

Redcedar Removal Restores LEPC Habitat



In Brief: Woody plant encroachment is a leading threat to remaining grassland habitat in the Southern Great Plains. Results from a new study show that female lesser prairie-chickens (LEPCs) did not nest in grasslands with more than 1 tree/acre, placed nests at least 1000 feet from the nearest tree, and stopped using grasslands altogether when tree density reached 3 trees/acre. Removing encroaching redcedars is critical to LEPC habitat conservation. To improve habitat most effectively, conservation efforts should focus on low-density sites, especially those occupied by LEPCs or adjacent to occupied sites.

Oil and Water: Lesser Prairie-Chickens and Redcedar

In the absence of fire, woody plants rapidly encroach upon Great Plains grasslands. Though sometimes called the “green glacier” for its steady progress across the prairie, eastern redcedar encroachment is far from glacial in speed. Open grasslands can convert to closed-canopy forest in as little as 40 years (Briggs 2002).

A new study offers the first empirical data that tests whether female lesser prairie-chickens (LEPCs) avoid grasslands where trees are present. Researchers from Kansas State University and US Geological Survey answered that question with a resounding “yes.”

Using GPS transmitters, researchers tracked the movements of 58 female LEPCs for two years on 35,000 acres of private land in south-central Kansas. They measured the response of LEPCs to trees 3 feet or taller, 80% of which were eastern redcedars. Three key findings emerged:

- LEPCs did not nest in grasslands with more than 1 tree per acre (Figure 1);
- they avoided trees by about 1000 feet on average when selecting habitat and nest sites (Figure 2); and
- LEPCs stopped using grasslands altogether when tree density reached 3 trees/acre (Lautenbach et al. 2016).

LEPCs in the study area were forty times more likely to use habitats with tree densities of 0 trees/acre than habitats with 2 trees/acre. This strong aversion to trees may be a response to a perceived risk of predation, though this correlation is difficult to test. Trees provide perches and hiding cover for raptors—major predators of LEPCs—and for mammalian predators like coyote and bobcat. In addition to confirming that redcedars and prairie-chickens do not mix, the study highlights the importance of redcedar removal in LEPC conservation efforts.



Mechanical removal of trees, teamed with prescribed fire to prevent further woody invasion, benefits lesser prairie-chickens and other grassland-dependent wildlife. Photo: Ken Brunson

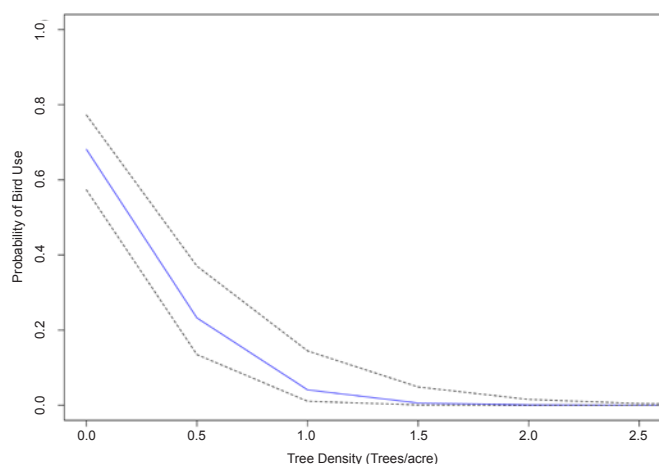


Figure 1. Relative probability of use for female lesser prairie-chickens in relation to tree densities (trees/acre). As tree density increases, lesser prairie-chicken nesting declines, reaching zero at densities greater than one tree/acre (Lautenbach et al. 2016).

