



UNIVERSITY OF NEBRASKA-LINCOLN

EC305



MANAGEMENT OF SANDHILLS RANGELANDS FOR **GREATER PRAIRIE-CHICKENS**

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Greater prairie-chickens fascinate landowners, hunters, and birders alike. They are a symbol of the natural heritage of the Great Plains. Their colorful mating rituals decorate pastures, and their booming calls add charm to meadows.

Many landowners want to learn more about managing pastures to increase the number of greater prairie-chickens. Some have a personal desire to conserve the species. Others recognize that these native grouse offer income opportunities in the form of fee hunting and ecotourism. The more information landowners have, the easier it will be to find these birds and make sure they flourish year after year.

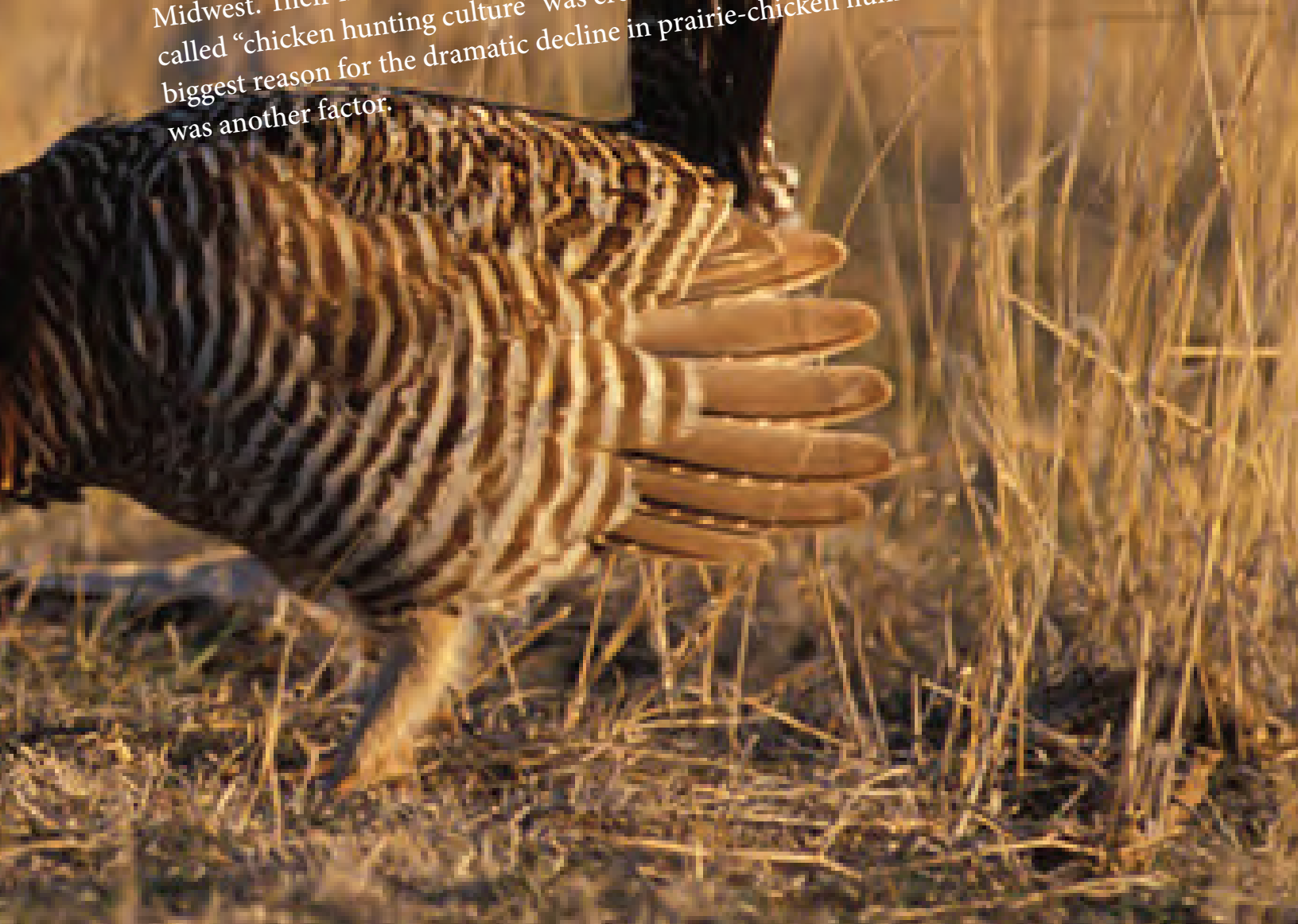
Whatever your interest in greater prairie-chickens, learning more about this interesting species will help you maintain their habitat while you maintain your land.





