

Attwater's Prairie Chicken

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FIGURE 1 A booming prairie chicken male

INTRODUCTION

The Attwater's prairie chicken, *Tympanuchus cupido attwateri*, is endemic to the Gulf coastal prairies from southwestern Louisiana west and south along the Texas coast to the Nueces River (Figures 2 and 3). It has been estimated that this endangered species formerly occupied 7,000,000 acres with population estimates ranging up to 1,000,000 birds.

The Attwater's prairie chicken should not be confused with the lesser prairie chicken, *Tympanuchus pallidicinctus*, which is found in the Texas Panhandle and parts of the Permian Basin. The lesser prairie chicken is slightly smaller than the Attwater's and the coloration is somewhat different. The historic ranges of these two prairie grouse probably never overlapped.

The Attwater's prairie chicken was a popular game bird in the late 1800s and the early 1900s. Hunting parties would camp out on the prairies and hunt for several days from late summer through early winter. Often only a small portion of the birds would be eaten while the rest were piled up at the camp to rot since it was not uncommon for a hunting party to kill 200 to 300 chickens during several days of hunting (Lehmann, 1941).

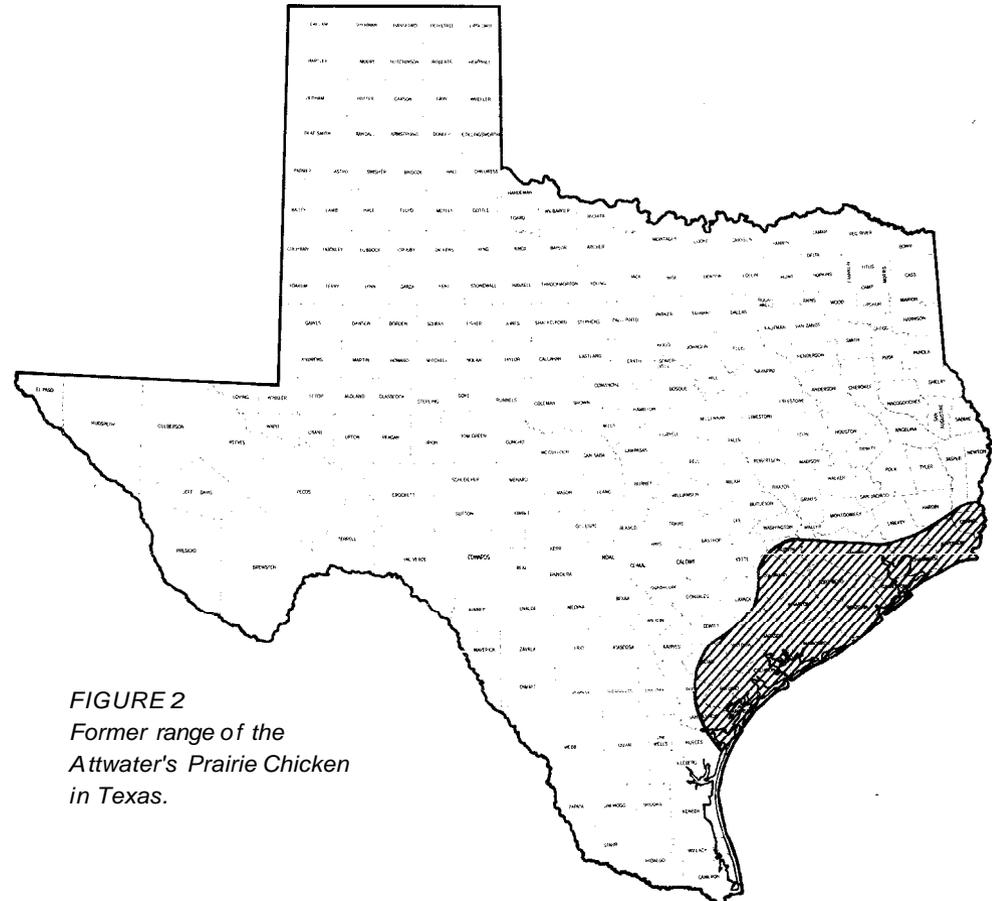


FIGURE 2
Former range of the
Attwater's Prairie Chicken
in Texas.

Most hunting was for sport rather than for meat. However, early reports indicate that prairie chickens often provided meat for cattle camps. Usually, only young birds were eaten because the adults tended to be tough. A common method to determine young from adult birds was to pick the bird up by the lower beak. If the bill broke from the body weight, the bird was a young-of-the-year.

There was no legal protection for the Attwater's prairie chicken until 1883, when a five-month closed season was set to protect the birds during the breeding season. In 1903, the Legislature passed a law setting the open season as November 1 through January with a daily bag of 25. However, since the Texas Game, Fish and Oyster Commission was not created until 1907, there was no real enforcement. Even after the new conservation agency was created, it was understaffed for years and had little effect upon illegal hunting.

In 1929, a new law set the open season on Attwater's prairie chicken as September 1 to September 4, inclusive, with a big limit of 10 per day. The Texas Legislature closed the season on the bird in 1937 because of its continued decline. The Attwater's prairie chicken was placed on the endangered species list with the passage of the Endangered Species Act of 1973.

Except for the work conducted by Val Lehmann for the Texas Game Fish and Oyster Commission in the late 1930s, and his periodic census surveys, little was known about the Attwater's prairie chicken. The census work conducted by Lehmann and William S. Jenning in 1950 showed that the bird had declined in numbers to a level that could possibly lead to extinction. For this reason the Texas Parks and Wildlife Department established Federal Aid Project W-100-R to study the birds as well as to conduct an annual census to determine population levels and trends.

Most of the information presented in this publication is data collected from the life history study of Federal Aid Project W-100-R. The annual census included the entire chicken range. Most of the research was conducted on two study areas. One area, located in native prairie, was in Victoria County. The other area was in the ricebelt in Colorado County.

The study was designed to find out the habitat requirements of the Attwater's prairie chicken as well as the life history of the bird. Once this information was collected it would be possible to conduct management practices that would aid the survival of the bird.

Radio telemetry was used as one of the chief techniques for observation. Basically, radio telemetry involves placing a transmitter on the subject to be monitored so that its movements can be followed. In this manner, the periodic location of the subject can be determined at any time, thereby yielding such information as movement, habitat requirements, brooding, mortality, and other aspects of its life history.

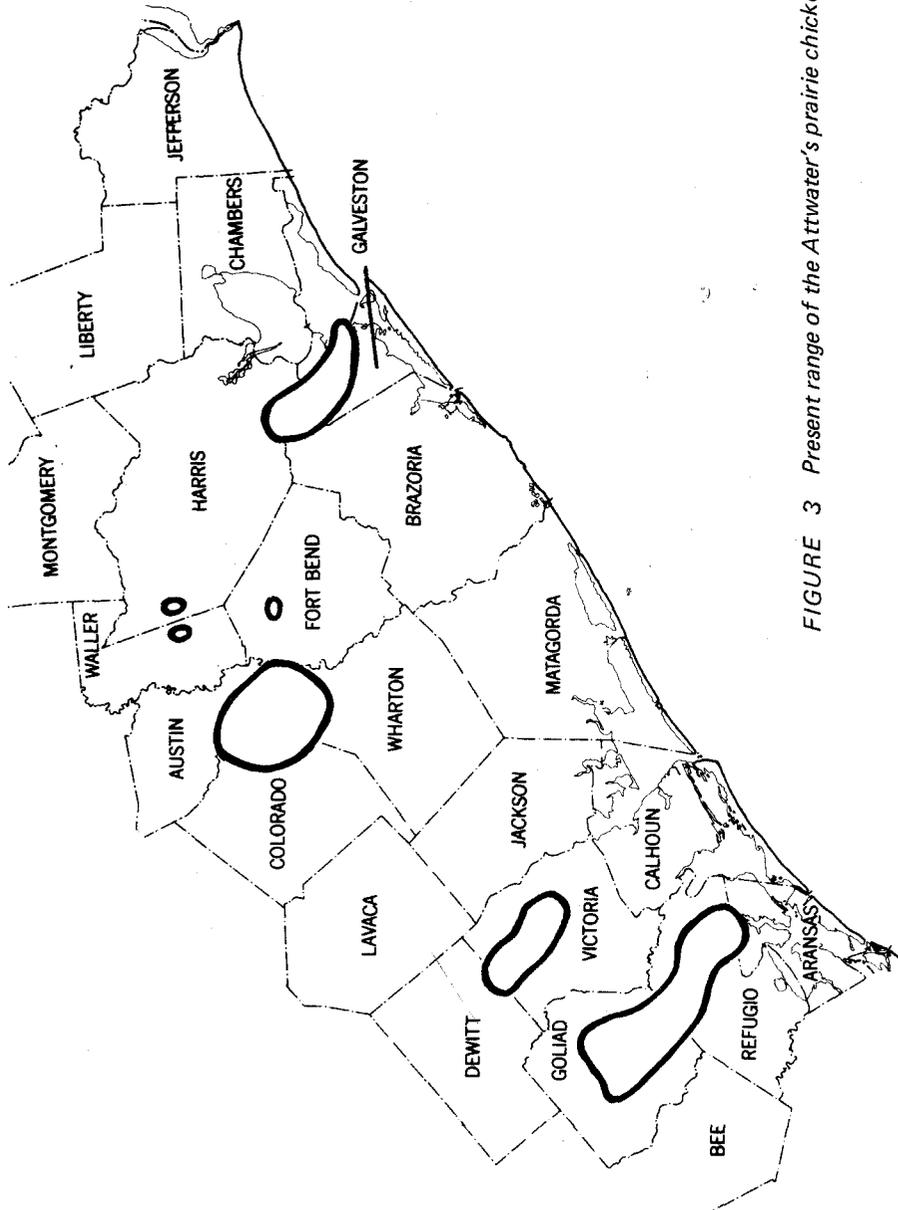


FIGURE 3 Present range of the Attwater's prairie chicken.

