

A History of the Prairie Chicken
In Missouri

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The prairie landscape encountered by Europeans when they first entered northern and western Missouri would look foreign to most residents today. Tallgrass prairies that covered most of the panorama have given way to seemingly endless acres of row crops and pastures. Outside of a few remnant or restored patches, the expansive landscapes of prairie that blanketed one-third of the state have disappeared. Depending on the region, this former prairie has mostly been plowed for crops or has been converted to seeded pastures or hayfields for livestock. Aside from the obvious aesthetic differences in today's landscape, this widespread conversion of the prairie has also detrimentally affected most of its natural inhabitants. Missouri was formerly home to large herds of well-known prairie creatures such as bison and elk, which are now limited to confined herds in a few specialized areas. Some creatures inhabiting the prairie landscape are less well-known to people today, yet they are often just as captivating. The Greater Prairie-Chicken, though now not recognized by many, once numbered in the hundreds of thousands and was found over vast swaths of Missouri.¹ A signature animal of the grassland landscape, the prairie chicken prefers large, open areas of grasses and forbs and shows little tolerance for much else. The awe-inspiring displays of the males, referred to as "booming," is among the most impressive animal displays in North America, even inspiring Indians to create dances in its likeness. Because of the prairie chicken's sensitivity to disturbance of grasslands and its important status with both pre- and post-European settlement inhabitants, it offers an excellent chance to study the effects of landscape change at the hand of humans. Doing so requires a multi-faceted effort, tracking land-use changes, changes in agricultural production, human attitudes, and government actions. In tracking the decline of the prairie chicken in Missouri and the corresponding efforts to save it,

¹ The only species of prairie chicken found in Missouri is the Greater Prairie-Chicken, or *Tympanichus cupido*. Historically there were two other subspecies of the Greater Prairie-Chicken: the Heath Hen, found on the eastern coastal prairies, and the Attwatter's Prairie-Chicken, found on coastal prairies near the Gulf of Mexico. The Heath Hen is now extinct and the Attwatter's is critically endangered. The Lesser Prairie-Chicken, a separate species, inhabits drier prairies of the southwestern Plains. For this paper, the phrase "prairie chicken" will refer to Missouri's Greater Prairie-Chicken unless otherwise noted, as it is Missouri's only native prairie chicken.

one can gain unique insight into trends and changes in the human relationship with one of Earth's most distinct creatures and one of its most misunderstood habitats.

To properly understand the Greater Prairie-Chicken in Missouri, one must first have a working understanding of the prairie. Prairies are classified as "natural communities dominated by perennial grasses and forbs (herbaceous flowering plants) with scattered shrubs and very few trees," with less than 10% tree cover being a traditional standard for vegetative composition.² Grasses are the predominant vegetation on the prairie, and they also make up the majority of the prairie's biomass. Nearly two-thirds of the prairie's biomass is underground, which is a remarkable figure when one considers that only one-third to one half of the typical forest's biomass is found underground.³ The deep, entangled network of roots that keep prairie vegetation anchored and allow it to utilize water efficiently are responsible for this discrepancy. Despite a rather monotonous appearance to the undiscerning eye, native prairies have exceptional plant diversity, and it is normal to find well over 200 species of plants on a 100 acre tract of native prairie in Missouri.⁴

Between five and seven million years ago, as the interior of North America experienced a long drying trend, the vast prairies of the Midwest were created. It is likely that the prairie landscape encountered by Europeans at first contact was partially the result of the glaciations (that had since receded) of the last Ice Age, as well as warmer, more arid climates, and some sporadic burning by Native Americans.⁵ Fire, whether it is caused by natural or human means, is among the most important factors in the prairie landscape. Most woody species are kept at bay by occasional fire, and these plants, if not kept in check, can cover a prairie quite quickly. Prairie plants grow up again relatively easily after a fire due to the previously mentioned-deep networks of roots. Prairies also thrive upon disturbance from large grazers, historically the bison, and to a

² Paul Nelson, *The Terrestrial Natural Communities of Missouri* (Jefferson City, Missouri: Missouri Department of Natural Resources, 2005), 255.

³ Ibid.

⁴ Ibid, 255-56.

⁵ Ibid.

lesser extent in Missouri, elk. Prairie species developed in tandem with the disturbances of grazing and the nutrient replenishing as a result of defecation, and actually benefit from mild to moderate grazing. The combination of grazing and burning made the prairie a dynamic landscape with changing levels of vegetative height and cover.

As mentioned previously, the prairie chicken was plentiful before the onset of European settlement. But care must be taken to determine how abundant prairie chickens actually were, in order to provide an accurate picture of historical developments. Walter Schroeder of the Missouri Department of Conservation spent twelve years compiling *Presettlement Prairie of Missouri*, and this work offers an excellent examination on the topic of the historical extent of prairie in Missouri. Figure 1 shows Schroeder's map of presettlement prairie. Vast tracts of prairie cover northern and western Missouri, with the northwest and southwest corners showing the most uniform distribution. Scattered swaths of prairie also occur in the Ozarks and the southeastern portions of the state. According to Schroeder, prairie covered 26.7% of Missouri before white settlement. This estimate is somewhat more conservative than other estimates, but Schroeder did not include timbered draws that extend into the prairie or small stands of trees surrounded by prairie within his calculations.⁶ The actual historical prairie chicken range may therefore be even greater than the pre-settlement prairie map indicates.

Missouri is a state blessed with a wide variety of terrestrial habitats due to a healthy diversity of climates and topography. To understand the prairie chicken's historical status, there must first be an elementary understanding of the states' key natural divisions and how these divisions affected what parts of the state were prairies. Knowledgeable sources usually divide Missouri into four natural terrestrial divisions: Ozark Highlands, Osage Plains, Glaciated Plains, and Mississippi Bottomlands. (See Figure 2) The Mississippi Bottomlands and the Glaciated Plains are also referred to more formally as the Mississippi River Alluvial Basin and the Central

⁶ Walter Schroeder, *Presettlement Prairie of Missouri* (Jefferson City, Missouri: Missouri Department of Conservation, 1982), 7.

Dissected Till Plains, respectively.⁷ Prairie chickens used to inhabit all four divisions within the state. In the Mississippi Lowlands, prairie chickens occupied sand prairies along with other prairie fauna such as bison, but extirpation of these creatures coincided with the white settlement of these prairies (to the best of the author's knowledge). A mention of the "Heth Hen or grows" (Heath Hen or grouse) in the journal of Meriwether Lewis from the region of Scott and Mississippi counties confirms the presence of prairie chickens here in 1803.⁸ These sand prairies were created as a result of natural levees, terraces, and elevated sandy ridges, in an otherwise mostly wooded and swampy region. Evidence of Native American habitation suggests that Native Americans perhaps actively maintained these prairies.⁹ The Mississippi Bottomlands historically had the fewest number of prairie chickens of any terrestrial natural division, as evidenced by the relatively small amount of prairie, but they were still a part of the historical landscape.

Each of the other three divisions also had historical occurrences of prairie chickens, and two of the three, the Glaciated Plains and the Osage Plains, still have populations. These two natural divisions represented the heart of the prairie chicken range in Missouri, so it is not surprising that the only populations remain here. Before more intensive settlement by whites, the Ozark Highlands (and border regions) did also have numerous populations of prairie chickens, including reports from 14 of 24 Ozark counties.¹⁰ Prairie chickens were found in areas frequented by fire and dominated by grassy vegetation. While most areas were primarily forest or woodland, diversity in topography allowed many areas in the Ozarks to be primarily savanna, and in some cases even nearly treeless prairie. Farther north, the Glaciated Plains of northern Missouri

⁷Timothy Nigh and Walter Schroeder, *Atlas of Missouri Ecoregions* (Jefferson City, Missouri: Missouri Department of Conservation, 2002), vii.

⁸ Meriwether Lewis, November 22, 1803, expedition journal, *The Journals of Lewis & Clark Expedition*, ed. Gary Moulton (Lincoln and London: University of Nebraska Press, 1986), 101. Dr. William Eddleman of Southeast Missouri State University confirmed that the only grouse likely to be present here was the Greater Prairie-Chicken, and also alerted the author to the presence of this material in the historical record.

⁹ Nigh and Schroeder, 285-86.

¹⁰ Nelson, 5, also Donald Christisen, *The Greater Prairie Chicken and Missouri's Land-use Patterns* (Jefferson City, Missouri: Missouri Department of Conservation, 1985), 4.

formed as glaciers extended into this region and then receded roughly 400,000 years ago. Prairie covered much of this area after the glaciers' retreat, but there were also wooded areas as well.¹¹ In the southwest portion of the state, the Osage Plains are the truest "prairie" area in Missouri, with over three-fourths of the area historically in prairie. This area, unlike the Glaciated Plains, was never covered by glaciers. The soils, mainly composed of eroded bedrock, are less fertile than those of the Glaciated Plains, which slowed the intensity of human agricultural development in the Osage Plains.¹² With an understanding of the presettlement prairie in tow, it is now necessary to briefly discuss the biology of the prairie chicken to demonstrate its relationship to the prairie ecosystem.

