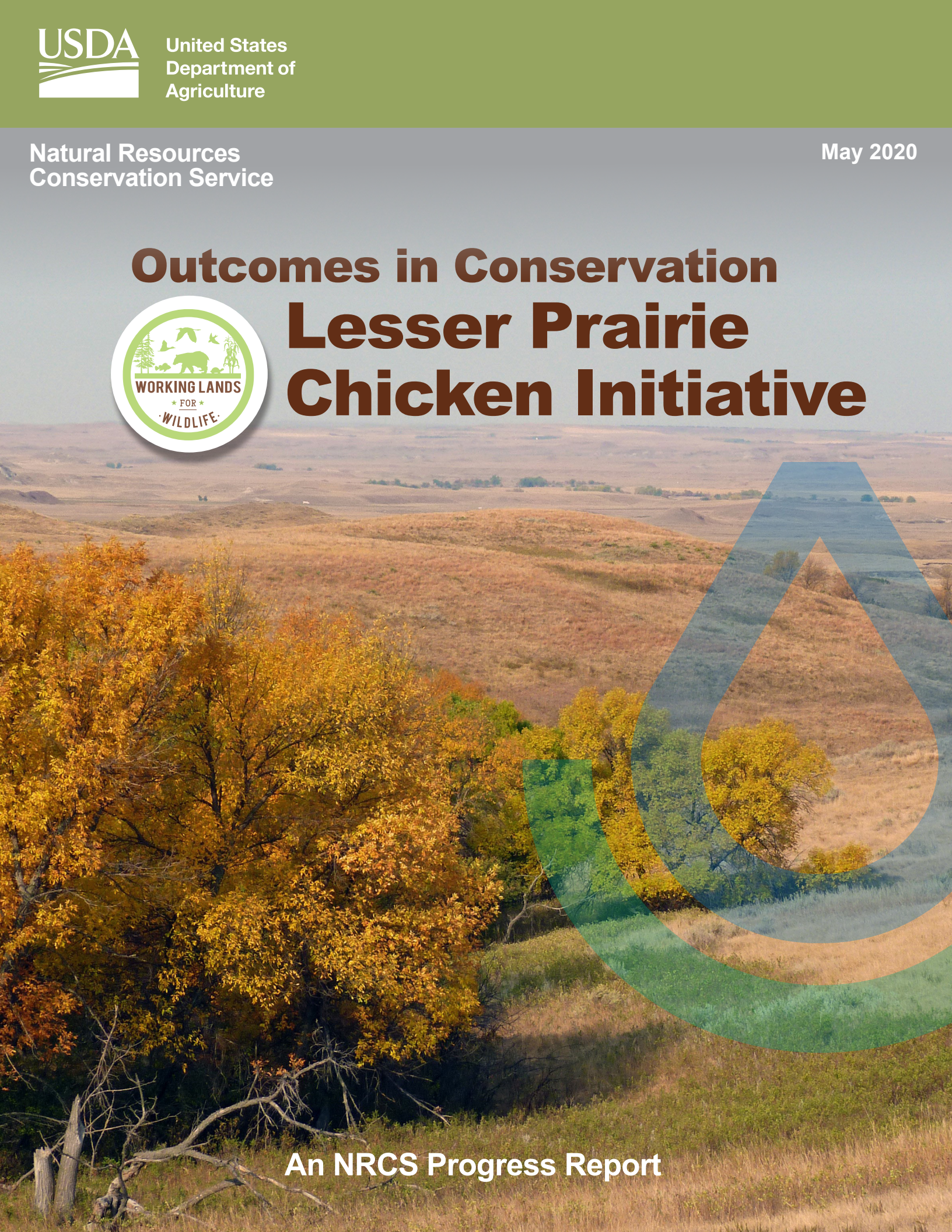
United States Department of Agriculture

Natural Resources Conservation Service

May 2020

Outcomes in Conservation

Lesser Prairie Chicken Initiative



An NRCS Progress Report

May 13, 2020

Outcomes in Conservation: NRCS contributions to Lesser Prairie Chicken through Working Lands for Wildlife