DECLINE OF THE PRAIRIE CHICKEN

Though hunting may have caused the decline of the chickens in some areas, the loss of natural habitat was the primary reason for the reduction in chicken numbers. This reduction in the population began in the early 1900s. The prairie chicken disappeared from Louisiana about 1919 and by 1960 the chickens were extirpated east of the Trinity River.

The loss of habitat was the result of several factors. Changing land use practices were the primary reason for the reduction in chicken numbers. The biggest single change was brought about by the start of rice production along the Gulf Coast. The first irrigation system using steam-driven pumps was built in 1885 at Crowley, Louisiana. From that time rice production moved rapidly westward. In 1892 there were about 175 acres of rice grown on the Beaumont prairie, and that same year the first Texas rice mill was built at Beaumont. The first rice was planted in the Eagle Lake area in 1898. From that time rice production increased along the Texas coast until today approximately 1,500,000 acres are in rice production (Table 1). (per comm. David Wintermann).

Optimum rice production requires that fields be rested for two to three years. The fallow fields produce abundant stands of forbs which provide excellent feeding areas for chickens. However, the lack of native grasses results in the loss of good nesting sites and roosting cover. Permanent levees which hold water on the rice crop also tend to retain water on the field during wet periods which often result in nests being flooded or the young being drowned. Fallow rice fields are an asset to the chickens in areas where all of the land is not in rice production. Unfortunately, in most areas of the ricebelt all of the prairie is in rice production, thereby removing all the native cover.

Another factor related to the reduction of the chicken population was overgrazing. Cattle numbers along the Texas coast increased in the early part of the 20th century and in many instances, overgrazing resulted in reduced acreage of chicken habitat. The increase in cattle production also resulted in the prairies being converted into improved pastures (Table 1). Over a million acres along the coast have been put into improved pas-

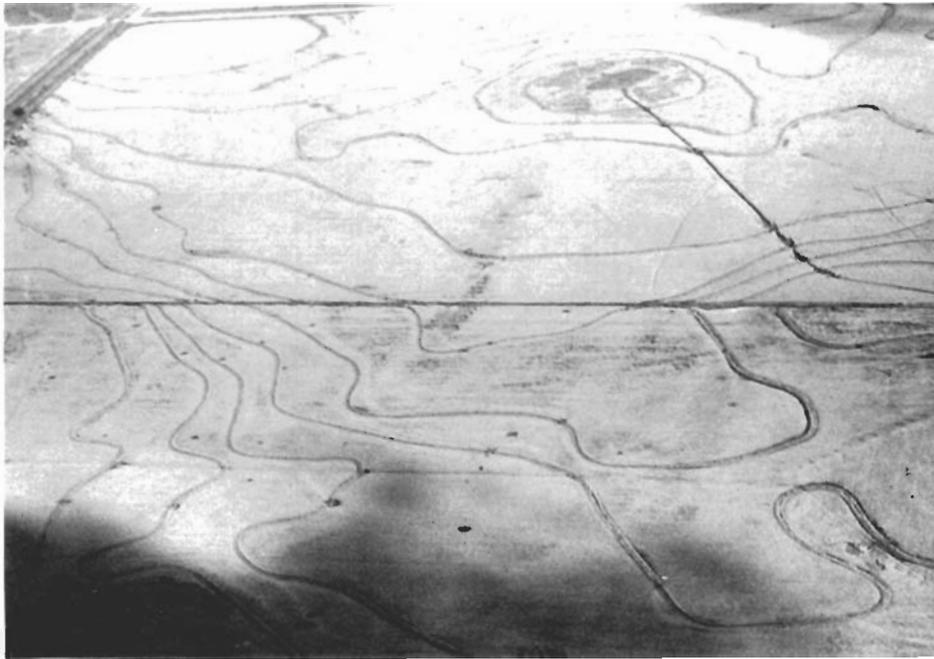


FIGURE 4 The introduction of rice farming along the Texas Coast resulted in the loss of vast areas of prairie chicken habitat. Shown above is an aerial view of an active rice field. The view below is a field ready for harvest.



FIGURE 5 Levees in rice fields retain water drainage and often result in flooded nests and drown young during periods of heavy rain.

TABLE 1
GULF COASTAL PRAIRIES*

County	Acres of Former Prairie	Present Acreage	Acreages of				Rice Cultiv.	Other Crops	Improved Pastures	Acres Invaded Woody Species
			Prairie Under Cultiv.	Cultiv.	Rice Cultiv.	Cultiv.				
Aransas	50,000	7,000	10,000	None	10,000	None	10,000		33,000	
Austin	130,000	70,000	21,000	16,000	5,000	16,000	5,000	35,000	4,000	
Brazoria	865,245	148,719	197,407	100,000	97,407	100,000	97,407	228,371	290,748	
Calhoun	285,440	8,218	110,000	22,000	88,000	22,000	88,000	17,222	50,000	
Chambers	248,406	16,240	174,740	160,000	10,000	160,000	10,000	52,426	15,000	
Colorado	225,000	50,000	110,000	100,000	10,000	100,000	10,000	6,000	10,000	
DeWitt	25,000	20,000	1,000	None	1,000	None	1,000	4,000	10,000	
Fort Bend	398,000	50,000	248,000	85,000	163,000	85,000	163,000	75,000	25,000	
Galveston	242,592	59,000	123,000	10,000	23,503	10,000	23,503	40,244	20,000	
Goliad	500,000	100,000	65,000	None	65,000	None	65,000	35,000	300,000	
Harris	919,600	9,783	162,168	86,405	75,763	86,405	75,763	278,135	25,834	
Jackson	468,500	165,500	195,200	101,600	93,600	101,600	93,600	30,600	138,400	
Jefferson	165,984	8,159	95,188	90,000	5,188	90,000	5,188	27,197	67,992	
Liberty	300,288	5,000	148,300	142,300	6,000	142,300	6,000	106,988	40,000	
Matagorda	473,000	187,278	198,482	149,982	48,500	149,982	48,500	35,779	23,650	
Orange	132,352	18,296	32,292	23,384	8,908	23,384	8,908	62,894	30,000	
Refugio	346,900	100,000	96,700	None	96,700	None	96,700	4,700	145,500	
Waller	200,000	22,000	145,000	120,000	25,000	120,000	25,000	30,000	3,000	
Wharton	431,000	7,000	370,000	180,000	190,000	180,000	190,000	43,000	11,000	
Victoria	545,000	132,300	125,000	19,320	105,680	19,320	105,680	22,700	265,000	
Total	6,952,307	1,184,493	2,628,477	1,405,991	1,128,249	1,405,991	1,128,249	1,135,256	1,308,124	

*Data furnished by District Conservationist, Soil Conservation Service



FIGURE 6 Overgrazing has resulted in the elimination of many acres of chicken habitat.



FIGURE 7 Most areas of Harris and Galveston Counties that used to be good chicken habitat are now covered by residential and industrial complexes.

tures. This was another setback to the chicken population as these pastures do not provide chicken habitat.

Urbanization and industrial expansion has taken its toll on chicken habitat. This has been most evident along the upper coast. Urbanization may result in a temporary increase in chicken numbers since the land to be developed is often bought and held to appreciate in value. However, the benefits usually are short-lived. Once construction starts the area is lost to the chicken.

The invasion of woody species has contributed to the loss of approximately 1.3 million acres of coastal prairie habitat. Woody species that have invaded the coastal prairies include Chinese Tallow, McCartney Rose, Wax-myrtle, Running Liveoak, Huisache and Mesquite.

This invasion is a result of overgrazing or a lack of fire. Historically, prairies were burned by man-made or natural fires. Today, the amount of burning is limited. However, some ranchers continue to burn and an occasional wildfire is caused by lightning.

Oil and gas development played a minor role in the reduction of chicken numbers. Although oil and gas activity may result in habitat loss, the increased human activity on the chicken range usually resulted in fewer birds. Also, in the early days of oil and gas exploration, it was commonly suspected that oil field "roughnecks" harvested game birds and animals in the oil fields year-round. Today, this is no longer a problem.