Beginning as early as January or February, the male prairie chicken begins his display, referred to as "booming" due to the low, hooting sound produced during the display.¹³ Males display on leks or booming grounds, which are areas where a number of males gather to compete for females. Lekking grounds are often elevated and are almost always devoid of tall vegetation. Beginning in March, females appear, and the males' display more vigorously. Females visit the lek for several days in a row before mating, and then leave to commence nesting, which usually begins in late April. The male has no further role in brood-rearing or nesting. The hen nests on the ground in grassy vegetation of moderate height, incubating the eggs until they hatch, typically in late May. Clutches are typically twelve to sixteen eggs, but nests as large as twenty-five have been known to occur. Prairie chicken young are precocial, meaning they feed themselves soon after hatching, and they travel together in a flock with the mother. As the chicks grow, the hen leads them farther and farther from the nest to feed, and by the age of three to four weeks they are capable of short bursts of flight. By the age of eight to ten weeks, the chicks are nearly fully

¹¹ The Missouri Department of Conservation, "Missouri's Natural Divisions," <http://mdc.mo.gov/areas/natareas/natural.htm>

¹² Ibid.

¹³ The biology of the prairie chicken is obviously much more complicated than a brief explanation will allow. The information for this section of this paper is drawn from Charles Schwartz's *The Ecology of the Greater Prairie-Chicken in Missouri*, which will be the best source of additional information for interested readers on prairie chicken biology specific to Missouri.

independent, and the breeding season is largely over. Beginning in the fall, birds gather and roost in flocks, which continues through the winter. Males will occasionally display on lekking grounds again during late fall. During the winter, birds roost and feed in mixed-sex flocks until the onset of the breeding season, until the approaching spring beckons them to divide into single sex flocks and repeat the process again. Prairie chickens have captured the eyes and imaginations of humans since long before European settlement, and with such interesting behavior and life history, there can be no doubt as to why.

The first humans to have a relationship with the prairie chicken were the Native peoples of North America. Unfortunately, the reliable historical record for American Indians is quite thin in Missouri, especially where peripheral customs and cultural norms are concerned. An examination of compiled oral histories for tribes who historically inhabited Missouri reveals a strong connection with the bison and fewer mentions of elk and other prairie creatures, but thus far, no mention of prairie chickens has been found. This is puzzling for multiple reasons. First, the majority of tribes that inhabited Missouri were of the Prairie-Plains cultural grouping, and some of these tribes show a clear relationship with the prairie chicken in the historical record in other states. Second, given the general Amerindian habit of intertwining conspicuous animals and other elements of the landscape into religious rituals and myths, the absence (or at least lack of any sort of prominent presence) of the prairie chicken from Missouri's Amerindian history seems bizarre. Third, given the importance of the prairie chicken in the diet of Missouri's European settlers (to be shown later) and at least a marginal importance in the diet of Missouri's Indians, it would be surprising if the prairie chicken did not have some small role of significance in native cultures. Why is this not manifested in the historical record? Following are some possibilities.

The Prairie-Plains tribes that inhabited Missouri prior to European settlement are not as well studied as their more western counterparts, such as the historically prominent Lakota to the

north. While a modest number of historical studies have been compiled about the Osage, tribes such as the Oto and Missouri lack the volume of history found among other tribes. Additionally, most written history is dependent upon records of whites, who very often misunderstood or failed to take proper notice of even the most conspicuous of rituals. The possibility of minor practices slipping through the historical record is not just a possibility, but a large probability. Lastly, there is significant evidence that prairie chickens played a significant role in the cultures of Prairie-Plains tribes outside Missouri. A compiled oral history of the Blackfeet has a prominent myth about prairie chickens that gives the bird a reasonably high status.¹⁴ The recent explosion of “prairie chicken dancing” at intertribal dance gatherings, or “pow-wows,” also suggests some deep-rooted connections in many Native cultures. A published interview with George Ceepeekous, a prairie chicken dancer who danced for over five decades, suggests that like most current native dances, the prairie chicken dance has its roots in centuries-old Prairie-Plains tradition, many now lost.¹⁵ In this dance, men emulate the mating display of the male prairie chicken in time to music. While there were admittedly many distinctions between Prairie-Plains tribes, it would be very strange if some of these cultural influences of the prairie chicken did not extend to Missouri’s Indians. Unfortunately, the author was unable to obtain enough information to say for certain.

As previously mentioned, prior to European settlement, the prairie chicken was abundant in Missouri. While the exact number of prairie chickens will never be known, estimates all place the presettlement population of prairie chickens well into the hundreds of thousands, perhaps even over one million.¹⁶ As for their historical range and distribution, chickens probably occupied every reasonably sized section of prairie, and thus, the map of presettlement prairie as shown in Fig. 1 also likely correlates to the prairie chicken’s historical range. The presence of prairie

¹⁴Percy Bullchild, *The Sun Came Down: The History of the World as My Blackfeet Elders Told It* (Lincoln: University of Nebraska Press, 2005), 165-167.

¹⁵ Saskatchewan Indian, Powwow Issue 1999, “George Ceepeekous: Dancer,” <http://www.sicc.sk.ca/saskindian/a99pow03.htm>

¹⁶ Christisen, 7.

chickens in scattered tracts of grassland in the Ozarks and the sand prairies of the Mississippi Lowlands suggests that chickens were capable of surviving even in relatively isolated pockets of prairie. It is also possible or even likely that some of the prairies in Missouri flourished due to Native American influence. Mississippian moundbuilders historically ruled over the St. Louis area before their demise, and there had been over 122 square miles of prairie within the present border of St. Louis City and St. Louis County at the time of the first official survey. The evidence suggests much of this prairie was created at the hands of humans. Nonetheless, the prairies of St. Louis (along with the populations of prairie chickens that inhabited them) were among the first to be destroyed by European settlement, as they were already markedly decreasing by 1821.¹⁷ Schroeder also notes that St. Louis could probably be considered the first “prairie city” of the United States, though one would be hard-pressed to find prairie there anymore.

In the early 1800s, primary documents begin painting a more concrete historical picture of the prairie chicken. Meriwether Lewis and William Clark encountered prairie chickens at many points along their journey, including in Missouri, as mentioned previously. In the early nineteenth century, where prairie chickens were found in large numbers, Missourians owed a large degree of their sustenance from game to prairie chickens. Missouri was experiencing explosive population growth, and there is no doubt that the prairie chicken was an important food source and trade good for many of Missouri’s residents. At least one account from southwest Missouri lists it as a critically important game bird, only trailing the wild turkey in significance among fowl.¹⁸ Trapping was the easiest method of capture, which was accomplished by putting traps out in fields with waste grain, and could result in the successful taking of dozens of birds at a time in one trap. Post-breeding flocks reportedly regularly consisted of hundreds of birds. But the massive swell of immigration to Missouri was not without detrimental consequence to

¹⁷ Schroeder, 16.

¹⁸ Wiley Britton, *Pioneer Life in Southwest Missouri* (Kansas City, Missouri: Smith-Grievess Publishers, 1929), 106.

wildlife, as humans began to cultivate the land and hunt game for food with greater intensity. As early as 1820, there are written accounts of game scarcity from many regions of the state, including western Missouri along the Platte River (1812), most of the Ozarks with the exception of the White River region (1818), and areas surrounding St. Louis, including the Cuivre River region (1820).¹⁹ Yet even areas that had plentiful game, such as the White River region, were decimated only a few years later. The 1818 report of plentiful game of the White River region was soon followed by a plea from the chief of the Delaware Tribe, living briefly in exile in the area, that without government aid his people would die of starvation from a lack of game. It was also during this period that the plowing of the prairie soil in Missouri began, with a record from Saline Co. in 1819.²⁰ While the initial impact of the plow was small, the turning of the prairie sod would eventually become an issue of utmost importance to the prairie chicken. The “prairie problem,” as it was called, was gradually solved by European settlers. Steel plows, originated by John Deer, had become available in 1837 and were reported to be much more reliable and effective than their cast-iron counterparts.²¹

Most settlers still dismissed prairies as less than ideal for human habitation through 1850, and to some degree, those prairies had avoided much of the market overhunting that had plagued other regions of the state. But as settlers began moving in droves and the spigot of settlement began flooding the prairie, the prairie chicken’s situation worsened. The human population of Missouri increased 79% between 1840 and 1850, and Missouri’s population grew by another 73% between 1850 and 1860, resulting in a population explosion of over 200% in twenty years.²² The onslaught of market collection proved impossible to avoid for prairie chickens in the more

¹⁹Daniel McKinley, *A Chronology and Bibliography of Wildlife in Missouri* (Columbia, Missouri: University of Missouri Library, 1960), 12-13.

