklahoma (Anon., 1962a), however, it is sufficient to indicate the successful re-establishment of the wild turkey in Payne County, Oklahoma.

Factors Affecting Wild Turkey Populations

The wild turkey was reintroduced into Payne County in an experimental program to determine the feasibility of re-establishing the species throughout central Oklahoma. The success of these transplants depended upon the ability of the birds to adjust to the environment of

TABLE XII

WEIGHTS AND MEASUREMENTS FROM TEN MALE TURKEYS
 SHOT DURING THE SPRING OF 1966 FROM
 FLOCK NO. 3 IN PAYNE COUNTY

Sex	Weight (lbs.)	Beard Length (in.)	Spur Length (in.)
M	23	9	1
M	22	4½	½
M	19	4	½
M	17	3½	3/8
M	16½	4	3/8
M	16	3	¼
M	15½	3	¼
M	15	3½	¼
M	14	2	¼
M	12	2	¼

their new habitat, and to overcome the factors in the area which might limit their survival. The Rio Grande wild turkey was able to adjust to the present conditions in the county and became established, while the Eastern wild turkey, originally indigenous to the area, seemed to be unable to make these adjustments and disappeared.

Numerous factors which determine the success or failure of adaptation by wild turkey populations are listed in the literature. Some of these factors have influenced the wild turkey transplants in Payne County and will affect their future existence in the area. For convenience, these factors have been grouped into three main types: Habitat, Human, and Climate (Table XIII).

TABLE XIII
FACTORS AFFECTING WILD TURKEY POPULATIONS IN PAYNE COUNTY

Habitat Factors	Human Factors	Climate Factors
Foods	Agriculture	Precipitation
Predation	Land Clearing	
Habitat Type	Domestication of Wild Flocks	
Roost Trees	Hunting	

Habitat Factors

Foods. The wild turkey utilizes a great variety of foods. Throughout its entire range, an adequate food supply is seldom a problem except during the late winter months. It has been shown, however, that the wild turkey can survive long periods of severe weather and food shortage (Bailey, 1955). The food requirements of

the wild turkey during such periods determines the size and daily movement of the winter flocks. Blakey (1944) and Bailey (1955) found that losses due to starvation during this period were not serious.

There have been no losses due to starvation reported in the Payne County area. Wintering flocks of wild turkeys remain relatively constant in size throughout this critical period, and the individual birds appear to remain in good physical condition. Winter wheat, the basic food of the wild turkey during this period, is well distributed throughout the county and is readily available to the wild turkey flocks.

Predation. The adult wild turkey has few enemies, and predation is normally not a serious limiting factor. The Rio Grande wild turkey has maintained stable wintering populations, therefore predation in the winter could not be a serious mortality factor. The Eastern wild turkey, however, appears to be more susceptible to predation, as four losses were reported shortly after their release in 1963 and 1964.

Predation upon the nest and young is a serious factor in areas of insufficient cover (Walker, 1954; Ramsey, 1958; Anon., 1960). Weston (1952) found a 50% loss of nests due to predation in areas where cover was depleted by overgrazing. In Payne County protective cover is abundant in the ecotone areas of the prairie and woodland. Predation does occur in Payne County, but due to the sufficient cover and relatively constant winter flock sizes, it does not seem to be of sufficient importance to be classified as a limiting factor.

Habitat Type. Throughout its range, the wild turkey is found in a great diversity of habitat types. The Eastern race prefers a forested area of 50% timber (Schorger, 1966), open understory and abundant water

(Dalke et al., 1946; Edminster, 1954), while the Rio Grande uses the more open habitat interspersed with forest (Goodrum, 1941; Walker, 1951; Kimsey, 1955). Steele (1959) found the sandy areas along the streams and rivers in northwestern Oklahoma to be the preferred habitat for the Rio Grande turkeys of the area.

The wild turkey's choice of habitat was demonstrated by the birds released in Payne County. All birds in the three releases of Eastern wild turkeys moved from the "cross-timber" prairie of the release site into the bottomland forest areas of the Cimarron River and Upper Salt Creek (Figure 4). The birds of the two releases of Rio Grande wild turkeys made in the bottomland areas (No. 1 and No. 9) left these locations and became established in upland forested areas.

Suitable habitat for the wild turkey in Payne County does not appear to be limiting at this time. However, due to this difference in the preferred habitat from that of western Oklahoma, further investigation is required to aid in the selection of release sites and to determine the potential range of the turkey eastward from its previous distribution.