The Attwater's prairie chicken also is susceptible to adverse climatic conditions. Heavy rains during nesting and brooding periods reduce survival. Also, hurricanes can result in drastic population reductions as they may drop rains of up to 20 inches over a large area in a period of two to three days.

Hail storms also can be detrimental to local chicken populations. Usually only young birds are killed but large hailstones can kill adult birds.

The Attwater's prairie chicken usually can overcome climatic setbacks, but loss of habitat is something that no wildlife species can tolerate.



FIGURE 8 Running live oak has invaded large areas in the southern part of the chicken range.



FIGURE 9 Macartney rose is another major invader plant in the chicken range.

PRESENT POPULATION AND DISTRIBUTION OF BIRDS

The chicken population started its decline in the early 1900s and by 1939 when Val Lehmann of the Game Fish and Oyster Commission took the first systematic census, only 8,600 birds (3,000 in Refugio County) were located. Lehmann also conducted censuses in 1963 and 1967, finding 1,335 and 1,070 birds, respectively.

The decline seems to have bottomed out in the late 1960s. When the Texas Parks and Wildlife Department began taking an annual census in 1970, the number of chickens had increased to about 1,450 and by 1975 had risen to about 2,250. The census figures for the 1970s (Table 2) indicate that the population has stabilized in the range of 1,500 to 2,000 birds, probably because land use practices have changed very little since the late 1950s. Despite this apparent stabilization, however, successive years of low reproduction or a natural catastrophe such as a devastating hurricane could further reduce the population.

The Attwater's prairie chicken presently occupies about 170,000 acres in 10 counties. These include Aransas, Austin, Colorado, Ft. Bend, Galveston, Goliad, Harris, Refugio, Wharton and Victoria counties (Table 3). Brazoria, DeWitt and Waller counties have a few birds which, with the exception of those in DeWitt County, may be doomed because of their isolation from established colonies. The birds in DeWitt County may be augmented by chickens coming from the Victoria County population.

The easternmost colony of chickens is found in southern Harris County and northeastern Galveston County. This colony of chickens is in the most danger of losing its battle for survival. The growth of Houston and associated urbanization and industrial expansion have claimed thousands of acres of prime chicken habitat. Houston is continuing to grow at a rapid rate and the destruction of habitat continues. It is only a matter of time before most, if not all, chickens in this colony disappear. A few chickens may remain in western Harris County. However, the numbers are so low and the birds so isolated that they probably will disappear.

TABLE 2
ATTWATER'S PRAIRIE CHICKEN POPULATION CENSUS

County	1/1937	1/1950	2/1963	2/1967	3/1970	3/1971	4/1972	4/1973	4/1974	4/1975	4/1976	4/1977
Aransas	1,212	902	0	0	0	22	0	0	0	0	40	96
Austin	339	200	200	200	284	332	364	330	292	576	498	186
Brazoria	948	53	0	0	20	20	20	40	20	20	20	20
Calhoun	25	40	15	10	0	0	0	0	0	0	0	0
Chambers	220	15	0	10	2	0	0	6	8	8	0	0
Colorado	926	350	200	175	186	378	166	144	150	422	324	178
De Witt	272	0	80	0	12	12	12	12	6	8	8	8
Fort Bend	10	0	30	35	22	26	92	136	114	148	96	80
Galveston	332	35	90	130	96	50	148	238	166	100	140	124
Goliad	4	0	23	75	216	402	290	260	486	188	5/164	80
Harris	261	123	140	120	78	56	92	92	112	58	16	24
Jackson	35	10	0	0	0	0	0	0	0	0	0	0
Jefferson	220	85	0	10	0	0	0	0	0	0	0	0
Liberty	10	0	0	0	0	0	0	0	0	0	0	0
Matagorda	15	5	0	0	0	0	0	0	0	0	0	0
Refugio	3,030	2,100	412	175	310	440	166	192	356	336	530	550
Waller	64	32	15	0	20	26	26	26	10	10	10	30
Wharton	75	50	30	40	76	214	108	72	42	24	16	20
Victoria	620	200	100	90	112	234	166	224	242	342	218	110
Total	8,618	4,200	1,335	1,070	1,440	2,212	1,650	1,772	2,004	2,240	2,080	1,506

- 1/ Rope count
- 2/ Landowner interviews and aerial census
- 3/ Aerial census and 10-mile driving line
- 4/ Landowner-Game Warden estimate, aerial census and ground counts
- 5/ Incomplete count

TABLE 3
ACRES OF PRAIRIE PRESENTLY OCCUPIED
BY THE ATTWATER'S PRAIRIE CHICKEN

County	Acreage
Aransas	2,000
Austin	20,000
Colorado	16,000
Ft. Bend	3,000
Galveston	4,000
Goliad	30,000
Harris	2,500
Refugio	50,000
Victoria	30,000
Wharton	10,000

One small colony of birds remains in Fort Bend County. However, most of this range is being converted to the production of rice.

One of the two major colonies of chickens remaining is found at the junction of Austin, Colorado, and Wharton counties, with most birds found in Austin and Colorado counties. This colony is often referred to as the rice-belt colony.

Austin County has some of the better chicken range found along the upper coast. There is just enough rice farming to be beneficial to the chicken population. The terrain is rolling and in many places too steep for rice production. As a result, the ricefields are scattered and provide feeding areas for the chickens. However, most of the rangeland is controlled by small landowners who tend to allow their livestock to overgraze. If overgrazing could be eliminated many more acres of chicken habitat would be available.

Historically, the prairies in Colorado County were excellent chicken habitat. Today, most of the prairie now is in rice production. Only one large ranch in the county remains in native prairie. Another area of native prairie is the U. S. Fish and Wildlife Service Refuge established for the prairie chicken. Intensive management of this 8,000-acre refuge could result in an increase of the chicken population in that area.

The other major colony of chickens is found in Aransas, Goliad, Refugio and Victoria counties. Although the Victoria County chicken range does not join the other counties, it is considered in the same colony as they are all found in native rangeland.

The prairie chicken range in these counties has remained about the same as land use practices have not changed greatly. However, some areas are overgrazed while others are undergrazed. Native prairie that receives little or no grazing pressure is usually avoided by chickens since grass cover becomes so dense it hinders bird movement.

The two major colonies of chickens are found in very different types of habitat. The one on the lower coast is in an area that is primarily ranching country along with some row crop farming. The other major colony is found in an area that is heavily farmed. Although the same bird in both places, they face different problems. The Harris and Galveston counties colony is found in habitat that is more closely related to the native rangeland type rather than the ricebelt.

LIFE HISTORY OF THE ATTWATER'S PRAIRIE CHICKEN

BOOMING GROUNDS

Prairie chicken breeding activity occurs on or near booming grounds. A booming ground is an area where males gather in early spring to attract females by strutting and calling. These booming, or drumming, grounds play an important role in the prairie chicken's life. They are usually located on bare ground or short grass areas which allows the males to be seen by the females. Historically, hardpan flats provided most of the booming ground sites. Usually only weeds were found in these flats. Today, as a result of man's activities, plowed fields, mowed pipeline rights-of-way and ranch roads often are used as booming grounds. Areas around barns or windmills often are overgrazed and thereby provide booming sites.

Chickens will use the same booming grounds year after year. Some areas have been used as long as any records are available. In addition to the historical grounds, new areas occasionally are established. These usually are the result of an increase in chicken numbers and often become inactive when populations decline.

The size of the booming ground varies from ground to ground. Some may be as small as one-eighth acre while others may be several acres in size. There is no set shape for a booming ground, the shape usually being determined by the clean or short-grassed area being used.

The number of males on the booming ground varies but the average booming ground will have from six to 15 males. A large drumming ground may have as many as 40 males while a small one may have only three or four birds. Lehmann described the activity of the males on the booming ground: "The call of the male resembles somewhat the sound 'whur-ru-rr,' " with strong accent on the second syllable. Although it generally lasts about five seconds, the call varies in length and tone. In midseason the calls are characteristically



FIGURE 10 Two males competing for a female on the booming ground,

deep and full-throated; later they become shorter and higher pitched, possibly because the males are then less vigorous. The sound of the booming carries for a mile or more on quiet days. It has a ventriloquial effect and often seems farther away or closer than it actually is.

". . . Males do not confine their courtship activities to vocalizing, and fights are common. Opponents usually approach each other, uttering peculiar whining notes, with necks outstretched, ear tufts erected, tails spread, wings drooped, and air sacs deflated. Then, as if possessed of the same thought, they suddenly hop off the ground, wings beating rapidly, and clash in midair. These bouts are usually discontinued after three or four flurries, and the victors seem satisfied after pursuing their opponents for short distances. Many feathers are frequently lost, but fights seldom end fatally. Male sometime engage fancied opponents, as clumps of weeds or tufts of tall grass, and at other times they joust and bluff for periods up to 30 minutes or more without striking a blow. With necks outstretched, heads held a few inches apart, and wings dangling loosely, they resemble domestic roosters fighting. At intervals males flutter into air to heights of three to five feet, alighting nearly on the spot whence they arose." (Lehmann, 1941)

Males start to gather around the booming grounds during late January. However, little activity is observed until February, when the males begin to set up territories on the booming ground. Each male will establish a territory and, when another male enters his territory, a fight usually follows. This fighting early in the booming season determines the social structure of the males on the ground. Usually one or two males will be dominant. The peak of booming activity is around mid-March.

