

Science to Solutions

# Mesquite Removal Restores Habitat for Lesser Prairie-Chickens



**In Brief:** While scientists have long suspected that honey mesquite encroachment negatively impacts lesser prairie-chickens, a new study is the first to quantify that impact. The study shows that lesser prairie-chickens strongly prefer sites with less than 1% mesquite canopy cover, rarely use habitat where cover exceeds 15%, and are absent from sites with cover greater than 50%. Total mesquite presence within each lesser prairie-chicken home range was less than 0.05%. Removing mesquite in low-density areas is critical to maintaining or expanding existing habitat and reducing the threat of habitat loss. Removing mesquite from higher-density sites can increase connectivity between high-quality habitat areas in the occupied range.

## Study Shows Lesser Prairie-Chickens Avoid Mesquite

**W**oody plant encroachment fragments and degrades prairie habitat in the southern Great Plains—home to lesser prairie-chickens and many other grassland-dependent wildlife species. Honey mesquite and eastern redcedar are responsible for most encroachment in this region. While previous research has clearly shown the negative effects of redcedar encroachment on lesser prairie-chicken habitat use (Lautenbach et al. 2017), a new study from a New Mexico State University (NMSU) research team is the first to quantify the effects of mesquite encroachment on the species.

The study, a collaboration among NMSU, the Bureau of Land Management, and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), addressed two main questions: To what extent does mesquite distribution affect the use of habitat by lesser prairie-chickens? Does the seasonal loss of mesquite foliage change the degree to which lesser prairie-chickens avoid it?

To answer these questions, the team captured, radio-tagged, and tracked the movements of 6 male and 14 female lesser prairie-chickens for two consecutive years during breeding and non-breeding seasons using VHF and GPS satellite



*Mesquite encroachment impacts the southern part of the lesser prairie-chicken's range. Dispersal of seeds by livestock and lack of fire contribute to the spread of mesquite on prairie grasslands (Drewa et al. 2001). Photo: Charles Dixon, NRCS. Upper right Photo: Randy Howard, BLM.*

transmitters. They used the bird movement data to assess landscape use with respect to mesquite canopy cover and mesquite presence.

Their key findings:

- Lesser prairie-chickens strongly preferred sites with less than 1% mesquite canopy cover, rarely used habitat where canopy cover exceeds 15% and never used habitat with more than 50% canopy cover.
- Presence of mesquite declined sharply from areas of low to high intensity of use.
- Total mesquite presence within each lesser prairie-chicken home range was less than 0.05%.
- Lesser prairie-chickens avoided mesquite year-round. The shedding of foliage in autumn did not significantly decrease aversion (Figure 1).