²⁰ *Ibid.* It must be noted that McKinley’s chronology draws upon hundreds of individual sources, the vast majority of which are unavailable to the author due to the age of the documents and incomplete citations in the text. The author has elected to cite each piece of information to McKinley, but most come from other sources and contain some of McKinley’s interpretation. Where the source is deemed to deserve special notice, whether to infer credibility or a lack thereof, the source is specified in the text.

²¹ *Ibid.*, 17.

²² *Ibid.*, 16-19, author’s calculations.

populated regions. Prairie chickens were one of the six animals to earn partial protection in Missouri's first game law, put into effect in 1851. Applicable only to St. Louis County, the law limited hunting of prairie chickens to five months of the year and forbade the selling of prairie chickens during closed periods. The prairie chicken shared the designation of the strictest season limit with two other game species, turkey and deer, while other popular game species, including quail, were only afforded looser protections.²³ Yet this relief came too late, as the prairie chicken was extirpated within a thirty-mile radius of St. Louis only two years later. Four years after the total disappearance of the prairie chicken near St. Louis, absolute legal protections were placed upon the prairie chicken in Lincoln and Pike counties immediately north of St. Louis County. This ban was repealed two years later, as enforcement of such laws was notoriously difficult.

Market hunting outside the St. Louis area persisted unabatedly through the early 1870s. Hunters were paid off by the dozen for prairie chickens in most known cases, a dozen chickens fetching from \$1.25 to \$1.50 in southwestern Missouri. Because of the intensity of market hunting on many species, Missouri's first statewide game law was passed in 1874. The law protected prairie chickens for 6 ½ months a year, and the sale of prairie chickens, even if collected outside the state legally, was prohibited during the closed season.²⁴ One loophole, however, allowed farmers to net or trap prairie chickens on their own property, in or out of season. The trend towards protection of prairie chickens continued in 1877 with the passage of a Missouri state law that made it illegal for any non-resident to "to kill, ensnare, trap, or net any... pinnated grouse."²⁵ Undoubtedly the passage of this law stemmed from the concern over market hunters who would travel between areas of plentiful game and also had little concern for long-term populations of game species within Missouri. Aldo Leopold later referred to this time of open or long seasons as the era of the "chicken trains," presumably referring to the trains that

²³ Ibid., 17. From census data.

²⁴ Ibid., 23.

²⁵ Ibid.

brought market hunters in mass numbers from further east, and perhaps also the trains that brought boxcars of dead prairie chickens back to market.²⁶

As an aside, around this time, Missouri's only indirect record of the Lesser Prairie-Chicken occurred, based upon a delivery of approximately thirty Lesser Prairie-Chickens that appeared in a New York market that were reported to have been taken in Missouri. Lesser Prairie-Chickens are closely related to Greater Prairie-Chickens, but are slightly smaller and inhabit drier areas. There is a great amount of uncertainty surrounding this record due to some complicating factors. First, Missouri lies outside the traditional range of the Lesser Prairie-Chicken, although they were sporadically reported from eastern Kansas, especially when the bird was more common in the nineteenth century. Second, while prairie chickens are known to wander sometimes, the presence of thirty birds so far from their usual range is very unlikely. Current sources treat the Lesser-Prairie Chicken as a hypothetical visitor, given the uncertainty of records.²⁷

As for the Greater Prairie-Chicken, the late 1800s brought a continuation of trends very unfavorable to the bird's population. Prairie chickens were getting scarcer, and hunters had to travel much farther afield to find them. The seasonal hunting restrictions were also upped to eight and a half months in Missouri in 1878.²⁸ The anonymous editor of *American Field*, as reported and explained by Daniel McKinley, had the following to say about the condition of the prairie chicken in 1881:

“You will not find very good chicken shooting in either Illinois or Missouri...”,
but he thought both northwestern and southwestern Missouri offered better
hunting than any part of Illinois. Around Sedalia, which had been famous for

²⁶ Aldo Leopold, *Game Survey of the North Central States* (Madison, Wisconsin: Sporting Arms and Ammunition Manufacturers Institute, 1931), 186.

²⁷David Easterla and Mark Robbins, *Birds of Missouri* (Columbia and London: University of Missouri Press, 1992), 117. There is some ambiguity in the date of the Lesser Prairie Chicken occurrence. McKinley lists it in 1877, while Robbins and Easterla date the event in the 1880s.

²⁸ McKinley, 24.

prairie chickens only a few years before, however... [an observer] said that all game there was exceedingly scarce except for quails.²⁹

The introduction of non-native grasses also hurt prairie chickens in Missouri, though initial actions probably caused only minor repercussions. As mentioned previously, native prairie is wonderfully diverse in its plant composition. This diversity leads to a mixed state of cover for grassland birds. Many native grasses tend to grow in clumps, allowing prairie chickens (especially young ones) avenues through which to travel. Non-native cool-season grasses, with some exceptions, tend to grow in much thicker and with less species diversity, making foraging, roosting, and nesting more difficult for chickens. By 1880, bluegrass, one such introduced species, was common in northern Missouri.³⁰ Native grasses showed very little tolerance for overgrazing, and they gave way to imported bluegrass as cows and other herbivorous animals grazed them down to the soil. White farmers also suppressed fire, and trees and other woody encroached upon grasslands.

Yet overhunting and the impending actions of the plow remained the most apparent threats for prairie chickens in the late nineteenth century. Prairie chickens had already all but disappeared from parts of northwest Missouri, including Nodaway County. The game laws put in place during earlier decades had not been at all effective. Enforcing the non-resident game law was particularly difficult, and was only done so sporadically and with little vigor. The legal harvest of prairie chickens continued to be extraordinary. *Forest and Stream* estimated the 1886 haul of prairie chickens from Missouri to be 38,911. McKinley has little faith in the figures provided by *Forest and Stream* as absolute totals, and they may only represent minimums, as other species estimates appear to be almost comically low. Around this time, the rumblings from sport hunters for stricter laws and effective application of existing laws also became stronger, as game became increasingly scarcer from market hunting, with reports of prairie chicken scarcity

²⁹ Ibid., 29.

³⁰ Ibid., 26.

now coming in from the relatively underpopulated northeastern counties. As a result, a five-year moratorium was placed on selling or shipping prairie chickens within the state in 1893.³¹

In the years between 1850 and 1900, Missouri had seen a dramatic increase in improved farmland. In 1850, there were only three million acres of improved farmland, but as of 1900, over twenty-three million acres of land were in active use.³² Though there are no comprehensive prairie chicken population figures for this time period, it is assured that such an increase in plowing and seeding had a large negative net effect on prairie chickens. At first, the small farms that sprang up around Missouri had a positive impact upon prairie chickens, as chickens benefited from the clearing of the forest for agriculture and the waste grains left in fields by farmers. However, as the historical progression towards more thorough cultivation of the landscape ensued, the threshold was crossed where, rather than being helpful, human agriculture became a clear detriment to prairie chickens on a statewide basis. Part of the difficulty of giving even a rough estimate for this tipping point is the widely varying intensity of agriculture in different parts of the state at any given point, and the differing times of the occurrence of denser human settlement in prairie areas. Donald Christisen estimated later that this tipping point of population loss may have occurred in the 1860s, but he also stated that this can never be known for sure.³³ Ralph Yaetter, who studied the prairie chicken in Illinois, estimated a similar date for the peak of prairie chicken populations in Illinois, which suggests that much of the central Midwest was experiencing similar types of pressures.³⁴ Aldo Leopold, whose work with prairie grouse will be discussed later, estimated that prairie chicken numbers peaked in 1870 in Missouri, and that large declines had set in by 1888.³⁵ Interestingly, as settlers expanded westward, the Greater Prairie-Chicken extended its range to the west and north into areas that it had not historically inhabited,

³¹ Ibid., 32-34.

³² Ibid., 38.

³³ Christisen, 7.

³⁴ Ralph Yaetter, "The Prairie Chicken in Illinois," in *Illinois Natural History Survey Bulletin*, Vol. 22 (Urbana, Illinois: Natural History Survey Division, 1943), 413.

³⁵ Leopold, 166.

as shown by Leopold. This expansion is attributed to the same factors (availability of waste grains and clearing of unsuitable habitat) that caused the increase in prairie chicken numbers in their “normal” historical range during this time period, namely the early to mid-1800s.