Lehmann describes this appearance of the booming male:

"As a preliminary to uttering the call he stretches his neck forward parallel to the ground. The erect pinnae, or neck tufts, point forward; the spread tail is held vertically or even inclined slightly over the back. The wings are extended downward and held firmly against the body and legs, the primaries almost touching the ground. The whole body appears strained and rigid. A short run forward is followed by vigorous stamping with the feet, which lasts only a few moments, but which under favorable conditions is distinctly audible for 50 feet or more. Inflation of the air sacs, which are actually but one sac with two lateral portions is synchronized with the stamping. The first syllable of the booming is given before stamping ends, the male quickly jerking his head downward as he begins the call and keeping it there until the air sac is deflated."

The males arrive at the booming ground just before daylight. Sometimes during the peak of the booming season mates will even boom on moonlight nights. Booming may be heard anytime during the day, but the main booming period is from daylight to about 9 a.m. During the peak of the booming season many males will come to the booming ground for a couple of hours before sundown. However, the evening session is not as intensive as the morning session.

The hens start coming to the booming grounds in late February and early March. The female's actions on the booming ground are opposite those of the male. They ap-



FIGURE 11 *A prairie chicken hen on the edge of a booming ground.*

proach quietly and appear shy, often staying on the edge of the booming ground. Shortly after mating, the hen will leave by walking away rather than flying.

Most mating occurs in early March, but another smaller peak occurs in April, probably a result of hens attempting to renest. When a hen visits the booming ground the males become much more vocal and active. This increased booming activity causes males not on the booming ground to fly to the ground and start booming. When a hen is on the booming ground the territory aspect is not as evident. Several males may follow the hen as she walks across the booming ground, crossing the territory of several males during this period. Often, if a hen is on the edge of the booming ground, a male may leave his territory and go to the hen and begin booming near her.

It appears that one or two dominant males do the majority of the breeding. Often a hen will walk past several booming males and pay no attention to them, but will continue directly to the dominant male. Why the hen selects the dominant male is not clear, but it is probably related to the aggressive behavior of the male.

The subordinate males often harass the dominant males during mating. As the male attempts to mount the female, one or more of the subordinate males will knock him from the back of the receptive female. Sometimes mating does not occur that particular morning and the hen will leave the booming ground.

Weather affects the booming activity of the males. They prefer a quiet, clear morning. They boom less on foggy, windy or rainy mornings. Unless it is during the peak of the booming season the birds will not boom as long on such mornings as on a quiet, clear morning. They will be on the booming ground but the activity will be low-keyed or the males might just sit or stand around on the booming ground. However, if a female appears, activity will immediately increase.

During the latter part of April and the first week or two of May the booming activity gradually ceases. During this latter part of the booming season less dominant birds may not come to the booming ground or stay for only a short time. The dominant males do not stay as long on the booming ground in the mornings, although they are the last to leave. By this time the evening sessions are usually terminated, although the dominant males may come and sit around on the booming ground. By the middle of May, the males have abandoned the booming grounds.

The booming grounds in the ricebelt are not as stable as those in the native rangeland. The birds' territories are not as well defined, and they are easily spooked from the display ground. The males do not display as much booming activity as those in native prairie. Booming grounds in native prairie are usually surrounded by good cover while those in the ricebelt are not. This lack of security probably results in the different actions of the birds.

REPRODUCTION

Nesting usually is initiated in early March, although some hens lay eggs in late February. Indirectly, nest sites are determined by booming ground locations since most nests are located within one-half mile of the booming ground.

The hens prefer to select a site that is on a gentle slope, if available. The nest is a well-concealed, shallow depression about eight inches in diameter lined with dry grass and feathers from the hen. In native prairie the hens prefer to nest against a clump of grass with the canopy of grass concealing the nest.

For nesting sites hens prefer moderate cover with some open areas that facilitate walking. They often utilize cow trails for access to their nests. They do not utilize dense vegetative cover as found in pastures that are deferred for an extended period of time.



FIGURE 12 A well-concealed nest in good cover.



FIGURE 13 The dense growth of forbs in fallow rice fields provides poor nesting sites.

Short vegetative cover also is avoided whenever possible. A lack of cover will result in nests being poorly hidden and easily located by predators. Short vegetation also exposes the hen to predation. For this reason, fallow rice fields make poor nesting sites.

The number of eggs laid varies from eight to 15, but the average is 11 in the first nesting attempt. The average is about nine in the renesting attempts. Eggs vary somewhat in color but are usually a dull cream color. As the eggs are incubated they become duller in color. Hens complete the egg-laying in about two to two and a half weeks. Normally the hen lays one egg each day, although it is not uncommon for the hen to skip a day. Usually the hens lay their eggs early each morning and stay on the nest from 30 minutes to one hour. They usually are through laying by 8:30 or 9:00 a.m. Hens normally walk to their nest site. However, if they are some distance from the nest they will fly to the general vicinity and then walk to the nest site. During the laying period, the hens seldom move more than a quarter of a mile from the nest.



FIGURE 14 A poorly concealed nest due to a lack of cover.

Incubation begins immediately after egg-laying is completed. The hen spends the entire time on the nest, except for one or two feeding periods ranging from 45 minutes to one and one-half hours. These feeding periods are usually once in the morning and once in the afternoon. Late in incubation the hen leaves the nest only once a day and some days may not leave at all. Hens seldom feed more than one-fourth mile from the nest. Peak of the hatch is April and May.

If a nest is destroyed a hen will renest. However, renesting attempts are limited because the males leave the booming grounds by mid-May. The second nest site is usually not over a few hundred yards from the first, although occasionally a hen may move one-half mile from the original nesting site. Although most nesting is completed by the end of May, a few broods are produced in early June.

Nesting losses are often a result of predators and flooding of nests. Cattle occasionally destroy nests by stepping or bedding down on them. Hailstorms, as well as human activities such as mowing and shredding in the nesting season also may destroy nests.



FIGURE 15. A prairie chicken nest destroyed by a skunk.

The length of time between destruction of the first nest and the start of the second varies. Some hens start laying eggs within a few days after the first is destroyed, while others may wait two or three weeks to begin the re-nesting attempt.

Many nests are destroyed before incubation even begins. During the egg-laying period, the nests are unprotected and are easy prey for any predator that finds the nests. The hens will attempt to re-nest if the nest is destroyed during the egg-laying period or during incubation. Although not observed, it is possible for some hens to attempt third and possibly fourth nestings, especially if their nests were destroyed during the egg-laying period. However, if a hen is successful in hatching and then loses the brood, she will not attempt to re-nest again that year.

In addition to the loss of nests, predators occasionally catch the hen while on the nest. She will often remain sitting on the nest until almost stepped on. The author has driven over a hen on a nest and the hen did not flush. When the nest site is good cover, the hen blends with the vegetation and is difficult to see. A hen sitting on a nest with her wings folded tight against her body emits little body scent. Attempts were made to locate hens on nests with the aid of bird dogs and retrievers and the dogs would pass within a few feet of the hen on a nest and would not smell the bird. The same dogs would often scent roosters 10-15 yards away. This lack of scent coupled with effective camouflage in good cover helps reduce predation on nesting hens.

The incubation period for the Attwater's is 26 to 28 days. The percentage of the clutch hatching is usually high, indicating high fertility. The period of hatching is a time of danger for the chicks as well as the hen. It may take up to 24 hours for all the chicks to hatch. During this period, the chicks may attract predators due to their chirping as well as the odor from the egg shells. Another danger to the young chicks is an invasion of fire ants into the nest. An attack by this poisonous ant could result in entire broods being killed. An increase in the fire ant population in the last 10 years has probably resulted in higher chick mortality.

When the eggs have hatched, the hen leaves the nest site with the brood. The hen often returns to the area of the booming ground with the chicks. It is not known why but the hens often travel toward the booming grounds with the brood.



FIGURE 16 Young chickens camouflage well in vegetation.

The hen takes the broods into the more open vegetative areas. This is probably to aid the young in traveling. It is very difficult for the small chicks to travel in dense vegetation. It is not uncommon for chicks to become separated from the hen in dense vegetation, thus becoming lost. The hen and her brood often travel along cow trails. Some broods in the native prairie country moved as much as a mile within a few days of hatching. Large movements were not found in the ricebelt.

Although utilizing some green vegetation, the diet of the young chicks is primarily insects. In the native prairie range, the hens will usually move the broods to hard pan flats which usually have abundant stands of forbs with a high insect population, thus providing good feeding grounds for the young birds. The wide dispersal of weedy areas in the native prairie range may account for the large movements of the broods. The ricebelt has an ample supply of weedy areas, providing adequate feeding grounds, and probably accounts for the smaller brood movements.