Overview

Voluntary actions by private landowners are pivotal to lesser prairie-chicken (LPC) success as 95 percent of their habitat is privately owned. USDA's Natural Resources Conservation Service (NRCS) has a rich history of successfully working with private landowners to voluntarily conserve agricultural lands. As part of NRCS's Working Lands for Wildlife (WLFW) portfolio, the Lesser Prairie Chicken Initiative (LPCI) uses a conservation strategy that targets NRCS technical and financial assistance to facilitate landscape-level improvements to grazing lands in the southern Great Plains. Conservation efforts are designed to be win-win, benefitting the bird while improving the sustainability of agricultural operations. NRCS-supported science demonstrates that sustainable grazing and LPC conservation are not only compatible but interdependent. In addition to having landscape and agricultural benefits, conservation in these grasslands also benefits many other species of wildlife.

To help producers accelerate implementation of beneficial conservation practices, NRCS uses the Conservation Technical Assistance Program and Farm Bill conservation programs, including the Environmental Quality Incentives Program (EQIP). Farm Bill conservation programs, including the Conservation Technical Assistance Program. Since 2010, NRCS has invested $41.67 million with 883 participating landowners in LPCI resulting in the conservation of 1.61 million acres of working lands. The LPC is currently not a listed species under the federal Endangered Species Act after a federal court in 2015 vacated the threatened status previously designated by the U.S. Fish and Wildlife Service (FWS). Regardless of current or future ESA listing determinations, NRCS remains firmly committed to promoting and delivering long-term conservation of the working grasslands the species needs for survival.

LPCI is designed to support LPC recovery by strategically focusing resources to promote healthy grazing lands that underpin LPC populations and viable grazing operations. The strategy provides for coordination and implementation on a range-wide scale while ensuring flexibility for local input and decision space in individual States. Wildlife benefits are maximized by 1) developing science support to better target resources and assess resulting outcomes, 2) targeting technical and financial resources within priority areas that encompass most populations and 3) by implementing conservation measures as identified in consultation with FWS. Consultation identified additional criteria to the national conservation practice standards that minimize short-term adverse effects on LPC because of practice implementation. Close collaboration of many stakeholders ensures that NRCS activities complement ongoing efforts.

Midway through this decade long effort, NRCS leadership in 2015 reviewed progress and developed the Lesser Prairie Chicken Initiative FY16-18 Conservation Strategy (hereafter Strategy – see attached) to guide NRCS investments. This time frame covered the remaining three years of the 2014 Farm Bill. The strategy aligns with goals outlined in the Lesser Prairie Chicken Range-wide Conservation Plan which FWS endorses as a "sound conservation design and strategy that, when implemented, will provide a net conservation benefit to the lesser prairie-chicken". For the first time, the strategy combined five locally developed NRCS state plans into a

single comprehensive commitment to LPC conservation. Strategy resulted in the conservation of another 251,618 acres, bringing the total conserved acreage through LPCI to 1.61 million (LPCI Scorecard – see attached).

Threats addressed though LPCI

The strategy focuses on five threats that impact the sustainability of grasslands. For each threat, we identified its purpose and need, associated conservation objective, total outputs reported as acreages, and resulting conservation outcomes. Outcomes are superior to outputs because they quantify the impact or upshot of the LPCI conservation effort. To date, NRCS has invested in outcome-based science resulting in 32 peer-reviewed articles and 18 extension-outreach publications that guide and assess efficacy of implementation.

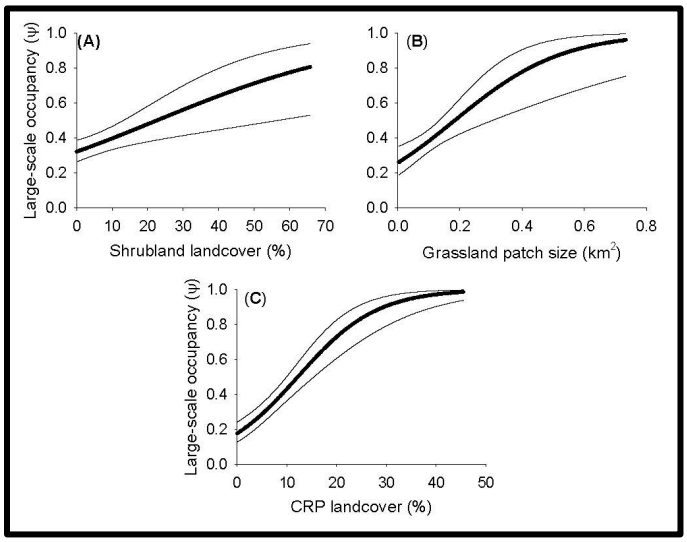
1. **Threat Addressed: Degraded Rangeland Health, Drought and Climatic Extremes**