The early twentieth century brought some victories for the prairie chicken in Missouri. In 1901, an Audubon Society was created in Missouri, making Missouri the twenty-third state to have such a conservation organization dedicated to birds. The Audubon Society became an advocate for the general well-being of wild birds, and there can be no doubt that it also lobbied on behalf of prairie species such as the prairie chicken. In 1905, Missouri established a game code, which contained many of the concessions that wildlife advocates had been asking for. Sport hunters had been also been vocal advocates for protection of many game species for some time as well, and there can be no doubt their work affected policymaker’s decisions, and had been responsible for some of the earlier protections. Thanks to the new law, prairie chickens could only be taken for one month out of the year, with a daily and possession limit of 25 birds. Two years later in 1907, an annual report of the Missouri State Game and Fish Warden estimated that only 12,500 prairie chickens still survived in the wild in Missouri.³⁶

Luckily for environmental historians, in 1907, Otto Widmann published *A Preliminary Catalog of Birds in Missouri*, which cataloged the distribution and status of Missouri’s birds. Widmann’s assessment of the state from an ornithological perspective is invaluable, but he also gives a chilling assessment of the environmental state of Missouri at the time. Lamenting the clearing of the Ozark forests and (correctly) predicting the destruction of the swamp forests of the southeast, Widmann indicates his concern for the status of woodlands and forests and the corresponding avian life found within them. However, Widmann does not show concern for the prairie habitat of the state to the same degree, though he does lament the fate of the prairie chicken at the hands of hunters. Widmann published his work before the ban on prairie chicken hunting had been put in place, and he attributed the decline of the chicken to hunting, even with

³⁶ Ibid., 40-41.

the extremely limited season in place at the time. Widmann believed that the prairie chicken was an easy target for any hunter, and that “in a state which issues over 65,000 hunters licenses, one month’s open season undoubtedly suffices to prevent any considerable increase of the small remnants left.”³⁷ Widmann did not recognize habitat loss as a specific factor in prairie chicken declines, but he does state that as human populations become dense in an area, chickens soon disappear. The evidence available today suggests that habitat loss for prairie specialists was generally a large problem at this time. Soon after Widmann published his catalog, a temporary ban was placed on prairie chicken hunting or trapping that same year (1907). Two years later, the ban became permanent, and it has never been lifted since.³⁸

With the initiation of the hunting ban, one finds a relative dearth of information on the Greater Prairie-Chicken in Missouri. This is not particularly surprising, as figures from hunting and testimony from hunters represented the primary source of information on prairie chickens prior to the ban. Aldo Leopold, in his *Game Survey of the North Central States*, offers many insights about the prairie chicken in the Midwest, and to some extent, Missouri specifically, in the late 1920s and early 1930s. On Leopold’s range map, which covers all the north-central states, he shows a modest prairie chicken presence in Missouri. The southwest and north-central portions of Missouri show the greatest concentrations of birds, with no birds present in the Ozarks (though some persisted in the Ozark Border). The northwest region is also largely vacated by this time. He indicates that virtually all his data from the southern portion of his study area (including Missouri) was reported by state agencies, and there are some small questionable holes in sections of northern Missouri where prairie chickens were reported to be in good numbers a decade later by Schwartz.³⁹ However, Leopold does provide a solid foundation for study. He notes the

³⁷ Otto Widmann, *A Preliminary Catalog of the Birds of Missouri* (St. Louis: Academy of Sciences of St. Louis, 1907), 81.

³⁸ McKinley, 40-41.

³⁹ Leopold, 163.

elimination of eleven former remnant populations in Missouri between 1914 and 1928: nine are in northern Missouri, while the remaining two are in the western Ozark Border. He also provides a population estimate of 8,467 for Missouri's prairie chickens in 1929.⁴⁰

For other states in the prairie chicken's range, Leopold outlines some very telling trends. Iowa, for all practical purposes, had already been cleared of prairie chickens, while areas north of the original prairie chicken range such as central Wisconsin were now the bird's stronghold, the chickens having expanded northward following along with white settlement. Much of the eastern range, including large tracts of Ohio, Indiana, and Illinois, had been vacated. By the 1930s, it is clear that the effect of humans on the prairie landscape had already been enormous. Leopold's status as a prominent environmental scholar prompts one to take his advice seriously when he says, "it offers current proof that it is not civilization, but the manner in which civilization uses the land, which determines the presence or absence of gallinaceous game."⁴¹ Considering this statement was made almost eight decades ago, it clearly indicates American society's inability to adjust to a manner of living friendlier to species such as the prairie chicken.

Works from the mid-20th century offer an excellent array of information on prairie chickens in Missouri. In the 1930s Rudolph Bennett ascertained the status of the prairie chicken in Missouri, and Bennett, using his own work and compiling the work of others, was able to estimate the prairie chicken population at three points: in 1929, at 8,467 birds; in 1934, at 5,110 birds; and in 1938, at 6,600 birds.⁴² Beginning in 1940, a young biologist named Charles Schwartz began what was to be the most comprehensive study of the prairie chicken ever undertaken in Missouri. Schwartz described his purpose as, "learn[ing] what factors have limited the range and abundance of the prairie chicken and upon what requirements its welfare depends."⁴³ Schwartz's work, carried out over the course of four years, is thorough enough that a complete review of his work

⁴⁰ Ibid., 170.

⁴¹ Ibid. "Gallinaceous" refers to game birds such as quail, turkeys, and grouse.

⁴² Charles Schwartz, *The Ecology of the Greater Prairie Chicken in Missouri* (Columbia, Missouri: University of Missouri, 1945), 30.

⁴³ Ibid., 13.

is not feasible, but there are many pieces of information uncovered in his research that make it truly noteworthy. Schwartz's range map provides interested parties with an accurate picture of the prairie chicken's distribution in Missouri in the mid-1940s (Figure 3). Comparing this map to Schroeder's presettlement prairie map, it is possible to see how precipitous the prairie chicken's decline had been. Given settlement patterns, it is reasonably safe to presume that the entire prairie range of Missouri was inhabited by prairie chickens in 1800, yet merely a fraction is occupied 140 years later.

There was ample evidence to suggest that intensive agriculture had already eliminated much of the prairie chicken's range. Schwartz continued the work of Rudolf Bennitt, who discovered that prairie chickens were most common on medium-fertility soil throughout their Missouri range. High-fertility soils attract much more intensive cultivation, which is very detrimental for prairie chicken survival due to the corresponding low amount of permanent grass cover, and thus explains their absence from these soils. According to Schwartz, low-fertility soil has a lower natural carrying capacity for prairie chickens; thus one might expect that a given amount of disturbance on low-fertility soil would have a correspondingly greater effect on prairie chicken populations.⁴⁴ Thus, areas of moderate fertility, such as the Shelby soils of north-central and northeast Missouri and the Oswego soils of southwest Missouri, carried the largest numbers of prairie chickens during the time of Schwartz's study. It is worth noting that each of these respective areas had different dominant vegetative covers at this time. Introduced grasses, also called "tame hay" by Schwartz, dominated grass-covered areas in the north central regions (including Sullivan County, which had the highest numbers of chickens). In the southwest, much of the prairie chicken's remaining range was in "wild hay," or native prairie vegetation. At this time, the mid-1940s, the prerequisite of prairie chicken occupation of a given part of its historical range was whether or not the area had sufficient permanent grass cover, regardless of whether or

⁴⁴ Schwartz, 23.

not the cover was native prairie.⁴⁵ This represents a shift from earlier periods where the intensity of hunting by market hunters had been a key variable (if not the key variable) in the strength of prairie chicken presence.

Permanent grass cover was no guarantee of prairie chicken habitation, however. The use of grasslands varied widely, and prairie chicken population densities varied widely with those uses. Schwartz notes that two practices were especially detrimental in the southwest: haying fields twice per year and spring burning of hayfields. These practices led to a much lower availability of cover for prairie chickens, and probably explained the lack of birds in otherwise suitable habitats. Schwartz also reveals that in northern areas, the prevalence of overgrazing by cattle led to similar issues with a lack of cover. Prairie chickens need cover at all seasons, not just during the nesting season, as chickens of both sexes roost in longer grasses year-round. Regarding the prairie chicken's need for food from agricultural production, Schwartz found it to be a non-issue. After a review of data from Missouri and other surrounding states on the topic, Schwartz came to the conclusion that prevalence of food was not an issue, as prairie chickens were found in areas with very low amounts of row crops, even thriving in such areas.⁴⁶

While there had been previous population estimates (Bennitt et. al), Schwartz's work gives interested parties the first truly comprehensive examination of prairie chicken numbers in the state at a given time. Schwartz used a combination of farmer interviews and booming-ground censuses to create his population estimates. Using this comprehensive method, Schwartz estimated the population for the spring of four different years, from 1941 to 1945. These figures were 1941, 13,692; 1942, 13,413; 1943, 12,153; and 1945, 9,250.⁴⁷ Schwartz makes several observations about these numbers. First, prairie grouse, like many bird species, tend to have cyclical populations. Therefore small, regular decreases and increases should cause little, if any, concern. However, Schwartz does uncover a trend that may be telling. Schwartz stated that the

⁴⁵ Ibid.

⁴⁶ Schwartz, 24-25.

⁴⁷ Schwartz, 35.

most severe declines recorded were nearly all north of the Missouri River. In some years of statewide population decline noted by Schwartz, there was actually no decline in the southwest and western Ozark border, but declining populations in the north had brought down the statewide total. It is possible, though not certain, that Schwartz keyed into a trend without realizing so. Within a few decades, the populations of northern Missouri would be nearly extirpated, and the Osage Plains would become the lone stronghold of the prairie chicken in Missouri.