When a young brood is approached, the hen usually will flush for a short distance, although she may or may not act injured in an attempt to decoy the enemy away from the brood. The young chicks freeze and are difficult to see because of their cryptic plumage. However, after about three or four minutes the young chicks often will begin to peep and run around, becoming very visible. After the chicks reach about two weeks of age, they usually flush with the hen. However, flights are relatively short.

During the first four weeks after hatching, high losses occur. It is not uncommon for chicks to become separated and lost from the hen in dense vegetation. Also the young chick is vulnerable to predators at this age. However, adverse climatic conditions probably take more young chicks than all other factors combined.

Heavy rains often drown the chicks. If the rain, even when heavy, is for a relatively short period of time, the hen will be able to keep the chicks dry under her. However, rains that continue for a day or more will result in the chicks becoming wet and possibly chilled, which often results in death. This is especially true when the temperature remains relatively low for springtime. Hailstorms also can result in high death losses to chicks.

The chicks are fairly mobile by four weeks of age. Mortality of birds over four weeks of age drastically declines since by this age they can fly fairly well and can travel very well on the ground. They now are large enough to get away from enemies. They also are big enough to avoid drowning except in extremely heavy flooding.

Brood size declines as the broods become older. This is expected as mortality is often high on the young chicks. By the time the young are half-grown, broods will vary in numbers from one to 12. The largest brood observed by the author was 14 birds. Broods numbering 10 to 12 occasionally were seen in a good year. Average brood size varies from year to year, depending on climatic conditions, predators, and other factors. Any brood that contains six or more young at six weeks of age is considered a good-sized brood. A .5 young/adult is thought to replace mortality.

The young chicks develop rapidly, being nearly half-grown when they are seven weeks old and three-fourths grown at nine to 10 weeks of age. By 12 weeks of age they are difficult to distinguish from the adults in the field. Although they are fully grown by three months of age, they do not weigh as much as the adults.

A good measure for reproductive success is the young-per-adult ratio. From 1970 through 1976, with the exception of 1975, the Parks and Wildlife Department conducted aerial summer brood counts each summer using helicopters. All chickens flushed were recorded as adults or juveniles to determine the ratio of young to adult. (Table 4).

TABLE 4
YOUNG PER ADULT RATIO BASED ON SUMMER PRODUCTION COUNTS
1970-76 EXCLUDING 1975

County	1970	1971	1972	1973	1974	1976
Austin	.83	1.00	.17	.12	1.38	.03
Colorado	1.83	1.16	.30	.25	1.33	.00
Fort Bend	*	*	.46	.27	1.04	.90
Galveston	5.33	*	1.10	.58	1.60	1.48
Goliad	*	.60	.48	.67	1.00	*
Harris	*	1.43	2.00	.58	.57	.00
Refugio	.36	1.12	1.90	.70	1.07	1.18
Victoria	.93	1.44	2.70	.37	1.21	.46
Wharton	*	1.28	.17	*	*	*
Average over entire range	.96	1.14	.51	.39	1.19	.49

*No data available

The reproductive success of the Attwater's prairie chicken varies greatly from year to year and even from county to county during the same year. From 1970 through 1976 the average young:adult ratio has ranged from a low of .39 young per adult in 1973 to a high of 1.19 young per adult in 1974.

Many factors contribute to the success or failure of the reproductive effort; however, the biggest factor is the amount of rainfall received during the March-May nesting period. Generally, below-average rainfall results in a good hatch while heavier-than-normal rainfall results in a poor hatch. Because much of the chicken range is flat the nests and small young are unable to survive heavy rains and flooding. The most detrimental rainfall pattern is heavy rains in late April and again in late May. Heavy April rains usually ruin the first nesting attempt and heavy May rains will ruin the re-nesting attempts.

The spring of 1974 was dry, with no heavy rains falling in April and May along the Gulf Coast. That year produced the highest young:adult ratio on record. However, dry springs are the exception rather than the rule along the Texas Coast, because mild cold fronts usually produce rains that result in flooding.

The chicken population may decline in one area while increasing in another during the same year. This probably is the result of different amounts of rainfall received over the chicken range. The end result is that the overall population remains relatively stable.

MOVEMENTS

The use of radio telemetry provided movement data previously unobtainable. The transmitter allowed an individual chicken to be located whenever desired. Without the plotted movements of birds with transmitters it would have been impossible to determine movements of individuals. Daily movements of chickens, with few exceptions, were

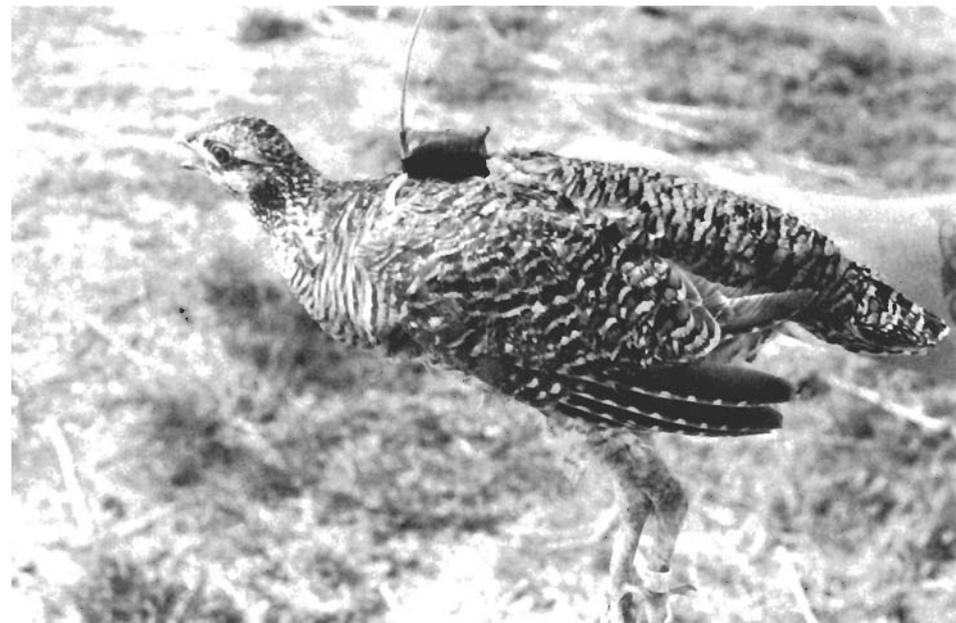


FIGURE 17 A prairie chicken hen fitted with a transmitter. The use of radio telemetry resulted in data being collected that was previously unattainable.



FIGURE 18 Receiver and antenna used in tracking birds with transmitters.

not extreme. Chickens usually never moved over one-half mile in one day. Most daily movements were considerably less than this. Seasonal movements often were considerably greater, especially during the summer period.

No seasonal movement and little daily movement occurred during the breeding season. When the males were not on the booming grounds, they usually were no more than about one-third mile away. The females usually were found in the general vicinity of the nest site. Even if a nest was destroyed, the hen usually did not make any large movements during the spring. It was not uncommon to locate the birds within 100 to 200 yards of the previous day's location.

After the breeding season ended, the chickens started the summer movements which were much more evident in the native prairie than in the ricebelt. After the males lost the urge to go to the booming ground, they usually began to wander. During the summer the males were usually solitary rather than in flocks. However, whenever a chicken was flushed, one could almost without exception expect to flush other chickens in that general area.

Movements exhibited by the males varied from bird to bird, but all males took part in the movements. In the spring the males usually could be found in the same general area, often no more than a couple of hundred yards from the previous day's location. During the summer the birds usually were found in the same location as the previous day. Movement from day to day was usually not excessive but movements of 300 to 500 yards from the previous day's location were common.

The males in the native prairie moved more than males in the ricebelt. It was not uncommon for a rooster in the native rangeland to move three to four airline miles from the booming ground during the summer. The zigzag pattern of movement displayed to reach the extreme point would often result in a linear distance of six to 10 miles. One male moved six airline miles from the booming ground during the summer and then returned in the fall.

Generally, males in the ricebelt never moved more than two miles from the booming ground and some never moved over a mile. The ricebelt birds did, however, exhibit considerable linear movement. Linear movement was about five to eight miles.

Males on both study areas had similar patterns of movements even though the distances were different. The birds would usually move to an area they seemed to favor and would remain there one to four weeks. Considerable daily movement would occur within this general area. However, the movements would often result in movement from point A to various other points and end up again at point A. After spending some time in an area, the bird would move to a new location, traveling more or less in a straight line for a few days and then remaining in the new territory for a time.

The time spent in a general area varied from bird to bird. Reasons for movements never were determined. It is possible that it is related to available food. The ricebelt provides a higher insect population than the native prairie. It was felt that the availability of insects may have an influence on bird movements, but insect collections in areas that a bird left and the new area it selected did not reveal a significant difference in the insect population.