Purpose and Need: LPCs require diverse and healthy grassland habitats to meet their seasonal needs. Prescribed grazing of livestock is the primary conservation practice required to maintain essential habitat. Additionally, prescribed grazing to maintain rangeland health provides greater resilience to droughts, which are frequent throughout the bird's range.

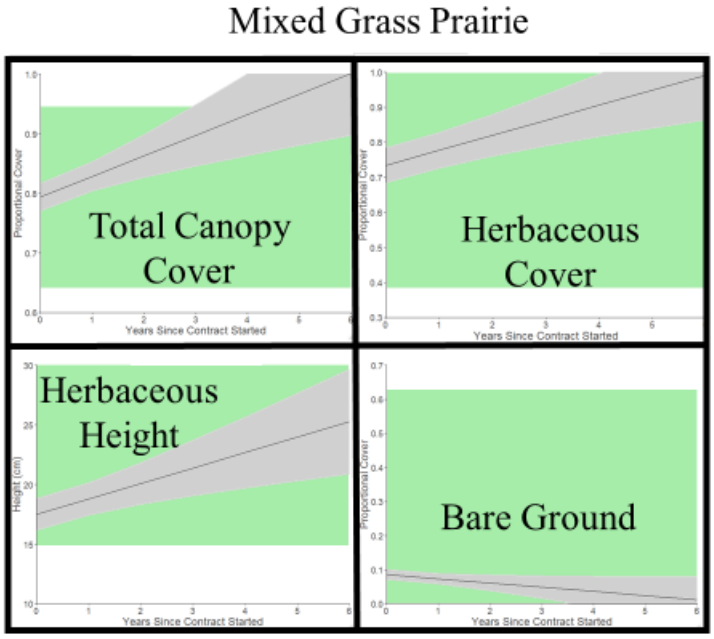
Conservation Objective: NRCS aims to provide vegetative structure required to sustain nesting and brood-rearing success. Rangelands grazed under prescribed grazing plans will also see reduced impacts from drought conditions and will recover more quickly when adequate moisture is present.

Outputs: LPCI has planned or applied Prescribed Grazing on 1,024,598 acres through FY18, which is 116% of our scorecard milestone goal of 878,969 acres.

Outcomes: Outcomes of the range-wide monitoring program, 2012–2016, indicate that grassland abundance is the primary determinant of LPC occupancy (Hagen et al. 2016). Findings indicate a four-fold increase in LPC occupancy when USDA's Conservation Reserve Program grasslands cover 40% of the landscape within 9.4×9.4-mi monitored grid cells (C in Figure). Hagen et al. (2016) observed large additive effects of prescribed grazing on shrubland (A) and grassland patch size (B) of native vegetation with measurable predicted increases (11%) in LPC occupancy as the proportion of prescribed grazing increased (1% of landcover enrolled). Bold trend lines are model averaged estimates of large-scale occupancy at the mean values of other covariates in the model and the bounding lines are 90% confidence intervals. WLFW features outcomes of this evaluation in our Science to Solutions series.