Roost Trees. The presence of roost trees is an important factor in the selection of suitable release sites for the wild turkey (Glazener, 1947; Anon., 1963). Because the wild turkey is found roosting in the larger trees in western Oklahoma (cottonwoods), the presence of these large trees is considered an important condition in the selection of good release sites in Oklahoma.

In Payne County, the wild turkeys did not use large trees for roosts. All roosts were located in smaller, more bushy trees (chinnaberry, hackberry, and elm) along ravines. Larger trees (cottonwoods

and pecans) were present in the roost areas, but the birds did not use them for roosts. For this reason, the presence of large trees for roosting is not considered an important factor in the selection of release sites in Payne County.

Human Factors

Agriculture. ^① Agriculture has been one of the major causes of the decline of the wild turkeys throughout the United States (Bailey, 1947; Edminster, 1954). Clearing and cultivating has eliminated much of the birds' original habitat. ^② Overgrazing by livestock has also depleted wild turkey habitat in many areas. This caused a reduction of food and cover, and increased the effect of predation (Walker, 1954; Glazener, 1963).

In Payne County, these practices seem not to limit the wild turkey at the present time, but have aided in the survival of the reintroduced birds. The principal cultivated crop of the county is wheat, which is the basic food of the wild turkey during the critical winter months. Overgrazing is not a problem in this part of Oklahoma and livestock are not considered detrimental.

Land Clearing. The practice of clear cutting is another major cause for the reduction of the wild turkey in the United States. The complete removal of the upland forests is now reducing the available habitat for the wild turkey in Payne County. This procedure is being used to increase the amount of grassland available for grazing, rather than for timber harvesting.

In 1959, an estimated 81,633 acres of woodland, both upland forest and bottomland forest, were present within the county (Anon., 1965).

According to this program, by 1975 over 50% of this area, primarily the upland forest, will have been completely cleared and prairie grassland will be the dominant vegetative type. These large blocks of uniform grassland are very poor habitat for the wild turkey (Walker, 1951) and the remaining bottomland forest is not the preferred habitat type of the Rio Grande wild turkey in Payne County. This land use will cause a loss of the majority of the wild turkey's preferred habitat, of which only a small portion probably will remain in the county by 1975.

Domestication of Wild Flocks. There has been much controversy over the loss of "inherent wildness" in pen-reared wild turkeys and their ability to establish themselves successfully in the wild (Leopold, 1944; Dalke et al., 1946; Latham, 1956). To be successful in establishing themselves,

"... the reared birds must be of a type that can successfully make the change from penned to wild living; they must also be wild in character as well as in name. After liberation they either succumb to some predator, or else find their way to the nearest barnyard" (Dalke, et al., 1946).

This factor appears to be present in the pen-reared wild turkeys in Oklahoma (Anon., 1962; Wint, 1964), but does not affect the wild-trapped Rio Grande variety which has had only limited contact with man. Shortly after the release of the birds of the Eastern race in Payne County, four carcasses were found. This suggests susceptibility to predation, but the actual cause of death is unknown.

Hunting. The harvest of individuals is a sound practice as long as the take is confined to the surplus of the population. However, when there is no surplus present or when the take exceeds the surplus, the harvest becomes unsound. A spring season, in which only males are harvested, has been shown to be feasible in areas with a high turkey

population (Frye, 1957; Colin, 1961; Lewis, 1961; Thomas et al., 1966), but in areas with a low population, the spring season has produced a depletion of males within the flocks and has resulted in reduced reproductive success (Goodrum, 1941).

The wild turkey requires a period of complete protection after release for the flock to grow to the carrying capacity of the area (Blakey, 1937; Glazener, 1947). The time required to reach carrying capacity and a harvestable surplus depends upon the reproductive rate and the survival rate of the population in question. In Texas, Glazener (1963) found that a minimum of 5 years of protection was essential for the successful establishment of a flock. Successful re-establishment of the wild turkey in Missouri required an extended period (Blakey, 1937). In western Oklahoma, the flocks were allowed over 5 years of complete protection.

In the spring of 1966, Payne County was permitted its first turkey hunting season after only 3 years of protection. Since their release, the flocks have continued to increase in size each year and maintain the winter populations during the critical months, experiencing no losses to natural factors. This continued increase suggests that the wild turkey flocks had not produced a population equivalent to the carrying capacity of the area during the initial 3 years (Fig. 1).