The home range size varied from bird to bird but the median size for males in the ricebelt was 456 acres. The median size for females was 726 acres. The home range sizes for males and females in the native prairies were 1,796 and 1,490 acres respectively.

The females followed movement patterns similar to those of the males, but usually not as pronounced. The more extreme movements for females were about two to three miles in native prairie and about one to 1.25 miles in the ricebelt.

In late summer the birds began flocking and it was not unusual to flush flocks of three to eight birds. These flocks were often of the same sex, but occasionally both sexes

would be in the same flock. These flocks of mature birds did not exhibit the special closeness displayed by the broods.

During September and early October the males show a pronounced movement back to the general area of the booming grounds. This is in anticipation of the fall booming season which occurs in late October and early November. The fall booming season is a small-scale model of the spring booming season. The males gather on the booming ground each morning for two to three weeks. Some low-keyed booming occurs as well as a few half-hearted flights. However, the activity is very mild compared to that of the spring booming season. The fall booming season may be keyed to day length since the length of daylight is approximately the same during initiation of fall and spring booming. After the short fall booming season, the males do not move about a great deal but stay in the general area of the booming ground awaiting the start of the spring breeding season.

In the fall, the females gradually move toward the booming ground, but in a manner not as pronounced as the movement of the males. The female movement is more obvious in the native prairie than in the ricebelt because summer movements in the ricebelt are not extreme and, as a result, the hens never move great distances from the booming grounds.

Flocks of females occasionally visit the booming ground during the fall booming season. They do not come for breeding purposes but rather appear as spectators watching the antics of the males on the booming ground. After fall has arrived the hens do not make any large movements away from the general area of the booming grounds.

During late fall and early winter the birds have a tendency to gather in large flocks. In areas with high chicken populations it is not uncommon to see flocks of 25 to 50 birds and at times even larger number of birds. These flocks are usually made up of only one sex.

The movement of broods seems to be related to the food supply. Some of the broods surveyed moved considerable distances while others did not exhibit the same degree of mobility. However, by late summer, most broods had moved a considerable distance from the vicinity of the nest.

Broods seem to maintain the family unit until the brood is about 10 to 12 weeks of age. Apparently some broods break up earlier than others. There is not a sudden breakup of the family group; rather, some of the young leave the brood while others may choose to stay with the hen for a while longer.

In summary, probably the most evident difference between chickens found on native range and those living in the ricebelt is mobility. The birds living on native range are definitely more mobile than those living in the rice fields. Reasons for this difference in mobility are unclear. They may be related to the habitat available to the birds. Chicken movements in the native prairies may be greater due to the scarcity of good feeding areas in the prairie. On the other hand, large feeding areas are available in the ricebelt habitat due to the lack of grasses and the presence of dense stands of weeds.

DAILY ACTIVITY

The daily activity pattern of the prairie chicken is predictable and varies only during the breeding season. The Attwater's day starts at dawn when the birds leave the night roost to feed. The only thing that will prevent early feeding is a rain or a very heavy dew. The chickens do not like to walk through wet vegetation because after a period of time the bird's feathers become wet, causing flying difficulty. If the bird becomes wet enough it cannot fly, making it vulnerable to predators. To avoid becoming soaked, the birds often will stay on roads or short grass areas until the grass dries. While waiting to dry out, the birds usually feed along the edges of the roads.

After the morning feeding period the birds go to a day roost. These roost sites are not significantly different from night roosts and are located in heavy cover for concealment. They frequently use bunch grass for concealment by sitting close to the base and using the canopy for cover. While on the day roost they appear to be asleep and often can be closely approached before flushing. The birds usually leave the day roost by mid-afternoon. A dust bath may be in order at this time, although there seems to be no set time for dusting. The dust baths serve to keep the birds clean as they thoroughly cover themselves when dusting. Favorite dusting sites are often on cow trails or any area where sand is available. In the rice fields, the birds often dust at the base of a levee.

The evening feeding period begins a few hours before sundown and continues until almost dark. This feeding period is about the same length as the morning feeding period. Shortly before dark the chickens go to the night roosting site. The birds often will walk to the roost site provided good roosting cover is close to the feeding area. Otherwise, they may fly to the roost site. In rice fields the birds often are forced to roost in the same vegetation type as the feeding ground.

Once on the roost no further movements occur unless the birds are disturbed. However, during the peak of breeding season males may boom on moonlit nights, but on the roost and usually not on the booming ground.

After the chicks become too large to stay under the hen they roost from three to six feet apart. Flocks of adults will roost in the same general area, but the individual birds will be from 10 to 50 feet apart. The birds choose moderate to heavy cover which provides concealment and protection from predators.

FEEDING HABITS

The Attwater's prairie chicken feeds on a wide variety of insects and vegetative matter. Table 5 gives the frequency of occurrence of food items found in the droppings of chickens. These data were collected in the ricebelt in an area of peanut farming. Insects are heavily utilized during the warm months when the insect population is highest. Some of the more common insects eaten include grasshoppers, stinkbugs, potato bugs, caterpillars, ants, as well as many other species of insects. The insects eaten vary from area to area, depending on the availability.

Insects normally make up the majority of the diets of chicks. The chicks usually are hatched when the insect population is high and the hens take the broods to the weedy areas which contain the heaviest insect populations. The young birds are attracted by the movement of the insects and will then chase and catch them.

Vegetation also plays an important role in the Attwater's diet. Seeds as well as the green leafy parts of small forbs and grasses are utilized. Native vegetation is utilized year-round, but is taken more when the availability of insects is lower. Young, tender vegetation is preferred. The chickens especially utilize the young, tender vegetation in late winter and early spring.

The prairie chicken feeds slowly and deliberately, especially when feeding on vegetation. The bird moves along very slowly and appears to be very selective in choosing its food. When feeding on insects, it often is necessary for the birds to move rather fast in order to catch their prey.

Native plants and insects are by far the most important food source for the chickens. Although the chickens do utilize cultivated crops these are relatively unimportant as food because, with the exception of rice, crops are not widely available for most of the chickens. The chickens utilize several crops when available. In areas such as Refugio County, where large acreage is planted in milo, the fields are very attractive to the birds,

TABLE 5
 FREQUENCY OF OCCURRENCE (%) OF FOOD ITEMS IN
 ATTWATER'S PRAIRIE CHICKEN DROPPINGS COLLECTED BETWEEN
 FEBRUARY 1975 AND FEBRUARY 1976, BY MONTH

Month	Forbs	Grasses and Sedges	Seeds	Rice	Peanuts	Insects
1975						
February	80.9	41.8	41.9	T	0	1.0
March	66.2	46.9	60.0	3.5	0	2.7
April	72.8	51.6	58.8	-	0	5.6
May 1/	-	-	-	-	-	-
June	65.7	29.3	17.9	0	0	71.4
July	80.0	15.9	6.3	0	0	56.3
August	51.0	32.0	14.0	6.0	0	58.0
September, 1/	-	-	-	-	-	-
October	17.2	20.0	18.4	12.1	58.1	10.0
November	34.4	16.9	14.1	2.5	60.4	20.1
December	78.1	26.9	56.3	2.8	1.3	1.3
1976						
January	79.7	31.9	50.3	6.6	1.6	2.8
February	57.8	63.4	34.1	T	0	1.0
March	89.3	37.9	47.1	T	T	2.1

1/ Insufficient sample size

T Trace, less than 1%

Data collected by Winifred B. Kessler, Department of Range Science, Texas A & M University



FIGURE 19 Chickens often utilize rowcrops such as milo when it is available.

especially broods. This row crop provides shade for the birds as well as insects for food. Waste grain also is taken at harvest time.

Another favorite food source of the chickens is peanuts. Before the peanuts are harvested the chickens will frequent the fields, feeding on insects. After the crop is harvested, the chickens frequently move into the fields to feed on the peanuts left in the field. In an area of high chicken numbers as many as 100 may be seen in a peanut field. Peanut fields often attract birds from quite a distance, and the birds will feed almost exclusively on the waste peanuts until the supply is exhausted.



FIGURE 20 Rice lost during harvest is utilized by the prairie chickens.

Rice also is utilized by prairie chickens. The birds usually move into the rice fields to feed on the waste grain as soon as the rice is harvested. If heavy rains flood the rice fields after harvest the chickens often will feed along the levees, which remain above the water. The chickens also pick up waste grain that is spilled when the rice is loaded aboard trucks in the fields.

Corn fields also are used for feeding and loafing areas. Birds normally feed on waste corn after harvest because the ears of corn are out of their reach while on the stalk.

A new crop now being planted in the ricebelt is soybeans. It is not known how much the birds utilize the beans but they are often found in soybean fields, probably for cover as much as for feeding grounds.

PREDATION

Predators of the Attwater's prairie chicken fall into two groups: nest predators and those which prey on the birds.

Nest destruction of prairie chickens is high. Snakes, raccoons, opossums, skunks, coyotes, armadillos, dogs, and feral housecats prey on the nests. The most destructive is the skunk. Armadillos also destroy quite a few nests and will eat the eggs. However, most of the armadillo damage is done by their rooting through the nest site and thereby ruining the nest.



