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STRATEGIC HABITAT CONSERVATION FOR DECLINING GRASSLAND WILDLIFE POPULATIONS IN THE OAKS AND PRAIRIES JOINT VENTURE

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ABSTRACT

Degradation and conversion of functioning grassland ecosystems in North America has driven significant declines in grassland wildlife populations across multiple taxa. In an effort to address declines in the grasslands of Oklahoma and Texas, a number of governmental agencies and Non-Governmental Organizations have partnered to form the Oaks and Prairies Joint Venture (OPJV) to more strategically and collaboratively deliver conservation actions in this region. With northern bobwhite (*Colinus virginianus*) as the flagship species, OPJV has worked to implement a fully integrated Strategic Habitat Conservation framework that works at multiple scales to conduct biological planning, landscape conservation design, habitat tracking and population monitoring in support of conservation efforts aimed at restoring not just northern bobwhite, but a variety of bird and pollinator species that depend on healthy grasslands. The signature conservation delivery program of this effort was the Grassland Restoration Incentive Program (GRIP) which has improved habitat for grassland wildlife on over 24,300 hectares of working lands in focus areas throughout the OPJV geography since it was created in 2013. The Grassland Restoration Incentive Program was accompanied by a full complement of conservation delivery programs that support prescribed burning associations and other landowner cooperatives, utilize market-based conservation delivery strategies, and implement strategic outreach and communications. The conservation efforts were supported by over 4,500 point counts annually in National Bobwhite Conservation Initiative Coordination Implementation Program focal areas as well as 7 focal regions, each comprising clusters of 2-8 counties. Combining the efforts of multiple partners ties the range-wide population and habitat objectives with on-the-ground conservation actions for quail, other grassland birds, butterflies, and grassland pollinators.

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Key words: *Colinus virginianus*, habitat management, northern bobwhite, partners, Joint Venture, population objective, grassland birds

INTRODUCTION

Degradation and conversion of functioning grassland ecosystems in North America has driven significant declines in grassland wildlife populations across multiple taxa. Habitat loss and fragmentation were considered primary causes of the range-wide decline in northern bobwhites (Brennan 1991, Williams et al. 2004, Hernandez et al. 2013), and many other grassland and shrub-

grassland associated bird species (Brennan and Kuvlesky 2005). More conservation groups are starting to recognize the need for landscape-scale conservation, and that landscape-scale conservation will require cooperation of government agencies, non-governmental organizations, universities, and individual landowners working together to meet the landscape-level conservation challenges.

Williams et al. (2004) suggested effective conservation of northern bobwhite populations would require “scaling up management of habitat.” They further stated, “Managers must explicitly prioritize usable habitat availability and conservation and develop regionally based joint-venture partnerships for efficient delivery of

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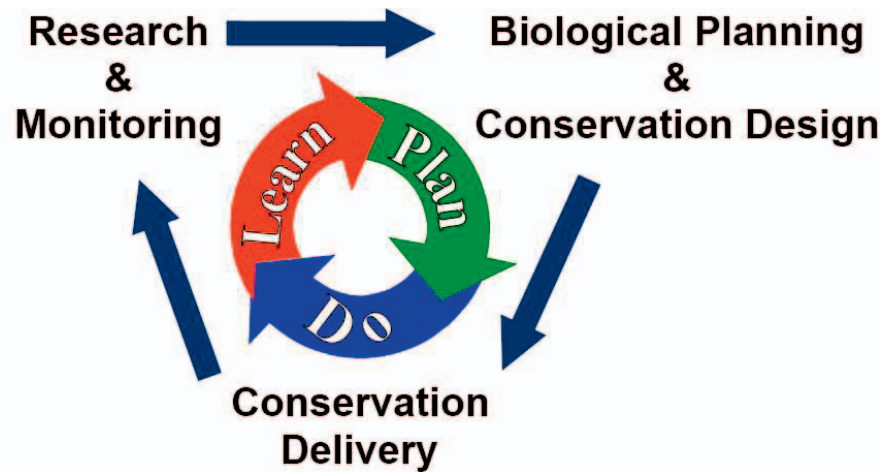