Schwartz's study also provides a clear window on the causes of mortality and threats to prairie chicken survival in the mid-twentieth century. Roughly one out of four farmers reported knowledge of the occurrence of illegal hunting.⁴⁸ Schwartz asserted that this likely had little effect on larger populations, but that on smaller isolated populations, this could be a critical problem. Additionally, given historical landowner attitudes regarding government agencies, it is likely that not everyone reported the truth to Schwartz, and the hunting may have been more extensive. Besides the land-use problems mentioned earlier, Schwartz adds that spring burning and premature haying destroyed many nests each year. He dismissed the notion that predation was a primary threat to prairie chickens. While there can be no doubt that prairie chickens were preyed upon by a variety of birds and mammals, Schwartz saw no reason to believe that predator control was necessary for prairie chicken management.⁴⁹

Schwartz did, however, recommend management practices that is truly the first management proposal for prairie chickens in Missouri. For obvious reasons, Schwartz recommended keeping a closed season (or hunting ban) on prairie chickens until the population grew to "a higher level than it enjoys at present."⁵⁰ Schwartz also recommended a continuation of the booming ground census that he established, as well as continued efforts on the part of conservation personnel to limit the detrimental practices described earlier, specifically overgrazing, ill-timed mowing, and promiscuous burning. It is also worth noting what Schwartz

⁴⁸ Ibid., 85.

⁴⁹ Ibid., 85-87.

⁵⁰ Ibid., 90.

did not recommend. He saw no use for restocking, as his analysis revealed that the lack of prairie chickens in nearly all cases was determined by improper habitat rather than the prairie chicken's inability to reproduce and return to unoccupied areas. He also did not recommend any form of predator control.⁵¹

Despite the knowledge uncovered by the work of Schwartz and others, the total state population of the Greater Prairie-Chicken continued to decline through the 1950s and 1960s. There were at least two efforts to reintroduce Greater Prairie-Chickens into ranges where they had formerly been found in an effort to boost populations north of the Missouri River. The first effort involved the reintroduction of twenty-five birds at Swan Lake National Wildlife Refuge in Chariton County, but the reintroduction failed in the immediate area.⁵² There is another instance of trapping and relocation that involved the capture of seventeen birds from Pettis County that were later released into Macon County in north-central Missouri. A later range map from Donald Christisen shows an isolated report from Macon Co., but the origin of this record is unclear.⁵³ Ultimately, there were no clear successful reintroductions of prairie chickens in Missouri during this time period. However, the mere effort highlights the belief among wildlife agencies that there was suitable habitat in Missouri that was uninhabited by prairie chickens at the time. This time period did harbor some new hope for prairie chickens, as in 1959, the Missouri Department of Conservation bought the Taberville Prairie Unit in southwestern Missouri. By 1985, the MDC had acquired over 30 prairie conservation areas to help slow the chicken's decline (as well as protect other grassland species), but this acquisition of Taberville represents the first step in that direction. Census data in 1967 had indicated an estimated population of 6,000 male prairie chickens, which would represent a decline from earlier decades; however, the initial results from

⁵¹ Ibid., 92-93.

⁵² Robbins and Easterla, 116.

⁵³ Fred Lee Arthaud, "Populations and Movements of the Prairie Chicken Related to Land Use in Southwestern Missouri" (M.S. diss., University of Missouri-Columbia, 1968), 46. Also Christisen, 6.

management at Taberville showed excellent results for prairie chickens.⁵⁴ This success likely led to the desire for more prairie acquisition as prairie habitat on private land continued to deteriorate.

In 1985, Donald M. Christisen of the Missouri Department of Conservation published *The Greater Prairie-Chicken and Missouri's Land Use Patterns*, a thorough study that gives another clear snapshot of the prairie chicken's position in Missouri in a given period. Christisen's range map (Fig. 4) shows a very different picture of prairie chicken distribution from Schwartz's, despite a time difference of only four decades. The most notable changes are the absence of prairie chickens in several key areas, all of which are in northern Missouri. Sullivan County and surroundings, the former stronghold of the prairie chicken in the state, was now totally devoid of chickens. The entire northeastern corner of the state had been vacated, as well as the former range within the Grand River Grasslands, mostly in Harrison County farther to the northwest. The sole remaining population of prairie chickens north of the Missouri River in Missouri was now in Audrain County and surroundings, roughly 100 miles northwest of St. Louis. It is reported in this study that most of the northern Missouri range had disappeared by the mid-1950s, but the order in which the various populations disappeared is unknown. While the Osage Plains remained more stable, there were changes there as well. Some areas show a decrease in range size, but there are also some small apparent expansions, most notably in the "Cole Camp" area of Pettis and Benton Counties and apparent expansion into Cooper County near the Missouri River.⁵⁵ Whether or not these differences are a result of true expansion or difficulties Schwartz had in getting good data for this region is difficult to say.

Given past trends, the continuation of increasing agricultural intensity throughout the prairie chicken's range should come as no surprise, and Christisen shows this in several ways. In general terms, he noted the presence of "more cultivated land, less native prairie, less hayland,

⁵⁴ Arthaud, 115.

⁵⁵ Christisen, 6.

and more acreage... in non-agricultural use.”⁵⁶ Some of Christisen’s findings are particularly noteworthy. Schwartz’s mapped range of the prairie chicken in Missouri included roughly 2,500 square miles, and Christisen’s only includes 900 sq. miles. Therefore, one might expect a corresponding decrease of over 50% in prairie chicken numbers. However, Christisen notes that the decrease was only about 30%, because densities had actually improved in some areas. This is perhaps attributable to the acquisition and management of thirty-four public prairies in eighteen counties by the Missouri Department of Conservation, as some prairies, such as Taberville Prairie in St. Clair County, had very dense populations of birds both on and adjacent to them.⁵⁷

Also found in Christisen’s work is perhaps the most detailed published analysis of agricultural trends within the prairie chicken’s range in Missouri that is widely available to the public. There is simply too much information to summarize it all, but especially noteworthy is the analysis of land use in Sullivan County. In the years between 1948 and 1958, cattle had increased from 35,800 head to 46,100 head, thus placing grasslands squarely at risk for the overgrazing Schwartz had warned about. Additionally, the acreage of wheat and soybeans had skyrocketed, the latter by a factor of ten, while the acreage in hay had dropped as well. During this time, the number of prairie chickens on Shelby soil (the soil type found in Sullivan county) plummeted from 770 to 0. Christisen also notes changes in the statewide prairie chicken range, as evidenced by data gathered on regular census routes established by Schwartz. In 1945, the balance was 69.2% grassland to 29% plowland on prairie chicken lek sites. By 1982, the percentages were near even, with grassland at 48% and plowland near 47% .⁵⁸ It is also worth noting that most of this shift occurred after 1961, as shown from intermediate figures. The period between 1971 and 1981 was particularly notable for a decline in native prairie from 12.9% to 7.2% of the survey area, and hay as land cover dropped from 23.5% to 16.0%. These last figures

⁵⁶ Ibid., 1.

⁵⁷ Christisen, 8.

⁵⁸ Christisen, 24. The remainder is non-agricultural land.

pertain to census route figures at large, not the cover at lek sites, and thus show habitat loss on a more ominous scale.

Unsurprisingly, the primary factor addressed in prairie chicken decline in the mid-1980s is still the loss of grassland cover, both in quantity and quality. While the contributions of Christisen and McIntosh (the editor and designer of *The Greater Prairie-Chicken and Missouri's Land Use Patterns*) should not be trivialized, since the interim between the 1930s and 1940s, when the works of the Hamerstroms, Yaetter, and Schwartz were published, no “silver bullet” for the recovery of the prairie chicken in Missouri had yet been found.⁵⁹ While there had been a solid amount of research on the effects of proper and improper management on prairie grouse, little had changed in the recommendations for prairie chickens: less grazing on existing grassland, fewer acres of row crops, and more grassland acreage. But clearly adequate progress had not been made, so what needed to be done? Christisen has the following to say, and given his extensive research and the apparent simplicity of the recommendation, it should be considered heavily (author's emphasis added):

Farms and ranches within the prairie chicken range can be productive of this native grouse if at least a ratio of one in four acres is in native prairie or an acceptable permanent grass of good quality... this cover can be maintained at a level attractive to prairie chickens by judicious grazing, haying, and burning *without sacrificing economic gains*.⁶⁰

The fragmentation of suitable blocks of habitat is another problem that has plagued the prairie chicken since intensive European settlement began. Those studying the prairie chicken have long considered habitat fragmentation to be a problem for the prairie chicken, though its effect in Missouri was never directly studied until the 1980s. An extensive study from 1988 found that prairie chickens (especially hens) that inhabited areas with scattered blocks of suitable habitat in a

⁵⁹ The Hammerstroms studied the Greater Prairie-Chicken in Wisconsin, while Yaetter did so in Illinois.