FIGURE 21 *The skunk is the most destructive nest predator.*

Predators that feed on the chickens are numerous. The coyote probably kills more birds than any other predator. The coyote kill is normally easy to determine because very little of the bird except feathers and the crop is left. In the ricebelt more chickens were taken by coyotes in the spring than during other seasons of the year. This probably is



FIGURE 22 *The coyote is the main predator of adult chickens.*

because the coyotes are raising pups at this time of year. Most coyote kills are probably made at night when the birds are roosting. However, some males also are taken from the booming grounds because they are not as alert while booming as at other times. Coyotes have been seen standing in the middle of a booming ground within 30 feet of booming males.

Skunks occasionally will kill an adult chicken, but most of the depredation by skunks is on young birds. Raccoons also can inflict damage to broods as well as to adults, although the feeding habits of raccoons do not lead them through chicken habitat.

Snakes probably take a few very young birds, but most snake damage is to eggs eaten in the nests.

Avian predation also occurs. Most avian predation is limited to young birds. Several species of hawks are capable of killing chickens, especially young ones. The hawk that probably kills more young chickens than any other is the Sennet's whitetail hawk. Young chicken remains occasionally are found around the nest sites. The marsh hawk especially is bothersome to the males on the booming grounds. They will harass the birds and often dive at the males causing them to flush. However, the chickens usually return. Often the males will not flush but will squat and remain motionless as the hawk passes by. Occasionally, a male will flip over on his back in a defensive position as the hawk dives at him. It is doubtful if the marsh hawk takes healthy adult birds. The marsh hawks are capable of killing young birds but usually hawks have migrated northward before the chicks are hatched. Great horned owls also occasionally take a chicken.

MANAGEMENT—RICEBELT

Certain management practices must be carried out before any appreciable increase of prairie chickens can occur in the ricebelt. The two basic problems to overcome in the ricebelt are flooding and lack of cover.

Flooding can be reduced greatly by cutting the levees in more places than the infrequent cuts that are used to drain water from the fields for harvest. Several cuts in each levee would allow the water to run off more rapidly, thereby reducing flooding.

To reduce flooding further would require taking out the old levees and sloping the field slightly to aid runoff. However, this is not practical if the field will later be returned to rice production. Cutting the levees in several places will not have any effect on future farming operations since levees are usually plowed down and new levees set up when the field is returned to rice production.

Providing adequate cover is more difficult and time-consuming. The nature of rice farming prevents vegetation from going through succession and reaching a grassland situation. The two or three years of lying fallow do not allow enough time for grass to become dominant vegetation on the fallow fields. One possible solution to this problem is for the landowner to set aside a block of land and allow it to revert to a grassland situation. This would provide adequate nesting and roost sites. The size of the plot should be as big as possible with a minimum size of 50 acres. The bigger the area, the better are the chances of helping the chickens.

If such areas are established, it will be necessary to have a predator control program on the area. If the chickens utilize the area for nesting, it is probable that the nests will be relatively concentrated and predators could destroy a high percentage of them. Predator control just prior to the nesting season would be highly desirable and would result in fewer nests lost to predators.

Another method of improving chicken habitat which shows promise has been developed in conjunction with Dr. Jim Dodd of the Range Science Department of Texas

A & M University. This technique involves treating first-year fallow rice fields with one pound per acre of 2,4-D when the forbs are about six to eight inches tall. The application of this herbicide, if done properly, will result in about 90 percent of the forbs being killed. Grass, which is not affected by the chemical, is then given a chance to utilize available light and moisture and grows rapidly. A minimum grazing deferment for 30 days is required to allow the grass to become established. This method provides more grass for livestock as well as better cover for chickens while not removing it from future rice production.

Most fallow rice fields are grazed. However, the predominant stands of forbs provide little grazing, thus the fields have to be stocked at a very light stocking rate. The treated fields produce about the same amount of vegetation as untreated fields except it is in grass rather than forbs. One experimental field was treated with one pound of 2,4-D per acre in May. The following November sampling of the field indicated that 2,830 pounds of vegetation per acre were produced as compared to 2,825 pounds per acre on a portion of the field that was not treated. The difference was that the treated portion produced about 2,700 pounds of grass per acre while the untreated part produced only about 200 pounds of grass per acre. This tremendous increase in grass production can be provided with a relatively small investment, thus providing increased forage for livestock as well as greatly improving chicken habitat.

Treated fields, grazed moderately throughout the fall and winter, will allow adequate cover to remain for nesting the following spring. There is often a tendency on the part of the landowner to overstock the treated pastures because of the abundant grass available. If the fields are heavily grazed during this period, by the time nesting is initiated they will be almost bare, thus providing no nesting cover.

This method has the most promise for improving chicken habitat in the ricebelt. It does not take any land out of rice production. Also, it is practical from the landowner's standpoint as it provides increased grazing for his livestock. The herbicide also affects the following year's growth and treated fields will continue to have less forbs than untreated fields. However, if the treated field is overgrazed during the fall and winter after treatment it may have a stand of forbs as thick or thicker than an untreated field the following spring.

The toxicity of the herbicides at the recommended rate is extremely low, and will not have any ill effects on wildlife species. The one pound of 2,4-D amine salt usually is aerially applied with fixed-wing aircraft, in three gallons of water per acre. However, it must be applied on still mornings to prevent drift onto broadleaf farm crops that it will kill.

When treating large areas, 400 acres or larger, approximately 25 percent of the field should remain untreated to provide adequate feeding areas for chickens. Untreated areas should be dispersed when a large acreage is treated. Landowners should contact the Parks and Wildlife Department for recommendations pertaining to specific situations.

Except for the above-discussed procedure, it is difficult to improve chicken habitat in the ricebelt with the present land practices. It is virtually certain that the chickens never will increase in the ricebelt unless steps are taken to improve the habitat. It is probable that rice farming will always be a major crop on the Gulf Coast. Consequently, unless better habitat is provided, the future of the chickens in the ricebelt appears bleak.

MANAGEMENT—NATIVE PRAIRIE

Land management in the native prairies for chicken habitat improvement is greater than in the ricebelt. Overgrazing often is a problem but pastures can be improved only by lowering the livestock stocking rate. If there is overgrazing or drought, it may be necessary to remove the cattle completely to allow the range to improve. This not only improves prairie chicken habitat but also will benefit cattle production on the affected pastures in future seasons.

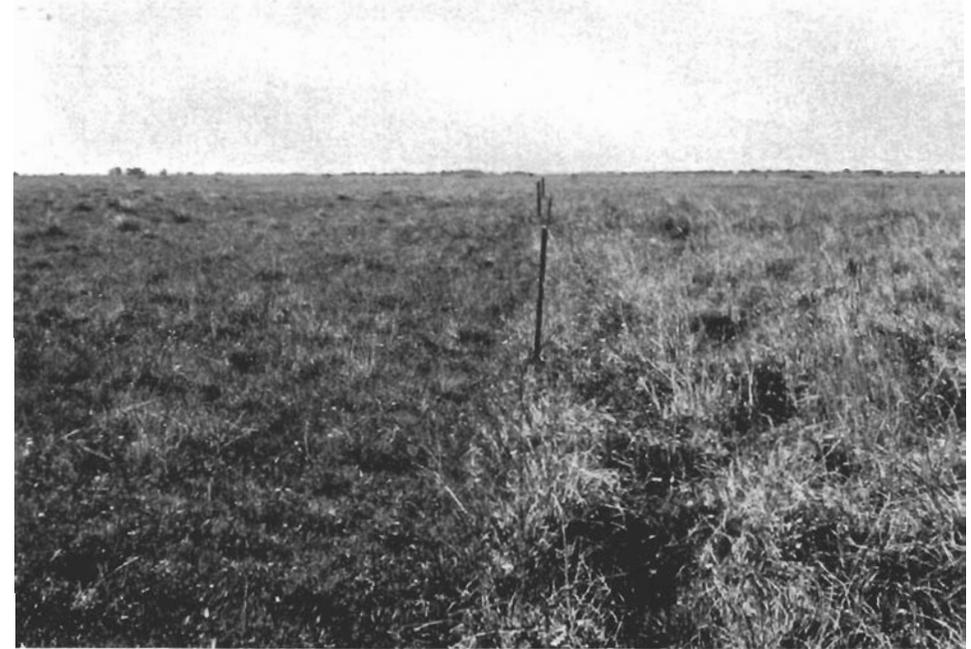


FIGURE 23 Overgrazing as well as undergrazing both result in a loss of chicken habitat.

A burning program can often be intergraded into the overall ranch management plan which will not only help the chickens but will also help provide more grazing for the cattle. At times some pastures, or certain parts of some pastures, become undergrazed. Undergrazing may be brought about by things other than a lack of cattle on the range. Livestock may not be able to consume the heavy vegetative growth during periods of excessive rainfall. Also, during wet periods low areas having standing water often receive little grazing pressure. Undergrazing also can be brought about by uneven watering locations on the prairie. Cattle normally will not graze too far away from a source of water since they drink at least once a day. As a result, certain areas of a pasture may be overgrazed while others may be undergrazed. Reducing the size of the pastures or increasing watering locations will help reduce this problem.