Stuhr Museum of the Prairie Pioneer

Millions of greater prairie-chickens once inhabited the vast prairies in the Midwest. Their numbers were so great that in the late 1800s and early 1900s, a so-called "chicken hunting culture" was created. The loss of habitat was, by far, the biggest reason for the dramatic decline in prairie-chicken numbers, but hunting was another factor.



INTRODUCTION

About the Greater Prairie-Chicken



FIGURE 1. Two male greater prairie-chickens performing a mating dance on a lek.

A species of prairie grouse historically found in the central part of North America, the greater prairie-chicken is a frequent attraction among birders and hunters alike. Slightly larger than a football, these birds can be identified by their broad chests, plumage with brown and beige bars, and orange marks above their eyes. Males are characterized during their mating dance by their black feather “ears,” orange air sacs on their neck, and fanned tails that they display.

The Sandhills of Nebraska are also home to another species of grouse — the sharp-tailed grouse. To distinguish males during breeding dances, sharp-tailed grouse have purple air sacs on the neck, and the sacs are orange on prairie-chickens. Sharp-tailed grouse have more feathers on their feet, and they lack the long “pinnae” or ear feathers, which are erected during male courtship displays by prairie-chickens. In flight, prairie-chickens have a rounded tail, and sharp-tailed grouse have tail feathers that come to a sharp point. Sharp-tailed grouse use some of the same habitats, but their needs are distinct from prairie-chickens.

The mating dance of the male greater prairie-chickens is a special attraction (*Figure 1*). During this dance — known as “booming” — the males will flare their head feathers, stomp their feet, inflate their air sacs to show dominance, and produce long, low hums broken up by clucks, whines, and cackles. These sounds are known as “booming calls,” and they can be heard from up to 1 ½ miles away. During

booming, males compete with other males for the center-most location of the breeding grounds, areas called “leks.” Females frequent these leks to select a male for mating.

After mating occurs, roughly three-fourths of the hens will choose their nesting site within about 2 miles of the booming grounds. Depending upon the success or failure of their nests, females may mate up to four times within a single season. A hen in the Nebraska Sandhills will lay about 10 eggs per nest.

Special Considerations for the Eastern Nebraska Sandhills

Greater prairie-chickens range from central Illinois to eastern Colorado and from central Oklahoma to northeastern North Dakota. They are most common in areas from eastern Kansas southward into northeastern Oklahoma and from the Nebraska Sandhills northward into South Dakota (*Figure 2*).

Most of the information provided for land management focuses on greater prairie-chickens in tallgrass prairie, but a lot of greater prairie-chickens breed, nest, and live within the more sparsely vegetated lands of the Nebraska Sandhills. This extension circular outlines the best means of managing this region to promote the success of this native, year-round resident of the Nebraska Sandhills.



FIGURE 2. The past and current range of greater prairie-chickens.

TERMS AND TOOLS

Certain terms and tools can help you understand information in this circular.