⁶⁰ Christisen, 26.

large landscape had higher mortality rates than prairie chickens that inhabited areas with larger, more contiguous blocks of habitat. This finding was attributed to greater chicken movement to meet needs in areas with scattered tracts of habitat, and also probably increased odds of nest predation or destruction due to heavier nest concentrations in the few suitable areas.⁶¹ While fragmentation was not a new trend by any means, modern efforts at prairie chicken recovery show a near-uniform belief in the value of creating large blocks of habitat, rather than scattered smaller plots, even if the given amount of suitable habitat in each case is equal. Given the steady trend towards fragmentation of native prairie and other suitable habitat through the twentieth century, one can safely say that fragmentation was a large problem in Missouri before it was confirmed in the strictest scientific sense, and it continues to be a problem to the present day.

The most recent history of the prairie chicken can only be covered in modest detail, due to the increase in government activity and corresponding increase of documents related to that activity. In 1997, the Missouri Department of Conservation issued a report on wildlife diversity that highlighted important events and trends regarding the prairie chicken in Missouri. Perhaps the most important developments were the serious efforts at reintroductions in the former strongholds of north-central Missouri. The report acknowledges formally that the experimental reintroduction of prairie chickens to Sullivan County had been met with initial success. Individual winter flocks as large as 75 birds had been reported in Sullivan County, with 58 males having been counted on booming grounds. While the initial number of reintroduced birds was not noted, a winter flock of 75 birds represents a jaw-dropping total in an area where they had formerly been absent. Prairie chickens had also returned to the Grand River grasslands in Harrison County, with a high count of twenty males on the booming ground.⁶² In 1997, the

⁶¹ Loren Burger, "Movements, Home Range, and Survival of Female Greater Prairie-Chickens in Relation to Habitat Pattern" (M.S. diss., University of Missouri-Columbia, 1988), 90-91.

⁶² Carol Davit and Dennis Figg, *Missouri Department of Conservation Wildlife Diversity Report* (Jefferson City, Missouri: Missouri Department of Conservation, 1997), 3. The Harrison County birds came from failed reintroductions in Iowa, as the birds found habitat in Missouri more suitable (information from personal communication with MDC employees). Prairie chickens are noted for their ability to find suitable

reintroduction efforts progressed into an operational stage, with 50 birds reintroduced into both north-central Putnam county and east-central Mercer county, both in north-central Missouri. The Schwartz range map of the 1940's shows a healthy prairie chicken population in Putnam County, but no birds in Mercer County. It is possible that the grassland to cropland ratio was considered favorable by the Missouri Department of Conservation at this time, enough so that they would release birds outside their earlier range.

The tone of the 1997 report clearly suggests optimism for the prairie chicken in north-central Missouri, and the release of birds into Mercer County especially furthers this view. What is unclear, however, is why the reintroductions stopped. The report notes the preliminary intention of the MDC to reintroduce approximately 100 prairie chickens per year for the next four to five years into north-central Missouri, pending fiscal considerations.⁶³ Apparently, the finances for the reintroductions dried up or were reallocated, as they stopped relatively quickly. In 1997, "flocks reintroduced to north central Missouri seem to be doing well... additional small booming grounds are showing up. Winter flock sightings are becoming more common."⁶⁴ Surveys in the following years indicated steep declines in the prairie chicken population in this area. The report also projected that if the overall statewide rate of decline over the previous 28 years held steady, the prairie chicken would be extirpated from Missouri by 2009. Also, the report gives background history and a progress update on the Partners for Prairie Wildlife program. Begun in 1992, it was the first program of its kind, designed to coordinate public and private land management among multiple government agencies in two project areas, one south of Sedalia and the other near Nevada, MO. The program offered shared costs and free technical assistance for landowners, and was reportedly well received. While the Missouri Department of Conservation had historically worked with private landowners, the fact that the first large-scale program was

habitat, covering great distances to do so, and the Harrison county birds inhabit an area managed by The Nature Conservancy for prairie restoration.

⁶³ Ibid., 3.

⁶⁴ Ibid., 37.

chosen for prairies and selected the prairie chicken as a primary target species, speaks to the prairie chickens' status as an important indicator species and importance to contemporary wildlife personnel and landowners.⁶⁵

Despite the increasing intensity of effort for prairie chicken recovery, the species joined Missouri's endangered species list in 1999. This decision was made as a result of the prairie chicken's continuing downward population spiral, as there were now fewer than 1,000 of the birds in Missouri. While prairie chicken populations had only dropped about 30% in the interim between Schwartz's and Christisen's respective studies (a gap of roughly 4 decades), between 1982 and 1999, the statewide population of prairie chickens plummeted by over 80%. Because of this decline in prairie chickens and the corresponding decline in other prairie wildlife, the Grasslands Coalition was formed in 1998 to serve two purposes: "To help the public understand the importance of grasslands... [and] to improve grassland habitat in areas that could make a significant and lasting difference to species like the prairie chicken."⁶⁶ The coalition is comprised of public and private entities such as the Missouri Prairie Foundation, Audubon Missouri, The Missouri Department of Conservation and Department of Natural Resources, as well as many other organizations. The Grassland Coalition identified nine focus areas, all with extant populations of prairie chickens, as areas upon which to concentrate efforts for prairie recovery. The Coalition organized events such as the "Lek Trek" in 2000, designed to promote public awareness of prairie issues by creating a 565-mile tour of sites and events in western Missouri. The trek had educational events for people of all ages, and the mascot of the endeavor (symbolically and literally) was the prairie chicken.⁶⁷ Nonetheless, despite increasing awareness and restoration efforts, prairie chicken populations continued to decline.

⁶⁵ Ibid., 59.

⁶⁶ "Grassroots Work For Grasslands," *Missouri Conservationist*, date unknown.
<http://mdc.mo.gov/conmag/2004/12/40.htm>

⁶⁷ *Missouri Conservationist Almanac*, date unknown.
<http://mdc.mo.gov/conmag/2000/04/almanac.htm>

For this reason, in 2006, the Missouri Department of Conservation and the Grassland Coalition adopted a formal Prairie Chicken Recovery Plan. The recovery plan calls for a continuation of the 1984 and 1991 recovery plans (unavailable to the author) in many respects. The 1984 and 1991 recovery plans were not fully implemented due to time and budget constraints. The core of the 2006 plan, which calls for the adoption of the Partners In Flight (PIF) habitat model, addresses many of the problems that prairie chickens have faced historically in Missouri and elsewhere. The PIF model calls for a continuous core of at least 2,000 protected acres in permanent grass centered near prairie chicken leks. The model also calls for 2,000 of the remaining 8,000 acres within a given 10,000 acres to be additional well-managed permanent grassland.⁶⁸ The long-term goal of the Prairie Chicken Recovery Plan is to establish, to the greatest extent possible, landscapes as close to this PIF model as possible in each of six focus areas. It should be noted that these six focus areas are nearly identical to the nine focus areas proposed by the Grassland Coalition, but three have been lumped together for practical purposes (and to underscore the importance of connectivity between larger populations). The plan suggests, in a preliminary fashion, for the species to be taken off the state Endangered Species List only if the state population of Greater Prairie-Chickens exceeds 3,000 birds, with no less than 200 birds in each of the six targeted landscapes, which are shown in Fig. 5, for a period of ten years. The plan aggressively targets both public and private land within these target landscapes, including a spending estimate of nearly 2.5 million dollars for private land improvements and a total cost estimate of over 10.5 million dollars over five years.⁶⁹ There are also plans to begin reintroductions of up to 500 birds to the El Dorado focus area over the next five years, probably due to the successful rehabilitation of Wah'Kon'Tah Prairie and the surrounding area.

⁶⁸Missouri Department of Conservation, *Recommendations for Recovery of Greater Prairie-Chicken in Missouri* (Jefferson City, Missouri: Missouri Department of Conservation, 2006), electronic PDF, 9.

⁶⁹Ibid., 6.

The most recent reports on prairie chickens in Missouri provide reason for both disappointment and optimism. Populations of prairie chickens declined in every single focus area in the period between 2005 and 2007, and the total number of prairie chickens outside focus areas decreased by over 50%.⁷⁰ However, prairie habitat restoration is now taking place on public land and surrounding private areas with fervor that is perhaps the greatest the state has ever seen. Only time will tell if this effort is effective in preventing the extirpation of the prairie chicken from Missouri. Additionally, a survey of landowners in close proximity to existing populations of prairie chickens conducted in 2007 showed significant landowner interest in prairie chickens, as 63% described having prairie chickens on their land as very important or somewhat important.⁷¹ However, a majority (over 60%) of landowners in focus areas had not seen or heard a prairie chicken on their land in the last ten years. Limited landowner cooperation is also an issue, as only 24% of landowners answered “yes” when asked if they would be interested in habitat recovery programs to benefit the prairie chicken and other grassland wildlife. An additional 37% answered “maybe.”⁷² Other questions show that many landowners are neutral or positively inclined on many issues of habitat restoration on their land, but few are hostile to the idea. Long-term solutions undoubtedly depend on cooperation from such landowners, making their attitudes towards prairie chickens and other grassland wildlife critical knowledge for agencies wishing to work with them on conservation of prairie chickens and other wildlife.