Fig. 1. Strategic Habitat Conservation includes biological planning, conservation design, conservation delivery, and research and monitoring in a Plan-Do-Learn cycle to address uncertainties in a continuous cycle. All activities require communications of relevant information to appropriate audiences.

management regimes (Pg. 867).” They continued, “...we should promote development of regional joint ventures (through local conservation cooperatives that join local residents and both nongovernmental and governmental agencies) in which partners work together toward an appreciation of landscape relationships...” Our purpose was to describe Bird Habitat Joint Ventures (JVs) in general and identify Joint Ventures with significant responsibility to conserve northern bobwhites. Then we describe how the Oaks and Prairies Joint Venture partners are working together to “scale up management of habitat” as a case study of a Joint Venture focusing on grassland conservation for priority bird populations.

Bird Habitat Joint Ventures and Northern Bobwhite Populations

Bird Habitat Joint Ventures (JVs) are “regional, self-directed partnerships of government and non-governmental organizations as well as individuals working across administrative boundaries to deliver landscape-level planning and science-based conservation, linking on-the-ground management with national population goals (Giocomo et al. 2012).” The 18 U.S. Bird Habitat Joint Ventures work to implement national and international bird conservation plans, as well as other state and species conservation plans such as the National Bobwhite Conservation Initiative (NBCI) (National Bobwhite Technical Committee 2012). In general, Joint Ventures bring together local and regional partner agencies and organizations, who, in many cases, are already separately delivering conservation actions on the ground, to build support systems that allow for national and regional planning (landscape-scale) to inform local conservation action decisions, while local habitat, socio-economic, and bird population conditions inform landscape-scale planning and programs.

JVs work under an adaptive management framework developed by the US Fish and Wildlife Service and US Geological Survey known as Strategic Habitat Conserva-

tion (NEAT 2006). Under this adaptive management framework, activities can be broken into biological planning, conservation design, conservation delivery, assumption-based research, mission-based monitoring, and communications (Figure 1). Each activity feeds information into the next activity in a cycle that eventually (usually every 5-10 years) leads to a new cycle of biological planning informed by the previous cycle. Each JV partnership decides which species and activities to prioritize in the adaptive management framework. The broad scope and diversity of habitat needs for hundreds of bird species at different times of the year (breeding season, migration, and wintering) requires this adaptive approach which recognizes that significant knowledge gaps exist.

Partners in Flight (PIF), a national landbird conservation cooperative, conducted an analysis of landbird populations based upon Breeding Bird Survey data. For northern bobwhites, PIF identified at least 10 of the 18 United States (US) Bird Habitat JVs with significant populations of the northern bobwhites (>1% of the estimated world population; Rosenberg et al. 2016). All populations showed decreasing long-term and short-term trends (Rosenberg et al. 2016; Table 1). Several of these JVs are working on elements of the adaptive management framework to address conservation needs of northern bobwhites in particular and grassland birds in general, and some have made significant progress.

Oaks and Prairies Joint Venture Partnership

In 2008, the Texas Parks and Wildlife Department and the Oklahoma Department of Wildlife Conservation partnered with federal government agencies and non-governmental organizations (NGO) to form the Oaks and Prairies Joint Venture (OPJV) to more strategically and collaboratively deliver conservation actions in central Oklahoma and Texas. A major goal of the OPJV was the maintenance, improvement, or restoration of breeding, wintering, and resident grassland bird populations and the

Table 1. Joint Ventures with significant populations of northern bobwhites (> 1% of the world population) and their Bird Conservation Regions (BCR). Included are long-term (decline 1966-2013 according to the Breeding Bird Survey) and short term trend (average annual trend from 2003-2013 from Breeding Bird Survey) (Rosenberg et al. 2016).