- ➔ **BROOD:** A collection of baby chicks. Places where baby chicks are reared are called “brooding sites.”
- ➔ **FORBS:** Herbaceous broadleaf plants that grow in meadows or prairies but are not grass. Common types in the Sandhills are western ragweed, cudweed sagewort, stiff sunflower, gromwells, annual sunflower, and prairie clovers. These plants can be sources of food and shelter, making them valuable to greater prairie-chickens.
- ➔ **LEK:** A relatively small area where a group of males gather to engage in competitive displays for the benefit of females who survey potential breeding partners.
- ➔ **LITTER COVER:** Fallen plant material — like leaves and stems — that covers the soil surface.
- ➔ **PREDATION:** Hunting, specifically in terms of a natural predator killing and eating its prey. The most common predators of greater prairie-chicken nests are snakes, coyotes, skunks, raccoons, red foxes, badgers, crows, and ground squirrels. In the Sandhills, adult chickens often fall prey to coyotes, great horned owls, red-tailed hawks, northern goshawks, and northern harriers.
- ➔ **ROBEL POLE:** An inch-and-a-half wide stick that has markings about every 2 inches (*Figure 3*). To use a Robel Pole for measuring VOR (described below), place the pole vertically into the vegetation until the pole contacts the ground. Leaving the pole upright in the vegetation, walk five large steps away (4 yards), and crouch until your eyes are about 3 feet from the ground. Look at the pole. The highest mark on the pole that is completely covered by the vegetation is the VOR.
- ➔ **SHRUBS:** Broadleaf, woody plants with multiple stems. They are shorter than trees. The most common species in the Sandhills are leadplant, rose, and western sandcherry.
- ➔ **VISUAL OBSTRUCTION READING (VOR):** Gives the height and cover density of vegetation in a particular area. The VOR is a valuable tool for land managers — it lets managers keep track of and compare vegetation characteristics in different areas. In this circular, you will see VOR used to describe the nest site and brood site characteristics. You can get the VOR by using a Robel Pole (described above).



FIGURE 3. The proper use of a Robel Pole to measure Visual Obstruction Reading (VOR), a measure of cover density and biomass. Photo by Silka Kempema.

Definition of Land Types

Due to the variety of terrains in the Nebraska Sandhills, it is important to first understand the types of land and vegetation that provide habitat for the greater prairie-chickens. The Sandhills region of Nebraska, one of the largest grass-stabilized sand dune areas in the world, is covered by a unique combination of plants found in tallgrass prairie, mixed prairie, and shortgrass prairie. The Nebraska Sandhills covers about 13 million acres and provides a wide variety of habitats, from low-moisture dune tops to wetlands.

About 80 percent of the land area comprises dune formations or upland prairie (*Figure 4*). These uplands are covered by a variety of warm-season tallgrasses (e.g., prairie sandreed and sand bluestem) with a selection of mid and short grasses (e.g., needleandthread and hairy grama). Broadleaf forbs (e.g., western ragweed) and shrubs (e.g.,

leadplant) are also common. The land's natural characteristics and producers' grazing management affect the distribution and types of plants, resulting in patches of differing plant densities and heights.

The groundwater is at or near the soil surface in the lowlands between the dunes. The lowlands are generally flat and include subirrigated meadows and wetlands located at the headwaters of creeks, along creeks and rivers, or around lakes. These subirrigated and wetland sites are covered by a dense mixture of cool- and warm-season grasses, grass-like plants, and, in places, woody plants such as willows. Vegetation on most subirrigated meadows is harvested for hay in July and August; regrowth is often grazed during the dormant season.



Photo by Eric Schocht

FIGURE 4. Dune formations or upland prairies make up 90 percent of the Nebraska Sandhills.