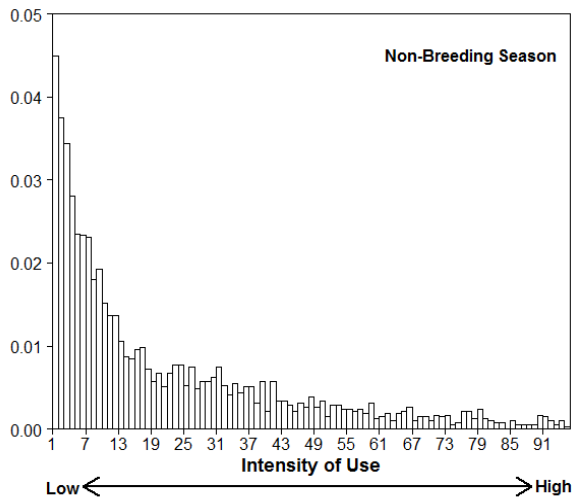
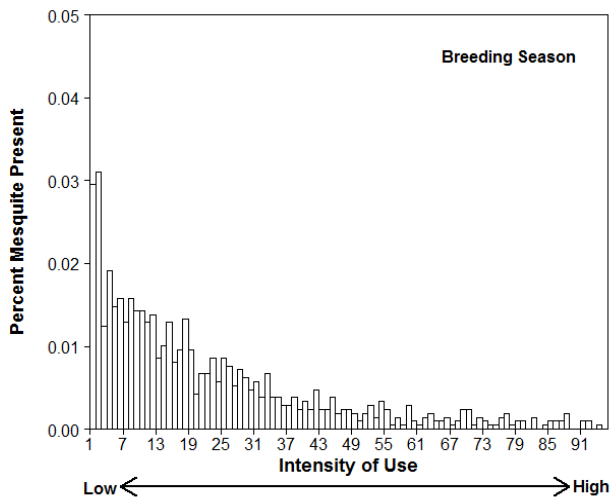
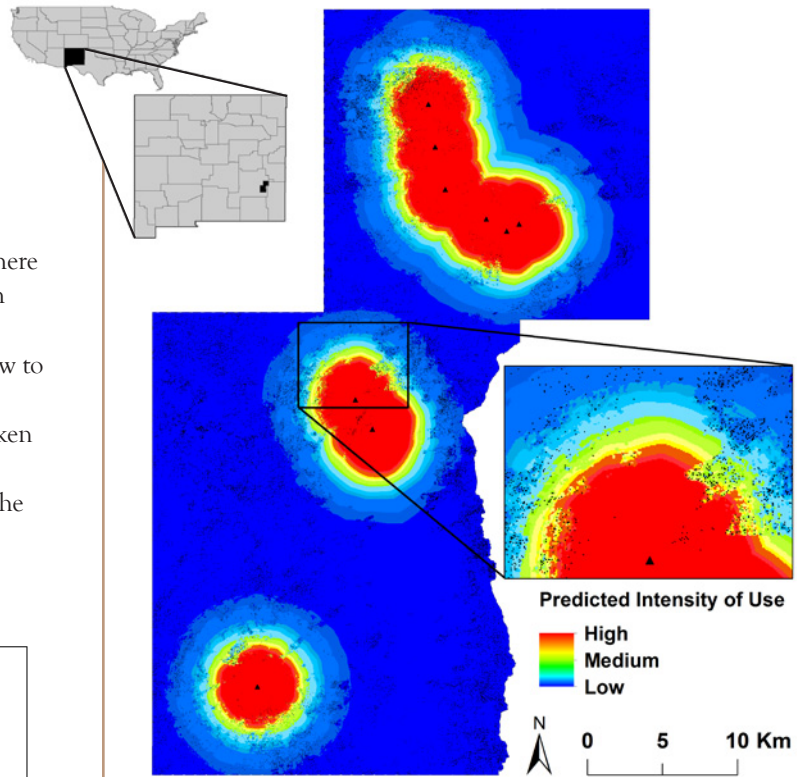


Figure 1. Year-round, lesser prairie-chickens strongly preferred habitat without mesquite.



Map of predicted habitat use of lesser prairie-chickens within the study area in southeastern New Mexico. Black dots represent mesquite bushes and closed triangles lek sites.

These findings have important implications for habitat management and implementation of the NRCS brush management conservation practice (314) in the regions of the lesser prairie-chicken range where mesquite occurs. Since 2010, the NRCS-led Lesser Prairie-Chicken Initiative has delivered financial and technical assistance to benefit both lesser prairie-chickens and the landowners who steward their habitat.

## Mesquite Aversion: A Critical Point for Habitat Management

**W**hen the research team from the New Mexico Cooperative Fish and Wildlife Research Unit at NMSU set out to assess how lesser prairie-chickens respond to mesquite presence in southeastern New Mexico, they had a hunch, from years of anecdotal evidence and scientific data documenting woody plant aversion by prairie-chickens elsewhere in the Great Plains, that they would see evidence of lesser prairie-chickens avoiding mesquite.

But they were interested in the nuances of that aversion. Exactly how much mesquite cover will the birds tolerate before they stop using an area? How close will the birds come



*Two means of mechanically removing mesquite—mowing skeletons (above) and grubbing live plants. Grubbing can simultaneously kill mesquite and remove its vertical structure. Photo left: Randy Howard, BLM; photo right: Construction Equipment Guide.*

to mesquite? Does that distance change during the year, as the birds engage in breeding, nesting, brood rearing, and winter foraging? Does the seasonal loss of leaf canopy cover in autumn affect the degree to which the birds avoid mesquite?

This last question has important implications for mesquite management. If lesser prairie-chickens avoid fully foliated mesquite, but tolerate defoliated shrub carcasses, removing those carcasses might not be necessary.