After abundant vegetative growth occurs, for whatever reason, cattle usually will not utilize these areas because the grass is unpalatable. Consequently, without cattle to keep openings in the vegetation, it is used less by chickens. Fire can be a valuable tool in these areas to improve chicken habitat as well as to provide better grazing for the cattle.

Burned areas often are used for booming ground sites, especially if short-grassed areas are in short supply.

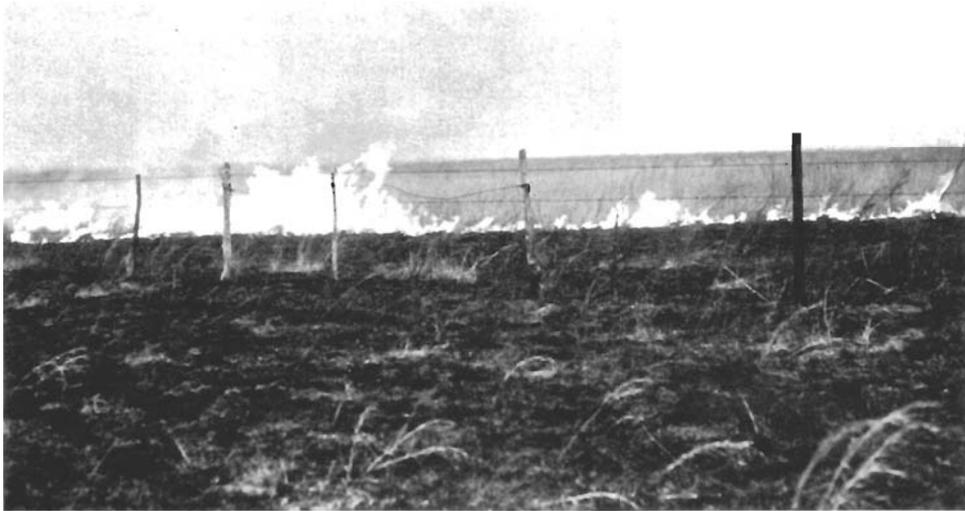


FIGURE 24 Controlled burning is a good management tool for improving chicken habitat.



FIGURE 25 Vegetation can become too rank and thick for chicken utilization.

Another advantage of the use of controlled fires is to control woody invaders on the prairie. However, it is important to have enough fuel for a hot fire to kill such species as running liveoak.

Areas should be burned in late fall or early winter. Regrowth in burned areas will attract livestock which will help to keep the vegetation from becoming too dense. A burning program on a ranch should be such that certain areas are burned one year, another area the following, and so on. This allows a checkerboard pattern of vegetative types to be established on the ranch. It also provides areas varying from light stands of vegetation to areas with moderately heavy cover that provide good nesting and roosting cover.



FIGURE 26 Medium cover allows chickens to move freely through the vegetation.

Pasture rotation is a tool that can be used to provide better chicken habitat as well as to improve grazing conditions for livestock. The pasture rotation system is simply using one herd of cattle and utilizing two or more pastures for grazing. Removing cattle from a pasture for a period of time allows the range to rest and prevents overgrazing and, consequently, removal of desirable grass species. One of the best rotation systems involves the use of four pastures and one herd of cattle. However, other grazing systems are possible and may be as beneficial. Interested landowners can be assisted by Parks and Wildlife personnel.

It is advantageous to the chickens to reduce the number, or remove livestock from pastures during the nesting season where major booming grounds are located. This eliminates the possibility of nests being destroyed by cattle stepping into or possibly bedding down on the nests.

In areas where booming grounds are scarce, areas should be shredded or mowed to provide adequate short-grassed areas for booming sites. Mowing should be initiated in late fall after the first frost occurs to prevent regrowth before the breeding season. About two or three booming grounds per square mile will provide enough areas for the birds.

The prepared booming grounds can be in any shape; however, oblong or round is most desirable. They should be at least an acre in size. The birds will not normally utilize the entire area. However, larger areas provide additional protection from predators that might use the vegetation for concealment in approaching birds on the booming ground. When the birds begin booming on areas created by fire, mowing or shredding, these areas should be maintained each fall to encourage the birds to return to the same area the following spring.

Pasture mowing or shredding should not be conducted within a half-mile of booming grounds from March through May. Mowing or shredding in these areas will certainly destroy nests and possibly the hens sitting on the nests. If the nests are not destroyed in the process of cutting a pasture, the hens probably will not return because of the removal of cover around the nest.

Shredding and mowing operations usually can be carried out in June without ruining nests. However, especially during the first part of the month, there may be young chicks that are unable to fly. If the operator of the tractor flushes a hen that flies only a short distance, he should inspect the area that the bird flushed from, as she may have a brood in the immediate vicinity. If a brood is located, the area the chicks are in should remain uncut to protect the young birds.

To provide feeding areas for the chickens, weedy areas of three to five acres scattered over the pasture should be left uncut. Also, if strips of vegetation about 50 yards wide and 300 yards long occasionally are left, this will provide adequate roosting cover for the birds. Areas left for day and night roost sites as well as weedy areas for feeding will provide the essential habitat requirements for the chickens.

FUTURE OF THE ATTWATER'S PRAIRIE CHICKEN

The future of the endangered Attwater's prairie chicken is not bright. As with many other species of wildlife, man's progress through land use changes is responsible for its decline, and man's goals have resulted in the prairie chicken's coming out second best.



FIGURE 27 The U. S. Fish & Wildlife Service Refuge is the only area set aside for the preservation of the chickens.

There is little hope that the chickens will increase unless some unforeseen event results in a major change in land-use practices. If present land-use trends continue, it is almost a certainty that the chickens will not increase. One unknown factor entering the prairie chicken picture in the ricebelt is the tremendous increase of soybeans being raised. Although its effect is unknown, the increased acreage planted to soybeans probably will be detrimental to the chicken population. This is expected, since the farming of beans on rice land results in a rice crop one year followed by two or three years of beans, which will eliminate fallow fields for feeding areas. Even though the fallow fields provide only marginal habitat, they are much better than vast areas consisting only of soybeans and active rice fields.

Increases in land values and taxes have forced landowners to have property produce the maximum possible return. Consequently, wildlife has suffered. However, it will be up to the private landowner to insure that the chickens have a chance in the future.

The only place in Texas that the Attwater's prairie chicken's requirements receive first priority is on the National Attwater's Prairie Chicken Refuge in Colorado County. This is the only immediate bright spot in the chicken's future. This 8,000-acre refuge was set up by the U. S. Fish and Wildlife Service strictly for the Attwater's prairie chicken. It is hoped that intensive management there will result in an increase of chicken numbers on the refuge and lands surrounding it. However, the refuge provides improved chicken habitat in only a small area. Without the help of landowners in other areas the future of the bird remains dark.

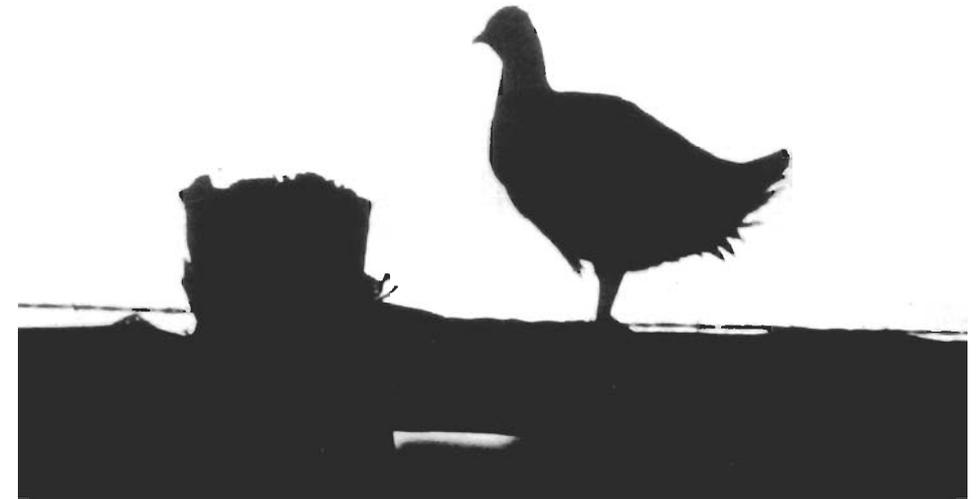


FIGURE 28 The future of the Attwater's prairie chicken is dark unless man comes to its rescue.

As the past history of the chicken has been adversely affected by mankind, the future must be affected in a positive way that will result in better conditions for this bird. The Attwater's prairie chicken's future is totally in the hands of man. It is up to him whether the bird's numbers are increased and the bird removed from the endangered list or whether it will join the list of extinct wildlife species.

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