ECOLOGICAL SITES AND GREATER PRAIRIE-CHICKEN MANAGEMENT ZONES



Photo by Maggie Sliwinski

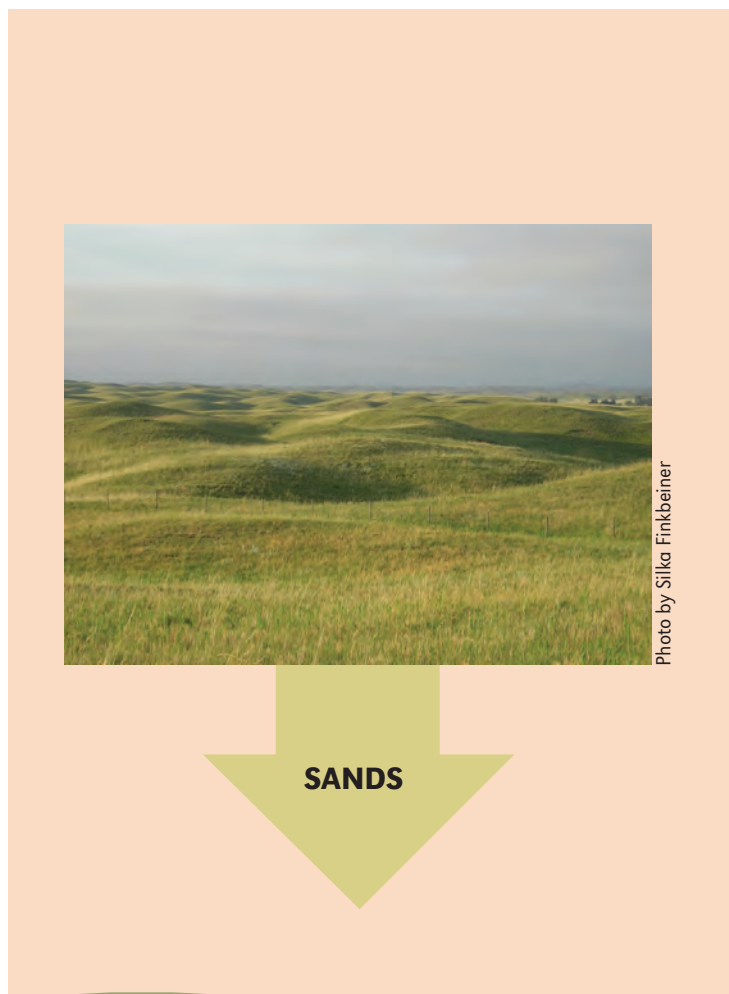


Photo by Silka Finkbeiner

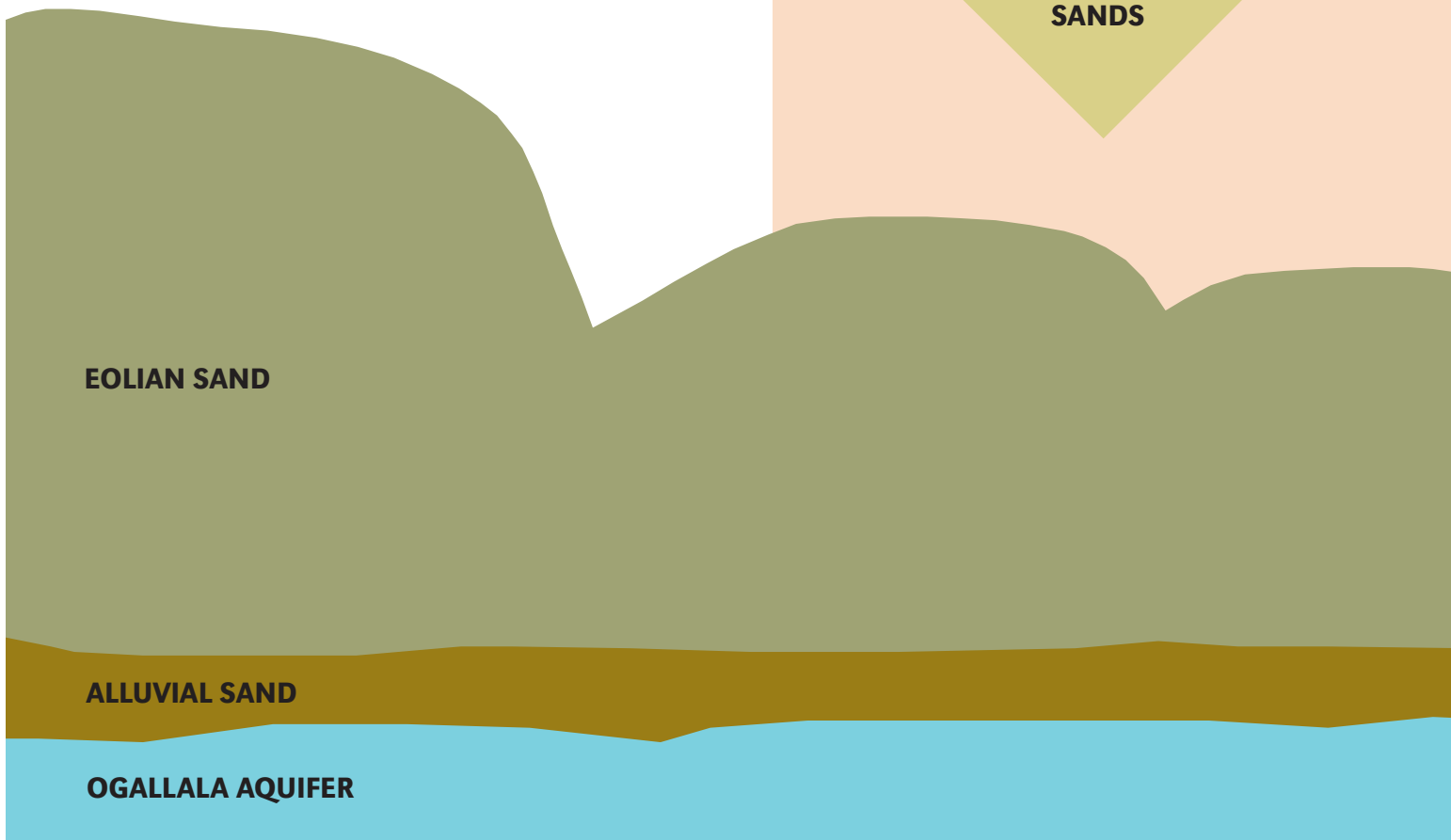


FIGURE 5. Position of four ecological sites in the Sandhills of Nebraska in relation to one another and to geologic and topographic features.

NESTING/BROOD REARING

LEKS



Photo by Jessica Milby



Photo by Jerry Volesky

SANDY

**SUBIRRIGATED
MEADOW**

UPLAND ECOLOGICAL SITES

Sands:

- Most common type of site in the Sandhills.
- Features rolling hills, sandy soil, and slight-to-moderate-grade slopes.
- Surface layer of soil is 2-9 inches thick and remains dry for much of the year.
- Vegetation is a diverse mixture of native grasses, forbs, and shrubs dominated by warm-season tall grasses and patches of mid and short grasses.
- VOR of grazed pastures is generally greater than 1.4 inches with VOR of patches of grasses or shrubs greater than 4.5 inches.
- Sometimes habitat for leks; often habitat for nesting and brood rearing.

Sandy:

- Mostly level sites between hills or above meadows.
- Surface layer of soil is 3-10 inches thick and has loamy/fine sand.
- Vegetation is similar to the sands ecological site and includes some nonnative grasses and short grasses.
- VOR of grazed pastures is generally greater than 2.5 inches with VOR of patches of grass or shrubs greater than 4.5 inches.
- Often includes reseeded mixtures of tall grass with a higher density than native prairie.
- Can be habitat for leks, nesting, and brood rearing.

Choppy Sands:

- Steep hills with frequent erosion/blowouts.
- Surface layer of soil is 2-9 inches thick, sandy-textured, and is very dry during most of the growing season.
- Vegetation similar to sandy and sands sites, but is sparser and less productive.
- Rarely habitat for leks, nesting, or brood rearing.