Joint Venture	BCR	Northern Bobwhite Area Importance	Long-term trend	Short-term Annual Trend
Appalachian Mountains	28	1%	-98%	-6.9%
Central Hardwoods	24	7%	-86%	-5.1%
East Gulf Coast	27	5%	-91%	-5.3%
Gulf Coast	37	2%	-79%	-3.3%
Lower Mississippi Valley	25, 26	4%	-92%	-5.8%
Oaks and Prairies	20, 21	8%	-93%	-7.3%
Playa Lakes	18, 19	23%	-28%	-5.4%
Rain Water Basin	19	2%	-35%	-4.7%
Rio Grande	35, 36	8%	-59%	-2.1%
Upper Mississippi River & Great Lakes	22, 24	17%	-79%	-5.4%

habitat(s) on which they depend. The OPJV used a Strategic Habitat Conservation framework integrated horizontally at the ecoregional scale to conduct biological planning, conservation design, conservation delivery, monitoring (habitat and population), research, and, communications, to vertically link field scale conservation actions and research with national and state level biological planning, monitoring, and conservation delivery efforts (Table 2).

OPJV partner organizations collaborated on the development of a set of biological objectives (e.g., threats, priority species, population estimates, population objectives, habitat objectives derived from species-habitat models) which were meant to provide a shared purpose to guide strategic decision-making (biological planning). These objectives were lofty, explicit, and based on the best available science and population models to answer questions such as: “how large are the current bird populations?”; “how many more are needed to meet shared desired population levels?”; “how much more habitat is needed to support the desired future populations?”

Early in the development of the OPJV, partners identified habitat loss and alteration due to changes in land use and natural disturbance processes as major drivers of population declines. These changes included altered fire cycles, livestock grazing practices, brush encroachment, use of non-native forages and crops, and urban/suburban development (Oaks and Prairies Joint Venture 2007). Working with partner staff land managers, biologists, university researchers, and other scientists, OPJV partners identified a set of grassland priority species that ranged from grassland specialist like grasshopper sparrow (*Ammodramus saviarum*) and eastern meadowlark (*Sturnella magna*), to shrubland specialist like painted bunting (*Passerina ciris*) and Bell’s vireo (*Vireo bellii*), to more generalist species like northern bobwhite.

Initial habitat objectives were derived by calculating the population loss over the most recent decade at the time of planning for the Oaks and Prairies Bird Conservation Region (BCR) for each of the priority species. Using population estimates from the PIF Population Estimates

Database (Partners in Flight Science Committee 2013) as a starting point, and subtracting estimated population loss for declining species using Breeding Bird Survey trend (2001-2011; Sauer et al. 2012), we were able to calculate the number of territories needed to add to the population in the next 10-years to maintain the population assuming population loss in the next decade was going follow the same trend from the last decade. The number of territories was then multiplied by a species specific average territory size obtained from published literature values to calculate a minimum habitat objective. We assumed territories represented “ideal” habitat conditions for each species and the area of habitat needed was a minimum estimate because there can be space left unused in a seemingly suitable habitat patch.

For example, the northern bobwhite population estimate for the Oaks and Prairies BCR was 345,000 territories, with a 10-year population loss of 38% resulting in a loss of 131,100 territories. Using an average territory size of 6.7 ha based upon literature review and expert opinion, we calculated a minimum area of new usable space needed, or habitat objective of $131,100 \times 6.7 = 878,370$ ha. We assumed species with similar habitat needs could be represented by the same habitat acres, and maximum habitat needs for grassland specialists and shrub specialists combined represented the OPJV habitat objective for the next 10 years. In the case of the OPJV geography, the 10-year goal was for an additional 5% of the 24.2 million ha geography (1.2 million ha habitat objective) to provide usable space for grassland and grass/shrub birds such as northern bobwhite.

The overall OPJV population-based habitat objective served three purposes. It provided an estimate of the overall scale of the need for conservation (e.g., 4,000 ha vs. 400,000 ha of conservation actions per year). It provided a benchmark to measure the annual rate of progress toward an overall goal. Finally, the population-based habitat objective served as a reality check to keep the conservation programs to create and restore habitat tied to the priority bird populations, instead of the conservation programs themselves becoming the focus of partner attention.