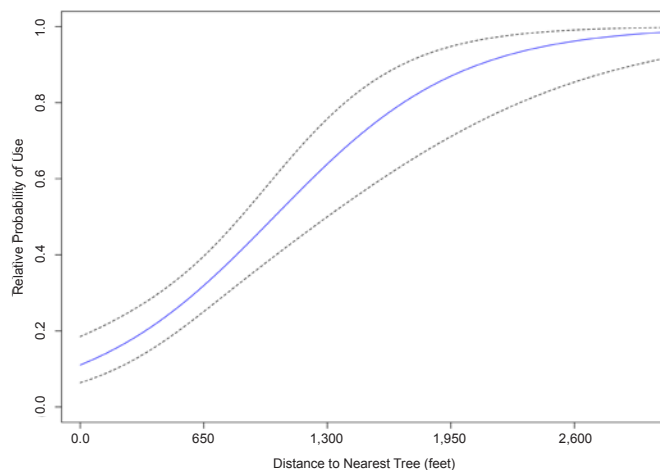


Figure 2. Relative probability of use for lesser prairie-chickens in relation to distance to the nearest tree. LEPC females nested, on average, at least 1000 feet from the nearest tree (Lautenbach et al. 2016).

Grassland to Woodland: The Problem of Encroachment

More than 90% of the grasslands on which the lesser prairie-chicken historically ranged have been lost to row crop agriculture conversion. Today, woody plant encroachment—largely the result of fire suppression—tops the list of threats to remaining prairie. Before settlement, frequent fires and periodic, intensive grazing by bison kept woody plants at bay. Fire suppression across the Great Plains has disrupted this dynamic.

On the east side of the LEPC range, where the Lautenbach research occurred, redcedar is by far the most problematic of the woody invasive species. Redcedar encroachment affects more than 675,000 acres of land in the occupied LEPC range (Table 1). When redcedars overtake grasslands, their presence causes a shift from C4 warm-season grass species to C3 cool-season grasses (Gehring and Bragg 1992), reduces herbaceous species diversity and biomass production, and changes nutrient dynamics (Briggs et al. 2002). This shift has significant negative consequences for both prairie wildlife and domestic livestock production.

Grassland birds have experienced some of the most precipitous declines of any US bird species (Coppedge 2004). Thirty-three species of grassland-obligate birds inhabit the Great Plains. Their preferences for grassland structure and composition vary, but they share an aversion to woody vegetation. As redcedar canopy cover increases, both the abundance and diversity of grassland birds decline, while species associated with shrub and woodland habitat increase (Chapman et al. 2004).

The LEPC requires large blocks of structurally diverse grassland habitat to breed, nest, and successfully rear young. Because of the bird's landscape-level habitat needs, scientists consider it an indicator species for grassland health (Hagen et al. 2004). Improving habitat for the LEPC will benefit many other grassland wildlife species.

Targeted Cutting and Burning for Cost-Effective Control

While not yet directly tested for LEPC, tree removal has proven effective in restoring habitat structure and function for other grassland wildlife species (Alford et al. 2012). The findings of Lautenbach et al. suggest that removing redcedar, even when present at very low densities, is critical to LEPC conservation.

Sites with low-density redcedar encroachment (<10% canopy cover) are the least expensive to treat and give the greatest return on investment. "Because the grasses and forbs are

"Because grasses and forbs are largely intact, low-density sites reset themselves quickly following treatment."

~ Christian Hagen, LPCI Science Advisor

Estimated Acreage of Redcedar Encroachment by Ecoregion						
Area of Redcedar Encroachment*	Woody Canopy Cover	Mixed Grass	Shortgrass/CRP	Sandsage	Shinnery	Total Acres
Entire LEPC occupied area	1-10% (low-density)	414,629	1,902	10,902	13,587	441,020
	11-50+%	219,422	555	4,159	10,055	234,191
LEPC Focal Areas/Connectivity Zones	1-10% (low-density)	105,428	560	4,082	341	110,411
	11-50+%	59,062	252	2,031	50	61,395
* See the Southern Great Plains Crucial Habitat Assessment Tool (CHAT) map, www.kars.ku.edu/maps/sgpchat						