LOWLAND ECOLOGICAL SITES

Subirrigated meadows:

- Flat areas near creeks, rivers, and lakes.
- Surface layer of soil is 3-10 inches thick, silty or fine-textured, and moist.
- Vegetation generally is dense and made up of tall, nonnative cool-season grasses and grass-like plants.
- Vegetation can be greatly affected by season and harvest management.
- Often habitat for leks; may be habitat for nesting and brood rearing, depending on the water levels, haying, and residual vegetation from previous years.

Wetlands:

- Nearly level areas where water table may be above or near the surface.
- Commonly near subirrigated areas.
- Surface layer of soil is 3-24 inches thick and typically is silty-clay loam or fine sand.
- Often features a layer of partially decayed plants.
- Vegetation includes dense stands of high-yielding grasses and grass-like plants.
- Not good habitat for leks, nests, or brood rearing.

Considerations for Lek Sites

Greater prairie-chickens generally mate in mid- to late-April on mornings with low wind speeds (Figure 5). As described previously, greater prairie-chicken males perform a mating dance to attract a mate. These booming dances occur on specific land areas called leks. Most males return to the same leks year after year.

About three-fourths of all leks can be found on subirrigated sites. Males choose areas on subirrigated sites where the vegetation has been kept short by haying and/or grazing practices — which makes it easier for females to see the bold display of colors and select a mate.

When looking for booming grounds, check near wind-mills, hay meadows, or other places where vegetation is short and visibility is good. In late March and April, stand away from your vehicle on days that are less windy (<10 mph) and listen for noises that sound like someone blowing on a pop bottle. These booming sounds may carry up to 1 ½ miles.