Vertical Dimensions - Activity							
		Biological Planning	Conservation Design	Conservation Delivery	Monitoring	Research	Communications
Horizontal Dimensions - Spatial Scale	National	NBCI and Partners in Flight		NRCS RCPP	Breeding Bird Survey		
	State	State Wildlife Action Plans, TPWD, ODWC		NRCS EQIP, FSA CRP, FWS Partners Program, TPWD LIP	Breeding Bird Survey, State Agency Fall Counts		
	Joint Venture/Ecoregion	Implementation Plan/Technical Team Plans	JV Conservation Planning	OPJV Grassland Restoration Incentive Program	Breeding Bird Survey		OPJV Communication Strategy
	Focus Area (clusters of counties)			OPJV Grassland Restoration Incentive Program	OPJV Grassland Bird Monitoring	OPJV Human Dimensions	OPJV Communication Strategy
	County			NRCS EQIP, FSA	OPJV Grassland Bird Monitoring	OPJV Human Dimensions	Agricultural Extension
Field			NRCS District Conservationist, TPWD Technical Guidance Biologists, ODWC Private Lands Biologists, and QF Farm Bill Biologists working with Private Landowners	OPJV Grassland Bird Monitoring (e.g., landowner quail surveys, eBird)	Research Projects		

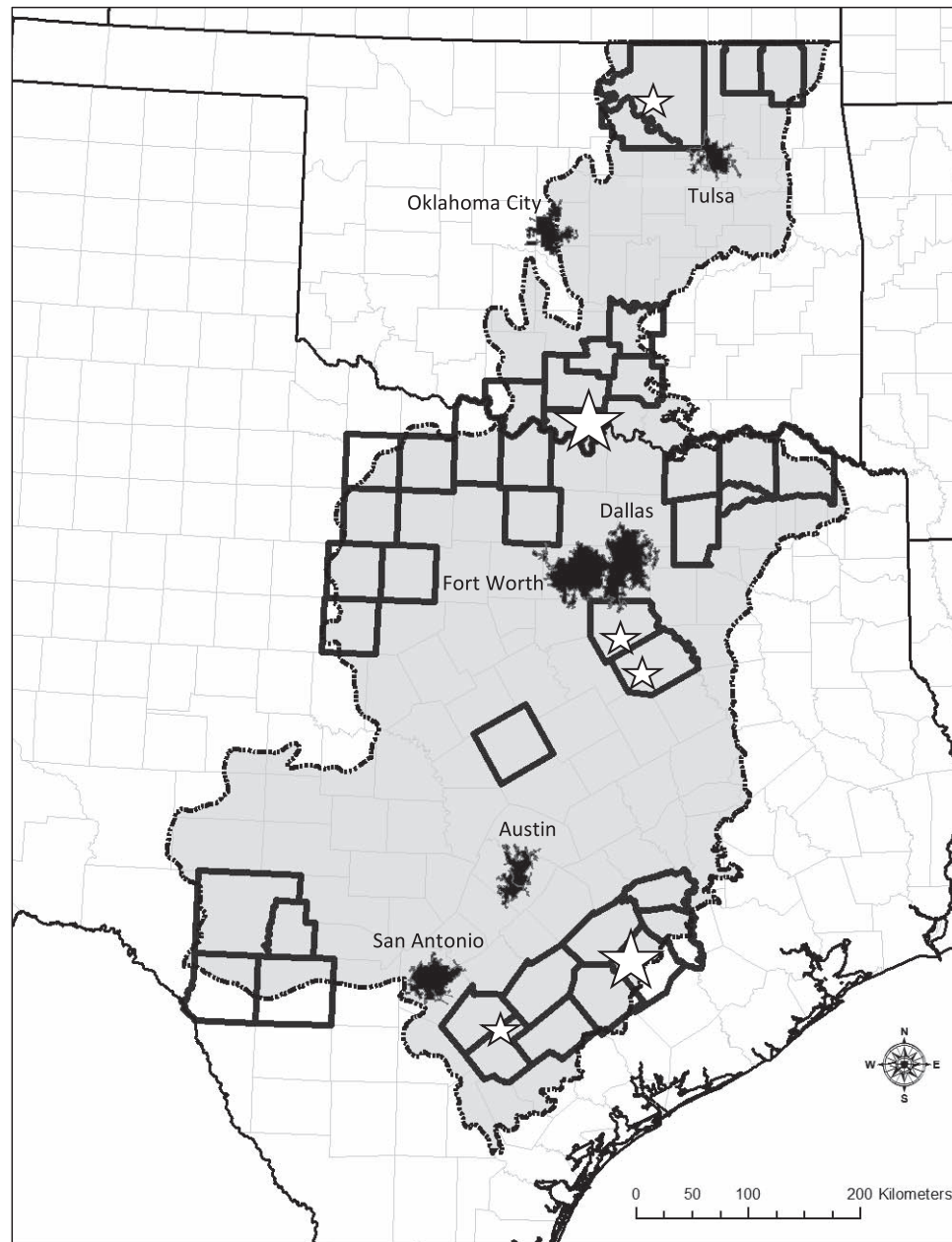


Fig. 2. Focal regions is the Oaks and Prairies Joint Venture region (gray) include 30 counties in Texas and 10 counties in Oklahoma (black outlined counties). Large stars indicate “official” National Bobwhite Conservation Initiative (NBCI) Coordinated Implementation Program focal areas in Colorado County, TX and Love County, OK. Small stars indicate additional focal areas with breeding season monitoring reported by Texas and Oklahoma state agencies in the NBCI habitat management inventory.

Once biological objectives were identified, OPJV partners began assessing the conservation potential of the landscape and providing spatially-explicit locations for conservation activities (conservation design). This process was intended to answer questions about “Where does grassland habitat exist?”, “Where are the most cost effective locations for conservation?”, and “Where should conservation actions be focused?” Our partners decided to use counties as the planning unit for the OPJV. Clusters of counties to serve as focus areas (Figure 2) for partner investment toward shared grassland conservation goals were selected based upon priority bird range maps,

partner interest, and the NBCI Biologist Ranking Information (National Bobwhite Technical Committee 2012). Within some of the clusters of counties, smaller focus areas (sub-county), including the Texas and Oklahoma NBCI focal areas, were established around conservation activity hotspots, including existing wildlife or prescribed fire landowner cooperatives. These county clusters (OPJV focus areas) and sub-county focus areas served as areas for concentrated partner cooperation for our monitoring and conservation delivery efforts (see below for OPJV Grassland Bird Business Plan).