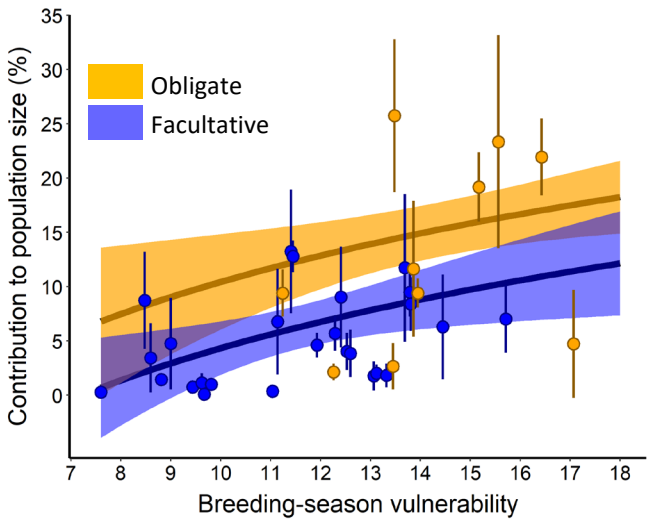


In a companion evaluation, outcomes from a large-scale field-based evaluation within LPCI contracts indicate that prescribed grazing to NRCS standards meets or exceeds local-scale published vegetative guidelines for LPC (Hagen et al. 2004) across Mixed Grass, Sand Sage, and Shinnery Oak Prairie ecoregions. Findings are the result of vegetation monitoring on more than 3,000 transects to assess benefits on land enrolled in LPCI (LPCI contracts) six-years post contract initiation. In Mixed Grass Prairie, total canopy cover (includes grasses, forbs, and shrubs) increased 20%, herbaceous cover (grasses and forbs) increased 25% and herbaceous height (grasses and forbs) increased 3.1 inches. As cover for LPC increased, bare ground decreased to almost zero after six years of management. Shrubs were slow to respond as the only vegetative component not meeting published guidelines. These vegetative trends shown for Mixed Grass Prairie were similar across the other two ecoregions (unpublished data, Christian Hagen, Oregon State University). The Shortgrass/CRP Mosaic was not analyzed due to small sample size.



Fences are integral to implementing prescribed grazing. Those installed to facilitate livestock grazing were previously hypothesized to contribute to LPC mortality. But after testing this assumption in Kansas and Colorado, scientists found only three carcasses and 12 possible collisions after observing 12,706 fence crossings by GPS-marked LPC and surveying another 1,750 miles of fences (Robinson et al. 2016). NRCS incorporated the researcher's suggestion to focus on habitat quality without the need to mediate the effects of fences.

In addition to LPC outcomes, the combined benefits of CRP and NRCS prescribed grazing provide spin-off benefits to declining populations of grassland songbirds. In 2016, these conservation practices conserved 4.5 million songbirds (CI = 4.0, 5.1). Scientists found that private lands conservation for LPC also benefited the most vulnerable grassland obligate species (specialism and vulnerability as ranked by Partners in Flight). By addressing landowner interests, and reducing habitat loss and degradation in agrarian landscapes, private land conservation provides an emerging solution to the declining avifauna of North America, and scales-up to meet population recovery goals for the most imperiled grassland birds (Pavlacky et al. Submitted). WLFW has created a Science to Solutions document to share with a broad audience the additional benefits of LPCI conservation to grassland songbirds.



Hagen, C.A., D.C. Pavlacky, Jr., K. Adachi, F.E. Hornsby, T.J. Rintz, and L.L. McDonald. 2016. Multiscale occupancy modeling provides insights into range-wide conservation needs of Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*). Condor 118: 597–612.

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

Pavlacky Jr., D.C., C.A. Hagen, A.M. Bartuszevige, R. Iovanna, T.L. George, and D.E. Naugle. 2020. Private land conservation programs scale-up to meet population recovery goals for the most vulnerable grassland birds. Conservation Biology: Submitted.

Robinson S.G., D.A. Haukos, R. T. Plumb, et al. 2016. Lesser prairie-chicken fence collision risk across its northern distribution. Journal Wildlife Management 80:906–915.

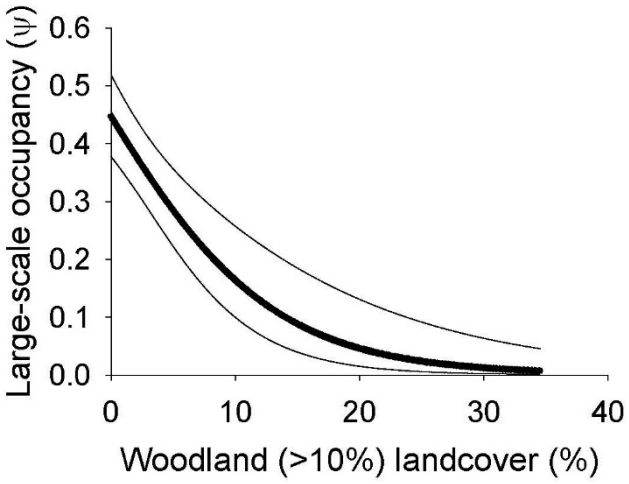
2&3. Multiple Threats Addressed: Invasive Conifers and Mesquite

Purpose and Need: LPC prefer large and intact grasslands free from visual obstructions including eastern redcedar and honey mesquite. Invasion by these two woody species throughout the bird's range continues to decrease suitable habitat.