Land management tips

To manage leks:

- Keep the vegetation short-cropped by haying and/or heavy grazing.
- Avoid daily disturbances to the lek. Ecotourism operations should take care to have guests arrive at blinds before dawn; people exiting the blind should minimize disturbance.
- Consider removing large trees or poles in the immediate vicinity of the lek if predators commonly harass the booming birds.

- Maintain quality nesting habitats, especially near leks. Functional leks require females, and females require nearby nesting cover (see “Considerations for Nesting Sites” below).

Considerations for Nesting Sites

Prairie-chickens in the Sandhills are found almost entirely in grasslands used for livestock grazing. Different grazing strategies can change the types of plants in an area over time, which appears to play a valuable role in the birds’ nesting habits. It is especially important to note that while greater prairie-chicken hens do not seem to choose their nest sites based upon the species of plants, they do seem to choose sites based on the previous year’s plant growth. Leaving adequate vegetation in pastures at the end of a growing season will help hens nest next spring.

Because nesting females are concerned with both their nest’s survival and their own survival, nesting sites for greater prairie-chickens in the eastern Nebraska Sandhills follow a certain logic. First, females use areas of the landscape near the lek for nesting so that they can return to the lek for mating if a nest fails. The majority of hens nest within 2 miles of the lek. Researchers have followed radio-tagged hens to nests up to 12 miles from a lek, but long movements are rare. Second, females need cover for nesting. Prairie-chickens find sites for nesting that have tall, dense vegetation with relatively high VOR compared to surrounding areas (about 4.5 inches in upland pastures) as shown in Figure 6. These high VOR patches generally are less than 10 feet in diameter and are surrounded by shorter grasses with a VOR of about 2 ½ inches. Researchers believe that females choose

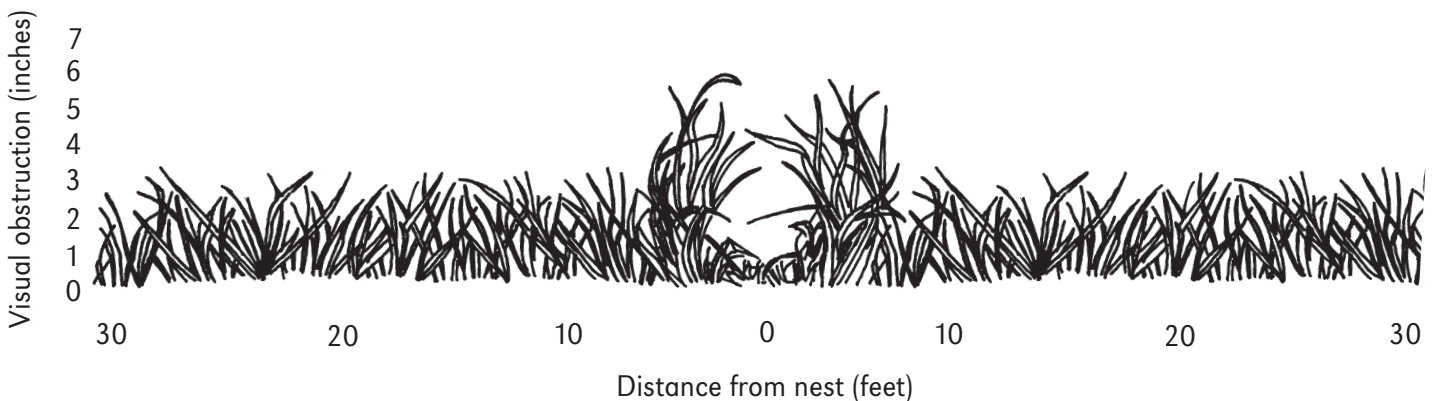


FIGURE 6. Prairie-chickens in the Sandhills use nest sites with a small patch of vegetation that is taller and denser than the surrounding area.

these sites because they want to find protection for their nest in these denser clumps while still being able to see any coming predators.