The “prairie problem” first faced by settlers upon their arrival in Missouri has given way to a new kind of prairie problem. While at first settlers eschewed prairies as inhospitable wastelands, their descendants became exceptionally good at plowing the prairie sod, planting it

⁷⁰Missouri Department of Conservation, *Fiscal Year 2007 Greater Prairie Chicken Recovery Accomplishments* (Jefferson City, Missouri: Missouri Department of Conservation, 2007), 18. Data is extrapolated using the survey method started by Schwartz in the 1940s.

⁷¹*Landowners and Grassland Wildlife Management Survey*, Assessment Resource Center (Columbia, MO: University of Missouri-Columbia, 2007), 26.

⁷²*Landowners and Grassland Wildlife Management Survey*, 6.

with non-native grasses, and turning it into productive farmland and ranchland. The fate of grassland wildlife, especially grassland specialists like the prairie chicken, depends on the ability of humans to strike a balance between the needs of nature and our own demands for food. The contemporary balance is shifted decidedly in the human direction. Currently, less than one-half of one percent of the historical native prairie in Missouri remains. While the contemporary plight of many other habitats are reported on and understood at least on an elementary level by the general public, the destruction of the prairie remains a virtually unknown ecological catastrophe. The threats of deforestation in the world's rainforests and global warming destroying the fragile balance of the Arctic tundra and polar ice environment are two issues that have the attention of the mainstream. To some degree, wetlands (and the protection from flooding that they provide) have begun to receive increase attention because of recent disastrous floods. The prairie, and most of its wildlife, is unfortunately still largely ignored.

For all intents and purposes, Missourians can never expect to regain the vast swaths of prairie that once blanketed the state, nor the numbers of prairie chickens that inhabited them. In truth, it is uncertain whether or not prairie chicken populations of any size can persist in the state on a long-term basis. The decline since the late 1800s has continued unabated, with only a few exceptions, to the present day. While market hunting of prairie chickens has long since been eliminated, the prairie chicken still faces many other threats. The primary threat is, and has been for over a century, the loss of grassland cover to increasingly intensive modes of agricultural production. Continued plowing over of former grasslands, overgrazing of pasturelands, and overhaying of fields are the primary culprits, and these practices have persisted for decades. The solution to improving prairie chicken populations is relatively simple: reverse the loss of grassland cover to the greatest extent possible.

However, as the old adage implies, "simple" and "easy" can often be worlds apart. The realities of farm economics and consumer demand for agricultural goods have made it difficult to hold the grassland status quo, and any real improvements are often the result of costly, time-

consuming, and sustained efforts. While such efforts are currently taking place statewide, success is not assured. The Heath Hen, the eastern subspecies of the Greater Prairie-Chicken, is already extinct. The Attwatter's Prairie Chicken, the southern coastal subspecies, is perilously endangered, with less than 100 birds (mostly of captive-reared origin) left in the wild. The Lesser Prairie-Chicken is struggling as well, and with few exceptions the Greater Prairie-Chicken is still declining throughout its range. It is now critically endangered in Missouri. Any permanent solution to the new prairie problem must involve a long-term solution that addresses the need for sustainable ways to use grasslands, and also must involve a more judicious use of existing plowland. Species with large home ranges, such as the prairie chicken, simply cannot depend on a few government-owned areas for their survival, as evidenced by the modern declines in such areas. Government agencies and private environmental organizations can only do so much with limited resources.

History has given us plenty of reasons to doubt whether humans will have the commitment to solve the new prairie problem. In a larger sense, the prairie chicken is an excellent example of the difficulties faced in many environmental dilemmas. Oftentimes there are no easy solutions, and believing that most problems can be patched with small quick-fixes is naïve. There are few better symbols for these sorts of environmental issues than the prairie chicken, and only time will tell if these birds will be a symbol for the success of conservation or an extinct symbol of a dying landscape.

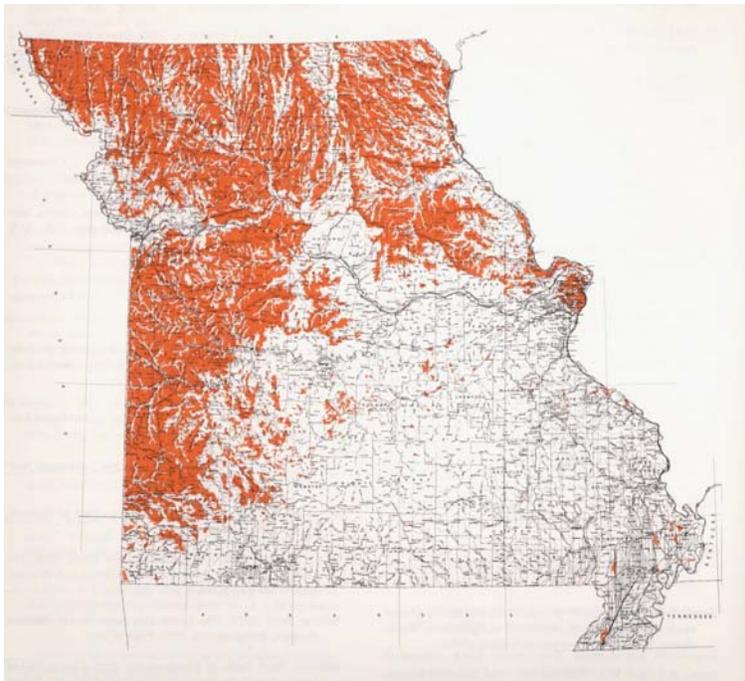


Figure 1. Presettlement Prairie of Missouri, Walter Schroeder, 1981. Prairie areas are dark.

The NATURAL DIVISIONS of Missouri and Their Sections

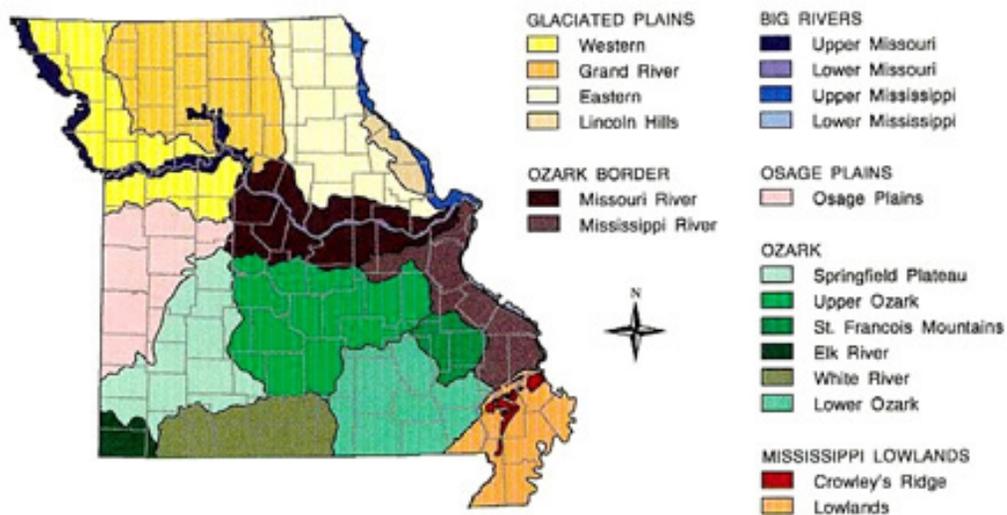


Figure 2. Natural Divisions of Missouri. Missouri Department of Conservation.

Mdc.mo.gov/areas/natareas/natural.htm Note that this map, like some others, divides the Ozark Highlands into the Ozark and Ozark Border.