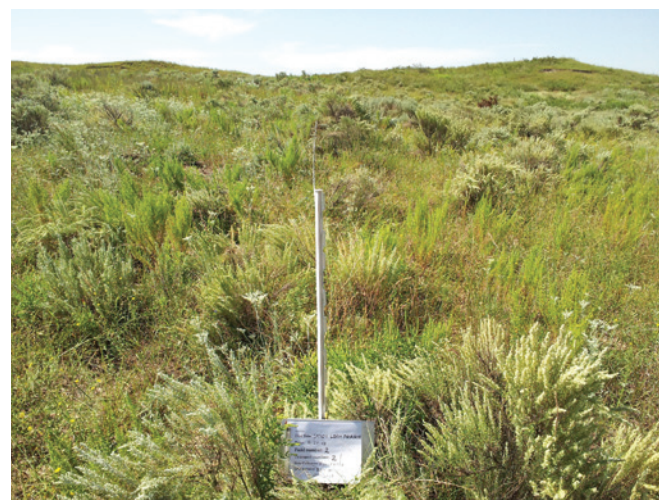
Table 1. Estimated acreage of low- and high-density redcedar encroachment by ecoregion, across the entire LEPC occupied range and within focal areas of critical habitat. Focusing conservation investment on areas with low-density redcedar encroachment (<10% canopy cover) provides the greatest return.

largely intact, these low-density sites reset themselves quickly following treatment,” LPCI Science Advisor Christian Hagen explains. “With high-density sites, you have to do more—not just to remove the trees, but also to bring seed sources back and restore the land to prairie. It’s a case of habitat improvement versus habitat restoration.”

Of the more than 675,000 acres of LEPC-occupied grassland habitat impacted by redcedar encroachment, about two-thirds (441,020 acres) currently (as of early 2016) have low-density redcedar cover. One-quarter of that low-density area lies within LEPC focal areas and connectivity zones, as identified via the Southern Great Plains Crucial Habitat Assessment Tool (see Table 1). Conservation dollars applied to those low-density sites in critical LEPC habitat areas will yield the greatest impact. Time is of the essence, as the redcedar density on these sites will quickly rise.

Restoration guidelines, in brief:

- Focus on stands with low-density redcedar encroachment, giving priority to sites within LEPC focal areas and connectivity zones, and sites already occupied by LEPC or adjacent to occupied sites.
- Use mechanical cutting or prescribed fire to remove all redcedar trees on treated acres.
- Use prescribed fire to maintain or restore open grasslands. Regular use of prescribed fire is a cost-effective way to prevent woody encroachment on grasslands.



Before and after mechanical removal of redcedar. Focusing treatment on lowest-density encroachment sites within the LEPC focal areas and connectivity zones offers the greatest return on investment. Photo: USDA-NRCS.



*Regular application of prescribed fire maintains grassland habitat.
Photo: Jeremy Roberts, Conservation Media.*

Source:

Lautenbach, J., R.T. Plumb, S.G. Robinson, D.A. Haukos, J.C. Pitman, and C.A. Hagen. 2016. In preparation. Lesser Prairie-Chicken Avoidance of Trees in a Grassland Landscape.

Additional Resources:

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Briggs, J. M., G. A. Hoch, and L. C. Johnson. 2002. Assessing the rate, mechanisms, and consequences of the conversion of tallgrass prairie to *Juniperus virginiana* forest. *Ecosystems* 5:578-586.

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Coppedge, B.R., D.M. Engle, R.E. Masters, and M.S. Gregory. Predicting juniper encroachment and CRP effects on avian community dynamics in southern mixed-grass prairie, USA. *Biological Conservation* 115:431-441.

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Hagen, C. A., B. E. Jamison, K. M. Giesen, and T. Z. Riley. 2004. Guidelines for managing lesser prairie-chicken populations and their habitats. *Wildlife Society Bulletin* 32:69-82.

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Photo: Nick Richter.