Conservation Objective: NRCS aims to reduce visual obstructions by redcedar and honey mesquite in LPC habitat. These woody species also use a large amount of water, which greatly reduces herbaceous vegetation production.

Outputs: LPCI has planned or applied conifer removal on 71,547 acres through FY18, which is 126% of our scorecard milestone goal of 56,448 acres. LPCI has planned or applied mesquite removal on 126,233 acres through FY18, which is 91% of our scorecard milestone goal of 138,045 acres.

Outcomes: Outcomes for invasive conifer and mesquite have been combined due to extensive similarities in both threats and associated benefits. Woodland expansion into prairies, savannahs and steppes is a global phenomenon affecting grassland systems on all continents except Antarctica (Nackley et al. 2017). In the Great Plains of Kansas, Lautenbach et al. (2017) found that LPC avoid placing nests in grasslands with > 2% eastern redcedar cover. Lautenbach et al. (2017) found that as tree density increases, LPC nesting declines, reaching zero at densities greater than one tree/acre. Figure depicts in bold the modeled trend lines bounded by 90% confidence intervals. WLFW has written an [eastern redcedar Science to Solutions] to summarize and share with partners and landowners the benefits of woodland management.



Similarly, scientists in New Mexico found that LPC space themselves further from mesquite than expected at random and avoid areas with ≤ 15% canopy cover (Boggie et al. 2017). Demographic consequences of woody expansion in LPC habitats still elude us, but population-level impacts are a foregone conclusion, primarily because selection was marked enough that birds making maladaptive fitness choices are too few to quantify in these studies (Hagen et al. 2019). WLFW has created an 'Ask an Expert' interview with LPCI science advisor Christian Hagen to describe the [role of mesquite management in LPC conservation].

Scientists at Colorado State University mapped woody canopy cover over the range of LPC to help target the efficient management of eastern redcedar and honey mesquite. The 1-m scale canopy cover maps provide the first and most geographically complete, high-resolution assessment of tall woody plant cover in prairie ecosystems (Falkowski et al. 2017). Spatial data provide managers the ability to visualize canopy cover, estimate the extent of threat in their jurisdiction, evaluate fragmentation, quantify threat reduction following management, and assist in broad-scale outcome assessments (Falkowski et al. 2017).

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. Rangeland Ecology and Management 70:68–77.

Falkowski M.J., J.S. Evans, D.E. Naugle, C.A. Hagen, S.A. Carleton, J.D. Maestas, A.H. Khalyani, A.J. Poznanovic, and A.J. Lawrence. 2017. Mapping tree canopy cover in

support of proactive prairie grouse conservation in western North America. Rangeland Ecology and Management 70:15-24.

Hagen, C.A., K.A. Taylor, A. Bartuszevige, A.B. Daniels, and M.T. DeLeon. 2019. Slowing the tide of mesquite invasion: using a flagship species to deliver conservation triage to desertification of grasslands. Journal of Arid Environments 168:46–55.

Lautenbach, J.M., R.T. Plumb, S.G. Robinson, D.A. Haukos, J.C. Pitman, and C.A. Hagen. 2017. Lesser prairie-chicken avoidance of trees in a grassland landscape. Rangeland Ecology and Management 70:78–86.

Nackley, L.L., A.G. West, A.L. Skowno, and W.J. Bond. 2017. The nebulous ecology of native invasions. Trends in Ecology and Evolution 32:814-824.