Lead researcher Matthew Boggie explained the team’s hypothesis about foliation as they began the study. “If lesser-prairie chickens have greater tolerance for defoliated mesquite than for fully-leafed mesquite, we would expect to see a stronger negative relationship between habitat use and mesquite canopy cover and mesquite presence in the breeding season relative to the non-breeding season,” Boggie said. “We’d also expect to see an increased use of mesquite-encroached areas in the non-breeding season.”

What they actually found was that lesser prairie-chicken aversion to mesquite remains relatively constant year-round. Birds in both seasons had a higher probability of using areas closer to leks, farther away from mesquite, and areas with lower mesquite canopy cover.

## Management Implications

**M**echanical removal of mesquite is a time-consuming and expensive process. Is it necessary, or is it enough to simply kill the shrubs with herbicide? The Boggie et al. study shows that, on its own, herbicide treatment of mesquite is not adequate to improve lesser prairie-chicken habitat—the shrub carcasses must be removed.

Furthermore, the study shows that the vast majority of habitat used by lesser prairie-chickens is in the lowest canopy cover classes (1–15%). Lesser prairie-chickens rarely used sites with medium to high canopy cover classes (16–50%).

### Management Implications, In brief:

- When planning mesquite treatments, prioritize areas of low canopy cover (1–15%) and areas near leks when those locations are known.
- Mesquite treatment must include removing all shrub vertical structure following herbicide treatment.
- Prescribed fire may be a cost effective tool for reducing seed-bearing plants and improving grass production.
- Mechanical removal of skeletons can be expensive but may be most appropriate depending on pasture size and limitations on available fuels.
- Grubbing is an expensive but effective tool for killing mesquite and removing vertical structure simultaneously.
- During grubbing, mesquite skeletons can be piled for “jackpot” burning at some future date.



In the study, lesser prairie-chickens avoided mesquite whether or not it was foliated. This indicates that herbicide treatment alone is not enough to improve habitat—shrub carcasses must be removed. Photo left: Randy Howard, BLM; photo right: Charles Dixon, NRCS.

This suggests that managers can prioritize canopy cover into conservation (1–15%) and restoration categories (16–50%). Low-canopy stands of mesquite are at imminent risk of being lost as lesser prairie-chicken habitat. Actively treating and removing mesquite in low-canopy (1–15% cover) areas will increase available habitat for lesser prairie-chickens and reduce the threat of habitat loss.

While restoration of areas with higher canopy cover (>16%) of mesquite in the occupied range is significantly more costly, land managers can target areas that will increase connectivity among high-quality habitat areas.

Because removing mesquite will be more costly on higher-canopy-cover sites, treatment efforts should prioritize the removal of low-canopy-cover mesquite as a means of maximizing returns on conservation investment.

## Source

Boggie, M.A., C.R. Strong, D. Lusk, S.A. Carleton, W.R. Gould, R.L. Howard, C. Nichols, M. Falkowski, and C. Hagen. 2017. Impacts of Mesquite Distribution on Seasonal Space Use of Lesser Prairie-Chickens. *Journal of Rangeland Ecology and Management*. In press.

## Additional Resources

Behney, A.D., C.W. Boal, H.A. Whitlaw, D.R. Lucia. 2012. Raptor community composition in the Texas Southern High Plains lesser prairie-chicken Range. *Wildl. Society Bull.* 36, 291-296.

Drewa, P.B., D.C. Peters, and K.M. Havstad. 2001. Fire, grazing, and honey mesquite invasion in the black-grama dominated grasslands of the Chihuahuan Desert: a

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## Suggested Citation

Lesser Prairie-Chicken Initiative Science to Solutions Series Number 3. Mesquite Removal Restores Habitat for Lesser Prairie-Chickens. 2016. 4pp.

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Within the lesser prairie-chicken's range, predatory birds are more abundant in prairie grasslands with mesquite cover than in open grasslands (Behney et al., 2012). Photo: Daniel Lusk, NMSU.

## Learn More



The Lesser Prairie-Chicken Initiative, led by the USDA's Natural Resources Conservation Service, is a partnership-based, science-driven effort that uses voluntary incentives to proactively conserve America's western rangelands, wildlife, and rural way of life.

To learn more, visit [www.lpcinitiative.org](http://www.lpcinitiative.org).