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Reducing Grouse Collision Mortality by Marking Fences (Oklahoma)

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A number of grouse species collide frequently with power lines, overhead cables, and fences. Because grouse fly fast these collisions are often immediately fatal, but likely a considerable number of birds either succumb later to injuries or become incapacitated and more vulnerable to predation. A multiyear radio-tracking study of the lesser prairie-chicken (*Tympanuchus pallidicinctus*) in Oklahoma found that collisions, primarily with stock fences, were the leading cause of mortality (Wolfe et al. 2007). Several other species of grouse, including the greater sage-grouse (*Centrocercus urophasianus*) in North America and black grouse (*Tetrao tetrix*) and western capercaillie (*Tetrao urogallus*) in Europe, also suffer high mortality rates because of fence collisions (e.g., Catt et al. 1994). In an effort to reduce this unnatural mortality, we explored various ways of marking fences to improve their visibility. Ideal marking material would be easily affixed, inexpensive, durable, and safe for livestock, and would add little or no weight or wind resistance to fences.

The lesser prairie-chicken has declined markedly in both extent of occupied range and population density. After being petitioned in 1995 under the Endangered Species Act, the U. S. Fish and Wildlife Service (USFWS) determined that protection was "warranted but precluded," so the lesser prairie-chicken remains only a candidate for listing. In 1999, we began a long-term study of the species in northwestern Oklahoma and eastern New Mexico to determine causal factors of the decline. In the past ten years, we have captured over 900 lesser prairie-chickens on spring and (sometimes) fall leks. We radio-tagged most males and all females, using a bib-mounted, tuned, looped transmitter with a mortality signal that allows early carcass recovery. All radioed birds were tracked at least weekly until transmitter batteries expired (roughly two years) or until the bird died. For each carcass, we attempted to determine the probable cause of mortality using established criteria (Dumke and Pils 1973) and measured distance to the nearest fence, road, and power line (we estimated distances >100 m).

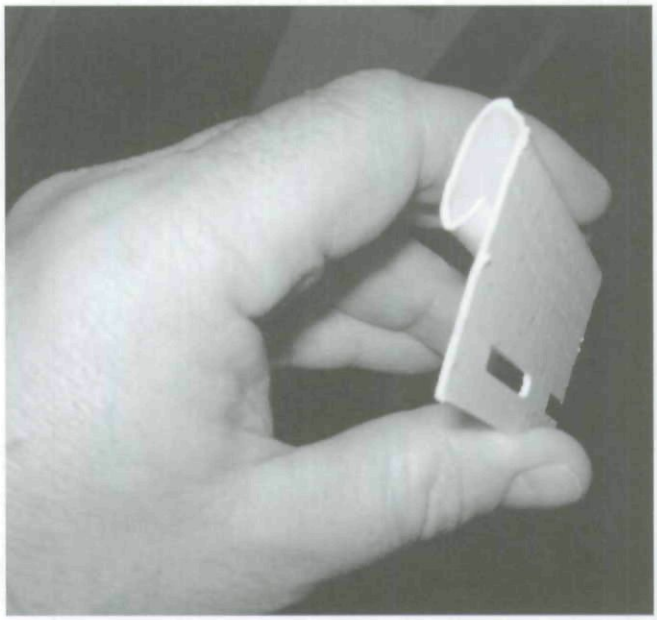

Figure 1. Side view of fence marker cut from vinyl undersill. Photo by Donald H. Wolfe

Fence collisions accounted for over 40% of the mortality (Wolfe et al. 2007). Although some carcasses lay immediately below a fence, the majority resulting from collisions were from several to 30 meters from a fence, suggesting that the bird plummeted or tumbled after impact. Much of the rangeland in northwestern Oklahoma is fenced in 65 ha (1/4 section) pastures, and because county roads usually run along every section line, there is often at least 6 linear miles of fence per square mile (3.8 linear km/km2). We concluded that fence marking could be an important conservation tool for this species.

European efforts to mark fences to reduce grouse collision rates met with success, reducing collisions across species by roughly 70% (e.g., Baines and Andrew 2003). However, material used in Europe—strips of barrier (safety) fence—was both expensive and susceptible to deterioration by ultraviolet radiation. Additionally, whereas strips of barrier fence could be attached to woven wire fences, there is no practical way to attach it to barbed-wire stock fences. The vast majority of fences in our focus area are 5-strand, high-tensile, barbed-wire type, with a typical spacing of 3.7 m between fence posts. Summers and Dugan (2001) evaluated different materials used to mark fences, but the most effective are cost prohibitive if used on a large scale. We therefore experimented with a number of materials and methods, including strips of polypropylene webbing attached to fence posts running parallel to fence wires, strips of aluminum flashing suspended from one wire, and pieces of polypropylene rope wrapped from the top wire to the second wire. All of these methods were either too labor intensive, not visible enough to be effective, or not durable.