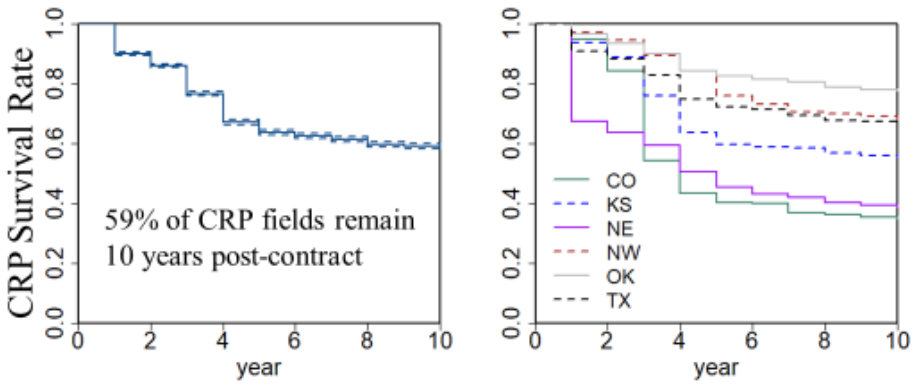
4. Threat Addressed: Cultivation of Grazing Lands, CRP or Native Rangeland

Purpose and Need: LPC require large blocks of grasslands to fulfill their life cycle needs and cultivation of grasslands reduces available habitat. In some areas, acres enrolled in the USDA's Conservation Reserve Program (CRP) have greatly expanded the habitat and range of LPC. Failure to maintain large blocks of these habitats upon expiration of CRP contracts is a substantial concern.

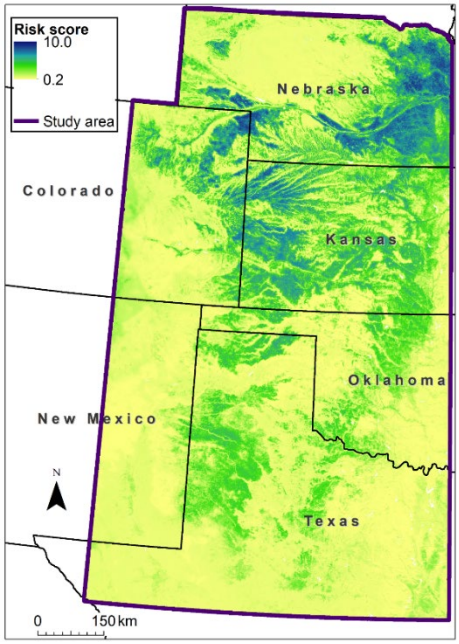
Conservation Objective: NRCS aims to reduce or offset the loss of expiring CRP acres to cultivation. Maintaining large unbroken expanses of grasslands suitable for LPC habitat in priority areas is important to reaching and maintaining habitat acreage goals.

Outputs: LPCI has planned or applied practices to address the threat of expiring CRP on 119 acres through FY18, which is 1% of our scorecard milestone goal of 19,987 acres. The scorecard metric however inadequately quantified the true progress towards meeting this goal. When the legacy effects of retaining 59% of CRP fields post contract are considered, 1.1 million acres of expired CRP has been retained, an amount equivalent to 55 times the LPCI scorecard goal.

Outcomes: Grassland abundance is the primary determinant of LPC occupancy in the southern Great Plains (Hagen et al. 2016). Key to LPC persistence is the ability to retain CRP fields as grasslands after expiration of the 10- to 15-year contracts. Ranching is the primary mechanism where idled CRP grasslands are transitioned to working lands through the grazing of domestic livestock. NRCS



routinely works with landowners to help them incorporate formerly idled grasslands into their sustainable grazing operations. In the first evaluation of its kind, scientists quantified the durability of voluntary conservation to assess the legacy effects of CRP grasslands after payments ended. Using known fate models and cropland data layers, scientists found that 59% of expired CRP fields remained as grassland a decade later (unpublished data, Christian Hagen, Oregon State University). Conversion to cropland largely occurred <5 years after expiration and durability was best predicted by spatial variation in grassland composition within 2.5 miles, field size, tillage risk and annual average precipitation. Expired CRP in portions of northeast Nebraska, eastern Colorado and western Kansas exhibited the greatest risk of becoming cropland. WLFW funded The Nature Conservancy to develop a tillage risk model to help NRCS identify vulnerability of expiring CRP contracts (Smith et al. 2016). Tillage risk influenced durability along with corn prices and drought severity. Overall, tillage risk ($\beta = 0.75 \pm 0.02$) and corn prices ($\beta = 0.56 \pm 0.08$) were the strongest predictors of conversion risk. The new map is now available to NRCS and partners who are planning strategic conservation actions aimed at retaining grasslands in vulnerable areas.