Nests commonly are found on upland sites (especially sands or sandy sites). In grazed landscapes, hens appear to prefer dune tops in sands ecological sites, although nests commonly are found in small sandy sites (<1 acre in size) or swales within larger sands sites. Hens occasionally will choose subirrigated meadows for nesting sites if the landscape surrounding the lek mostly is meadows where vegetation from the previous year is available (*Figure 7*). During wet years, birds will be especially likely to use uplands to avoid flooding in lowlands. In contrast, birds may be more likely to select nest sites in dense patches in meadows in a spring following drought because high grazing pressure during the drought would leave fewer plants in the upland sites. Nest sites may vary from area to area, but the themes of (1) diverse leftover cover from the previous year's vegetation and (2) locations near lek sites are the key to thinking about potential nesting habitats on your property.

The vegetation characteristics of nest sites are somewhat different from one ecological site to another. The patchiness preferred by hens for nests (relatively tall, dense patches less than 10 feet across and surrounded by areas of closer-cropped vegetation) is common in lightly to moderately stocked pastures on sands and sandy sites (*Figure 8*). The small sandy areas preferred by hens have relatively dense cover. When hens nest in larger sandy sites that have been reseeded, these sites often include more standing dead vegetation and less shrub cover than other ecological sites. The few nests located in the subirrigated ecological sites tend to have more forb and shrub cover and less standing dead vegetation cover than other ecological sites. Subirrigated sites provide less appealing nesting habitat because of wet conditions in most years, and because of either the lack of cover on hayed/grazed subirrigated meadows or the uniformity of dense, tall cover on subirrigated meadows that are not periodically harvested.



Photo by Jocelyn Olney

FIGURE 7. A greater prairie-chicken nest in a subirrigated meadow.



FIGURE 8. A prairie-chicken hen sits on her nest in a sandy site.

Photo by Jessica Milby



FIGURE 10. A chick struggles to walk through grass and litter.

Photo by Jessica Milby



FIGURE 9. Coyotes are one of several predators of prairie-chicken nests.

Photo by Jennifer Smith

Generally, less than half of prairie-chicken nests will hatch. This number changes from year to year, but predation of up to 60-80 percent of all nests is natural (*Figure 9*). Nest success is important for managing prairie-chickens because the success of nests and broods has the greatest influence on overall population numbers. Females may nest up to four times in a season if nests fail or broods do not survive.

Land management tips

Since grazing plays a key role in creating diversity in plant heights and densities, grazing management can have a huge impact on the success of greater prairie-chicken nests. Some key ideas to keep in mind:

- Stock upland Sandhills pastures at low to moderate rates to create different levels of VOR in these preferential nesting grounds.

- Avoid leaving excessive litter on the ground since litter provides shelter to rodents, which increases the number of predators in nesting areas.
- Leave standing dead vegetation (dry forbs, bunches of dead grass) through the winter to help females choose their upcoming nesting sites.
- Clumps of plants — especially bluestem, rose, and leadplant — are important nesting locations.
- Use rotational grazing at moderate stocking rates or patch-burn-grazing to create a diversity of plant communities, densities, and heights.
- Keep 30-50 percent of lands within 1 mile of leks as hospitable nesting habitat to help maintain and increase prairie-chicken populations.

Considerations for Brooding Sites

In successful nests, eggs generally hatch around the second week of June. Soon after the last egg hatches, the hen will leave the nest and lead her chicks across the landscape to feed on seeds and insects.

The most common causes of chick death are starvation, chilling, and predation (*Figure 10*). Females adapt by choosing brooding sites with vegetation that is dense enough to provide shelter from the sun and predators but thin enough to allow chicks to move. While the density of forbs does not seem to be a major factor in brood site selection, areas with forbs improve the chances of chick survival because of the abundance of insects (food).

As with nesting, the different types of land have different qualities that appeal to prairie-chicken females with broods. Prairie-chicken females with broods are most commonly found on sands ecological sites and tend to choose areas with higher VOR (around 4 inches) and thicker litter cover than what is found in unselected areas. Females with broods seem to avoid lowlands — probably because of high plant density and the greater abundance of predators (especially snakes). When females with broods are found in subirrigated sites, the brood locations tend to have lower VOR and more bare ground than unselected subirrigated sites. Brood sites in reseeded areas of larger sandy sites have

more warm-season grass cover and higher VOR than on other upland sites.