Although a minimum of protection was found to be necessary for the successful establishment of released flocks, releases made after 1966 have not received any protection from the threat of legal harvest. These new releases should be given a minimum of at least 2 years' protection from hunting in order to establish a population of sufficient size to contain a surplus of individuals. In this time a surplus of

males could exist which might be harvested with no harm to the reproductive success of the population.

Climatic Factors

Of the climatic conditions, rainfall is the most important factor. Walker (1949) found the Rio Grande turkey to be limited to a 20- to 30-inch rainfall belt in Texas. In the attempt to establish the Rio Grande turkey in eastern Texas, Glazener (1963) found rainfall to be the most pertinent factor limiting their success. Halloran (1964) found the wild turkey populations in southwest Oklahoma fluctuating inversely with the annual rainfall.

Precipitation limits the wild turkey both directly and indirectly. The nesting season and the brood rearing season have been shown to be the most critical periods of the year (Glazener, 1963). Excessive rainfall during this time causes drowning of the young and loss of nests due to flooding. The young, which are very susceptible to chilling, may become wet because of a spring rain or heavy dew and die from becoming chilled.

The average annual rainfall for Payne County is 32.35 inches, which exceeds slightly the suggested limit of tolerance for the Rio Grande wild turkey. This annual rainfall fluctuates considerably, however, varying from a low of 15.25 inches in 1956, to as high as 62.5 inches in 1958. Since the wild turkey program became active in Payne County in 1963, the annual rainfall has been below normal (Table XIV), never having reached 30 inches. During this period of low annual precipitation, the wild turkey has become established in Payne County; however, the most successful years may be those in which rainfall is below normal if the rainfall factor found in Texas is

TABLE XIV

MONTHLY AND ANNUAL PRECIPITATION IN PAYNE COUNTY, 1963-1966
(Inches)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Average	1.3	1.4	2.0	3.0	4.6	4.4	3.1	3.0	3.5	2.7	2.0	1.4	32.35
1963	0.4	0.1	2.9	3.2	3.8	1.8	4.9	3.2	3.0	2.1	1.7	0.2	27.14
1964	0.5	1.6	1.0	1.7	4.0	1.2	0.3	7.3	2.4	0.5	5.3	0.6	26.56
1965	1.0	0.7	1.4	1.9	3.8	5.3	1.7	2.7	6.5	0.5	0.0	2.3	27.78
1966	0.2	1.5	0.2	2.4	3.5	3.8	7.3	3.3	1.3	0.4	0.1	1.4	25.39

applicable in the Payne County area.

CHAPTER V

CONCLUSIONS

The Rio Grande wild turkey has become established in Payne County from releases made in the area since 1959. The flocks have shown good increases in size. Introductions of the Eastern turkey, however, were unsuccessful.

A list of the foods of the wild turkey was compiled from the examination of 377 droppings and 5 crop samples. Grasses are the most important food group. The birds utilize both seeds and vegetative parts of these plants. During the winter months, a dependency on winter wheat as a food source was found throughout the county. Acorns were not important as a food source during the study, probably due to poor mast production, not indifference on the part of the birds.

The future adaptive success of the wild turkey in Payne County depends upon the bird's ability to adjust to habitat changes occurring within the county. Land clearing is rapidly reducing the preferred post oak-blackjack oak habitat, and with this removal the birds will be forced to use the less desirable bottomland forests and flood plain areas. The bottomland area is the habitat type utilized by the wild turkeys in western Oklahoma, but is of less importance in Payne County. The reason for this difference in vegetative utilization needs further investigation.

Before the effect of hunting can be fully evaluated, the

reproductive rate of the wild turkey, the carrying capacity of the habitat, and the time of the hunting season in relation to the reproductive season must be determined for the Payne County area. This information will show if a harvest of individuals is justified, the length of protection required by the released flocks before hunting, and the time or times of the year when hunting should be permitted.

Rainfall, as a limiting factor, cannot be evaluated until Payne County again experiences an unusually wet climatic cycle.

The wild turkey needs further study in Payne County. The data obtained during this 1 year of research may be indicative of what has happened, but it may not be indicative of what the future holds. The limiting factors, such as reproductive success, food requirements, cover requirements, and the wild turkey's association with human populations all require further research before adequate management efforts can be directed toward this new inhabitant of Payne County.

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