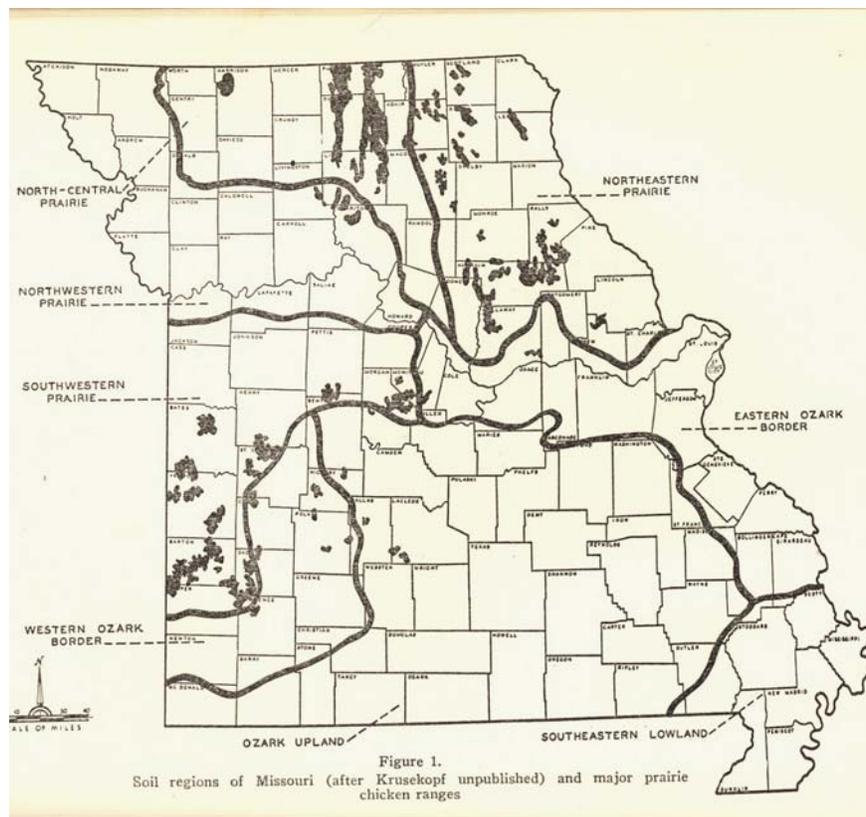


Figure 3. Prairie chicken range in Missouri in mid-1940s. Charles Schwartz.

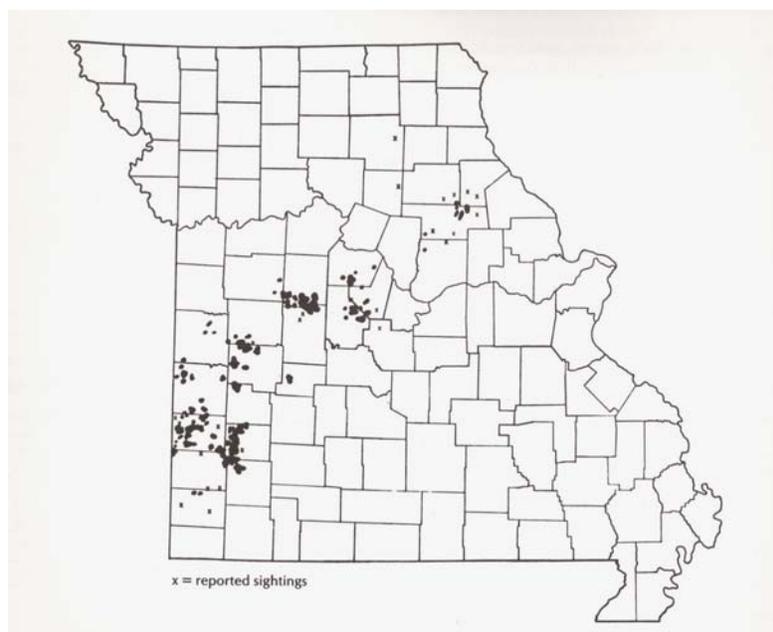


Figure 4. Occupied prairie chicken range in mid-1980's. Donald Christisen.

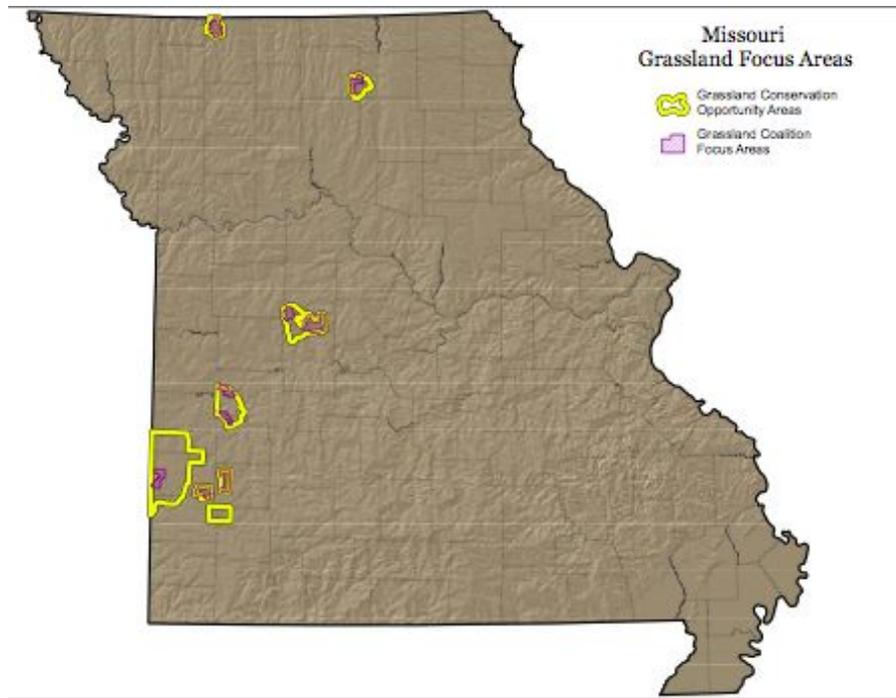


Figure 5. Grassland Coalition/Prairie Chicken Focus Areas. Missouri Department of Conservation, 2007.

Bibliography

- Arthaud, Fred Lee. "Populations and Movements of the Prairie Chicken Related to Land Use in Southwestern Missouri." M.S. diss., University of Missouri-Columbia, 1968.
- Britton, Wiley. *Pioneer Life in Southwest Missouri*. Kansas City, Missouri: Smith-Grievess Publishers, 1929.
- Bullchild, Percy. *The Sun Came Down: The History of the World as My Blackfeet Elders Told It*. Lincoln: University of Nebraska Press, 2005.
- Burger, Loren W. "Movements, Home Range, and Survival of Female Greater Prairie-Chickens in Relation to Habitat Pattern." M.S. diss., University of Missouri-Columbia, 1988.
- Christisen, Donald M. *The Greater Prairie Chicken and Missouri's Land-use Patterns*. Terrestrial Series No. 15. Jefferson City, Missouri: Missouri Department of Conservation, 1985.
- Davit, Carol, and Dennis Figg. *Missouri Department of Conservation Wildlife Diversity Report*. Jefferson City, Missouri: Missouri Department of Conservation, 1997.
- Easterla, David, and Mark Robbins. *Birds of Missouri*. Columbia and London: University of Missouri Press, 1992.
- "Grassroots Work For Grasslands." *Missouri Conservationist*, date unknown.
<http://mdc.mo.gov/conmag/2004/12/40.htm>
- Martin, Don. *Pasture/Hayland Seedings and Their Suitability for the Prairie Chicken*. Jefferson City, Missouri: Missouri Department of Conservation, 1988.
- Leopold, Aldo. *Game Survey of the North Central States*. Madison, Wisconsin: Sporting Arms and Ammunition Manufacturers Institute, 1931.
- McKinley, Daniel. *A Chronology and Bibliography of Wildlife in Missouri*. Columbia, Missouri: University of Missouri Library, 1960.
- Missouri Conservationist Almanac*. Date unknown.

- <http://mdc.mo.gov/conmag/2000/04/almanac.htm>
- Missouri Department of Conservation. *Fiscal Year 2007 Greater Prairie Chicken Recovery Accomplishments*. Jefferson City, Missouri: Missouri Department of Conservation, 2007. Electronic PDF.
- Missouri Department of Conservation and Assessment Resource Center. *Landowners and Grassland Wildlife Management Survey*. Columbia, Missouri: University of Missouri-Columbia, 2007.
- Missouri Department of Conservation. *Recommendations for Recovery of Greater Prairie-Chicken in Missouri*. Jefferson City, Missouri: Missouri Department of Conservation, 2006. Electronic PDF.
- Nelson, Paul W. *The Terrestrial Natural Communities of Missouri*. Jefferson City, Missouri: Missouri Department of Natural Resources, 2005.
- Nigh, Timothy A., and Walter A. Schroeder. *Atlas of Missouri Ecoregions*. Jefferson City, Missouri: Missouri Department of Conservation, 2002.
- Saskatchewan Indian. Powwow Issue 1999. "George Ceepeekous: Dancer."
<http://www.sicc.sk.ca/saskindian/a99pow03.htm>
- Schroeder, Walter A. *Presettlement Prairie of Missouri*. Jefferson City, Missouri: Missouri Department of Conservation, 1982.
- Schwartz, Charles. *The Ecology of the Greater Prairie-Chicken in Missouri*. Columbia, Missouri: University of Missouri, 1945.
- Skinner, Robert M., Thomas S. Baskett, and Michael D. Blenden. *Bird Habitat on Missouri Prairies*. Jefferson City, Missouri: Missouri Department of Conservation, 1984.
- Widmann, Otto. *A Preliminary Catalog of the Birds of Missouri*. St. Louis: Academy of Sciences of St. Louis, 1907.
- Yaetter, Ralph. "The Prairie Chicken in Illinois." In *Illinois Natural History Survey Bulletin*, Vol. 22. Urbana, Illinois: Natural History Survey Division, 1943.