Other materials and marking methods likely can be utilized, but we eventually hit upon a solution that met our criteria for cost, ease of application, durability, weight,

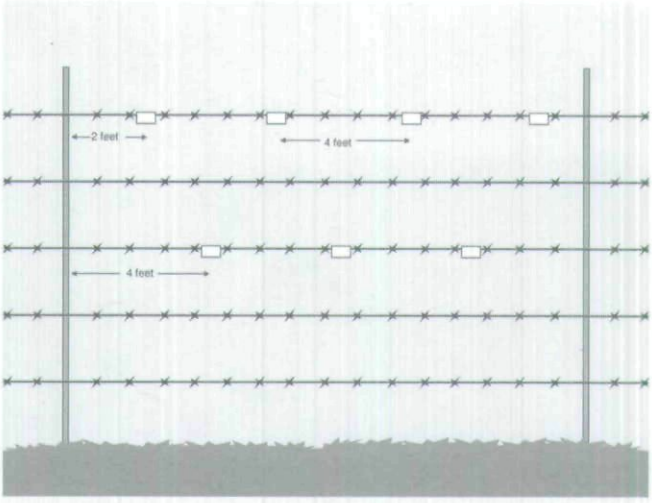

Figure 2. Schematic of suggested fence marker placement.

and visibility. Vinyl siding has become a popular building material for residential structures in the United States. Siding manufactured by Georgia Pacific (and likely other manufacturers) includes "undersill" strips, used for trimming along the bottom edges of houses and around windows and doors. Undersill strips have a molded lip (Figure 1) that can be snapped easily onto a barbed-wire fence. We cut 7.5 cm strips using an abrasive blade on a cut-off or miter saw. For smaller marking efforts, strips can be cut using tin snips.

In an effort to discourage birds from attempting to fly under the top wire, we usually mark both the top and the middle wires. We judged that spacing fence markers about 1.2 m (4 ft) apart renders fences sufficiently visible. Thus, with the typical 3.7-m (12-ft) distance between fence posts, the first marker is placed on the top wire approximately 0.6 m (2 ft) from a fence post, the second 1.2 m (4 ft) from it, and the third marker another 1.2 m away (roughly 0.6 m from the next post). We place two markers on the middle (third) wire, each 1.2 m from a fence post and each other (Figure 2). We deploy approximately 1,250 markers for each linear kilometer (2,000 per linear mile) of fence, although the number of markers can be reduced in low-lying areas or where dense brush or trees obscure the fence. The material costs can vary considerably, depending on suppliers, but generally run about $130/km. Life expectancy for this application remains unknown, but the material is rated for 20 years in normal applications (construction siding). We have had some markers in place for nearly three years, and no visible wear or deterioration has been observed. It is doubtful that this material would survive fire, but as prescribed fire is extremely rare and wildfires are usually suppressed immediately within lesser prairie-chicken range, we feel that this is of minor concern.

From March 2006 through December 2008, we marked 179 km of fences in portions of four counties in northwestern Oklahoma and two counties in the Texas Panhandle. Our earliest marking efforts concentrated on areas where documented collisions are frequent. We thereafter expanded our efforts into other areas where lesser prairie-chickens occurred. A major obstacle has been that we work almost exclusively on private land, so we must secure permission from landowners. In many cases two different landowners shared a fencerow, meaning permission from both was necessary, and some landowners proved reluctant to allow us to mark fences. Common reasons were that they did not believe fence collisions to be a major problem for the prairie-chicken, they had concerns over additional strain on fences or that marking fences would identify the presence of prairie-chickens on their land, or they simply felt the markers were unsightly. However, the Natural Resources Conservation Service and USFWS have begun requiring local landowners to mark fences as part of projects that these agencies fund. Moreover, the U.S. Forest Service and Bureau of Land Management have begun marking fences on some of their properties.

We have also removed approximately 57 km of unnecessary fences in the same areas. Without doubt, removing fences would better assure fewer collision, but it is time consuming and costly (approximately $600/km if outsourced) and would only slightly reduce fence density, since fences are vital to containing livestock.

We have continued to radio-track lesser prairie-chickens throughout the duration of our fence-marking efforts. Along some "high-collision" reaches, we recovered one collision mortality carcass per mile (1.2 km) annually prior to marking fences. After 30 months, we have yet to recover a carcass from a collision along a marked fence. Carcasses continue to accumulate along unmarked fences. We are thus hopeful that our marking efforts will continue to be supported by agencies and landowners because it appears likely that we have a real chance to increase lesser prairie-chicken survivorship and in turn allow dwindling populations to recover in western Oklahoma.

Acknowledgments

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Restoration I

9-11-08

two lovers late restore their love
in dark enraptured repetition—
their metaphors of moments past
offered not in sorrow
but in joyful resignation.

O.A.

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