Hagen, C.A., D.C. Pavlacky, Jr., K. Adachi, F.E. Hornsby, T.J. Rintz, and L.L. McDonald. 2016. Multiscale occupancy modeling provides insights into range-wide conservation needs of Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*). Condor 118:597–612.

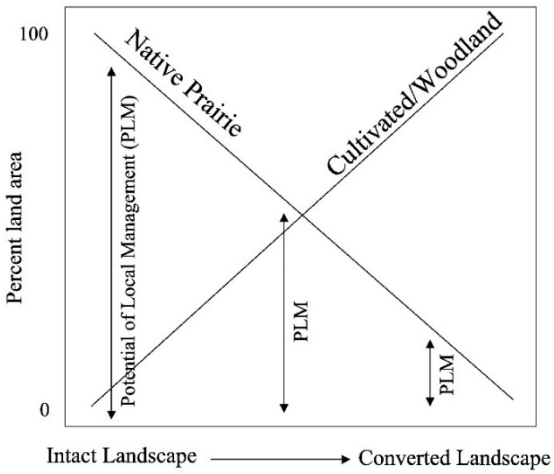
Smith J.T., J.S. Evans, B.H. Martin, S. Baruch-Mordo, J.M. Kiesecker and D.E. Naugle. 2016. Reducing cultivation risk for at-risk species: Predicting outcomes of conservation easements for sage-grouse. Biological Conservation 201:10-19.

5. Threat Addressed: Lack of Fire in Grassland Habitats

Purpose and Need: LPC require diverse grassland habitats that evolved with the interaction of fire and large herbivore grazing. Large-scale fire suppression efforts have decreased fire intervals resulting in woodland expansion.

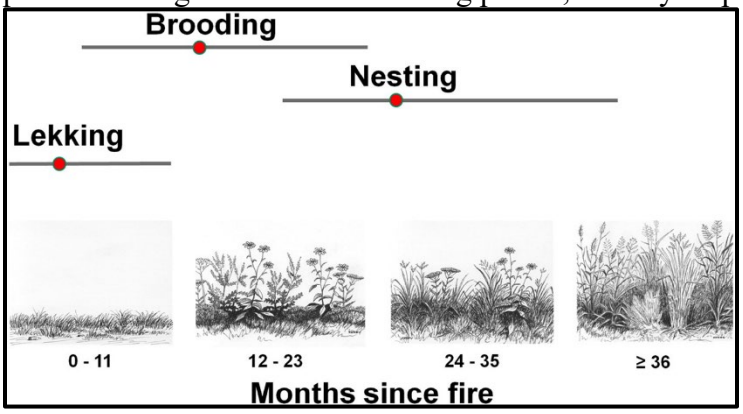
Conservation Objective: To reintroduce prescribed fire to grassland and prairie ecosystems. Native plant communities throughout the range of LPC evolved with fire as a natural part of the ecosystem and require periodic burns to remain healthy and diverse.

Outputs: LPCI has planned or applied prescribed burning on 21,410 acres through FY18, which is 80% of our scorecard milestone goal of 26,640 acres.



Outcomes: Fuhlendorf et al. (2017) uses hierarchy theory to illustrate how large-scale, regional factors constrain the influence of local factors in grasslands. In the southern Great Plains, cultivation and tree encroachment represent regional processes that constrain the success of locally prescribed grazing and burning management. LPC rely on the natural heterogeneity of habitats to meet their seasonal needs throughout the year.

In Kansas, scientists modeled LPC habitat selection relative to diverse vegetation generated through patch-burn grazing, microclimate and vegetation characteristics (Lautenbach 2017). Radio-marked LPC used all patch types created in a patch-burn grazing mosaic, with females selecting greater time-since-fire patches (>2-years post-fire) for nesting, 2-year post-fire patches during the spring lekking season, 1- and 2-year post-fire patches during the summer brooding period, and 1-year post-fire units during the nonbreeding season (Artwork courtesy of Gary Kirby in Fuhlendorf et al. [2017]). Used and available sites were similar in their vegetation structure and composition during each life-cycle stage suggesting that LPC habitat needs were met during every part of the year. Therefore, management should focus on providing structural and compositional heterogeneity across landscapes (Lautenbach 2017).