Land management tips

While it is hard to control predators and impossible to control weather conditions, following special land management practices for brood-rearing sites will help increase chick survival and greater prairie-chicken populations. Some key ideas to keep in mind:

- Graze upland sites so that they have a patchy VOR of about 4 inches.
- Use deferred rotational grazing at moderate stocking rates to create varied plant heights and densities.
- Consider using prescribed fire and grazing in a way that the plant life is diverse and not uniformly dense.
- Remove smooth brome grass from brooding sites since this type of vegetation can cause chicks to get wet and freeze to death. Grow native bunch grasses and widely spaced rhizomatous grasses instead to provide better habitat for chicks.

Monitoring Your Land for Greater Prairie-Chickens

Land managers can take the steps found throughout this circular to improve habitat to help maintain or increase prairie-chicken populations.

An important part of managing habitat and wildlife populations is to create a monitoring program. To create such a program, use the Prairie-Chicken Data Sheet on the next page to track your prairie-chicken populations. A map of your property can be used to mark locations of leks that you find.

Populations should be checked at least once a year to see if there are changes from year to year. The most effective monitoring program is to keep track of the populations of each lek. Counting the number of males on each lek annually will let you see how land management in specific areas affects chicken populations from year to year. Remember to use a long-term view when evaluating data from surveys — the numbers of males will vary naturally over time. Constant decline in numbers of leks across your property is a sign that management actions should be changed. A private lands biologist with Nebraska Game and Parks Commission can be contacted to evaluate your situation.

Here are some techniques to keep in mind:

- The number of males on a lek varies each day during the spring. Count males during early April because male numbers on leks are generally more stable from mid-March to mid-April.

- A useful approach for counting males is to spend one morning (daybreak to 9 a.m.) listening for new leks and confirming that leks from previous years are still active.
- If all leks are located well before 9 a.m., return to each lek that same morning to count males; otherwise, return to the leks the next morning to count. When counting males on leks, use binoculars or spotting scopes from 200-300 yards away. Males are typically interested in their competitors on the leks and will not flush unless you get within 200 yards.
- At the end of your observations, walk closer to the lek and flush the birds to double-check your count. Some males will be motionless at the edge of the lek, so the flush improves your count. The birds will return as soon as you leave.

Monitoring is critical, especially for landowners who are interested in managing prairie-chickens for hunting. Care should be taken to not depress the local population beyond its potential for recovery. Harvest managers usually limit harvest to 10-15 percent of a population in a given year, with more conservative limits during droughts or other stressful times.

Taking time to check greater prairie-chicken numbers is an enjoyable way to see how the methods you use to manage your lands can help create a deeper relationship with the animals that live and breed in the landscape. You can have a great impact on this beautiful and interesting species.



Prairie-Chicken Data Sheet

Property Owners: _____

Number of Males Counted					
Booming Ground	Location Description	Year _____	Year _____	Year _____	Year _____
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

Example

Number of Males Counted					
Booming Ground	Location Description	Year _____	Year _____	Year _____	Year _____
1	Pasture 6, near windmill	12	8	9	11



GREATER PRAIRIE-CHICKEN RESOURCES

Discover more information about greater prairie-chicken nest and brood site selection habits:

Visit the USGS management of greater prairie-chickens' site, a part of its series on grassland birds:

<http://www.npwrc.usgs.gov/resource/literatr/grasbird/gpch/gpch.htm>

Two UNL extension circulars are good additional sources of information on possible interactions between grazing livestock and prairie grouse habitat:

<http://www.ianrpubs.unl.edu/sendlt/ec127.pdf>

<http://www.ianrpubs.unl.edu/sendlt/ec158.pdf>

You will find more about prairie birds at UNL's Prairie Birds website:

<http://prairiebirds.unl.edu>

FRONT COVER – A male greater prairie-chicken displays on a lek on private rangeland in the Sandhills of Nebraska. Photo By Larkin Powell.

BACK COVER – A hen standing in the grass with a transmitter on its neck. Photo by Jessica Milby.

Prairie-chicken photos, pages 2-3 and 18, Nebraska Game and Parks Commission/NebraskaLand Magazine. Historic photo, page 3, used by permission of Stuhr Museum of the Prairie Pioneer, Grand Island, Nebraska. Copy and reuse restrictions apply. Photo depicts T. Henry Elsner hunting prairie-chickens near Grand Island, Nebraska, 1890.

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