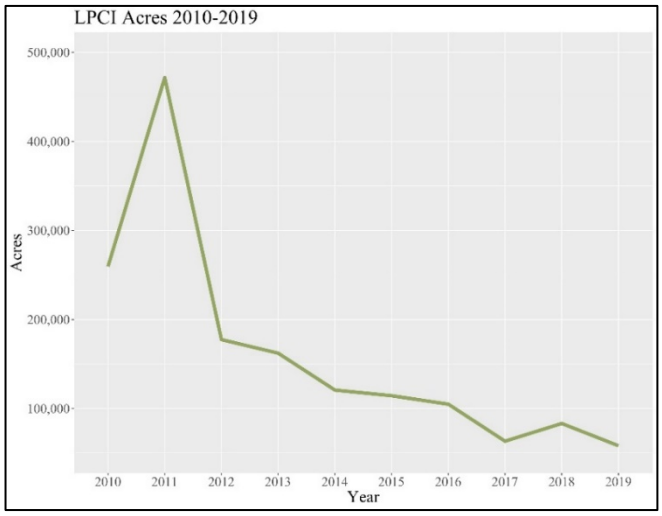
Fuhlendorf, S.D., T.J. Hovick, R.D. Elmore, A.M. Tannera, D.M. Engle and C.A. Davis. 2017. A hierarchical perspective to woody plant encroachment for conservation of prairie-chickens. Rangeland Ecology and Management 70:9-14.

Lautenbach, J. 2017. The role of fire, microclimate, and vegetation in lesser prairie-chicken habitat selection. Master's Thesis, Division of Biology, Kansas State University.

A decade of success with a look to the future

Spanning three different Farm Bills, NRCS and partners have successfully implemented LPCI from FY10 to present day. In this timeframe, NRCS has exceeded the goals outlined in our LPCI Strategy by investing $41.67 million with 883 participating landowners to implement grassland conservation on private working lands. Resulting investments have conserved 1.61 million acres

of LPC habitat, which is 107 percent of the LPCI Strategy goal of 1.5 million acres. This is in addition to the $4.1 million NRCS has invested into LPCI partnerships. Those partnerships provided human capacity to help plan and implement individual projects, produced science to guide investments and assess outcomes and developed communication materials to share the working lands story and increase participation.



Despite meeting our LPCI goals, interest from producers for participation has waned. This is concerning as landowner participation is the number one factor that determines the amount of conservation that hits the ground. To understand why, NRCS in 2018 co-sponsored a workshop in Oklahoma to hear from partners, and commissioned a study led by Virginia Tech to understand differences between enrollees and nonparticipants.

At the workshop, we learned from partners and landowners that LPCI is focused on the right threats but requires a broadened perspective that more thoroughly incorporates the needs of working agricultural operations to increase participation. Findings from Virginia Tech suggest latent participation if the program is modified and properly promoted and advertised. Study goes on to say that enrollees and nonparticipants are largely the same except that nonparticipants work more hours and earn a higher percentage of total income from their land (Sorice et al. 2018).

NRCS and FWS cooperatively revised the LPCI Conference Report to incorporate partner input and study findings in 2019. Updates reflect the desire to create a more balanced approach that invite landowners back to the table and give NRCS a renewed ability to market a more producer friendly initiative. NRCS remains committed to reinvigorating our approach to grasslands conservation in the southern Great Plains. While still addressing the primary grassland threats, we will expand our measures of success to include rangeland productivity, and ranch economics in addition to wildlife benefits. NRCS is poised to make the changes operational by the beginning of FY21.

Sorice M.G., J. Donlan, A.R. Santo and G.M. Luque. 2018. Final Report. Understanding participation in the Lesser Prairie-Chicken Initiative. Final Report to Pheasants Forever, Incorporated from Department of Forest Resources & Environmental Conservation, Virginia Tech, Blacksburg, VA, USA and Advanced Conservation Strategies, Midway, UT, USA