OPJV monitoring efforts consist of bird population monitoring and conservation tracking of habitat management. The bird population monitoring was designed to be a long-term (10-year) distance sampling using roadside point counts for several priority grassland birds during the breeding season, including northern bobwhite. The bird population monitoring was also designed to supplement national and state bird monitoring (e.g., Breeding Bird Survey and fall covey call counts) at the county scale to match the scale of our biological planning, conservation design, and conservation delivery. Several universities and state agencies, including Texas Parks and Wildlife Department, Oklahoma Department of Wildlife Conservation, Texas State University, and Oklahoma State University, were involved in funding, conducting, and logistically supporting monitoring efforts (over 4,500 point counts per year), increasing shared ownership of the monitoring effort.

Conservation tracking efforts within the OPJV partnership attempted to count and map acres managed to support grassland bird conservation efforts. Oaks and Prairies Joint Venture and partner staff collected habitat data before and after habitat improvement projects were completed and logged the data collected into a shared online database called the Grassland Management Inventory Tool. Combined, these two monitoring efforts helped the JV partners to evaluate progress toward achieving conservation goals and longer-term population response to landscape management. Ultimately, population monitoring and conservation tracking can provide needed information to justify conservation practices and programs while producing information to improve future conservation planning in the adaptive management cycle (Giocomo et al. 2012).

Cooperative research efforts could provide an opportunity to address uncertainties in assumptions used for biological planning and conservation design. Working under the adaptive management framework, replicated blocks of managed and unmanaged habitat could be identified to test basic assumptions built into our conservation strategy. The most basic assumption was that our priority species population will respond to large-scale habitat management. Large-scale test of basic assumptions have not been initiated in the Oaks and Prairies, but several small research projects are in progress to evaluate northern bobwhite survival and productivity in areas where our conservation delivery has been concentrated. For example, one project initiated by partners at Tarleton State University in Texas was following radio-marked northern bobwhites in GRIP project areas and surrounding control areas to evaluate the effects of prescribed fire on demographic parameters.

Finally, better understanding of the human dimensions of grassland conservation including studies of social, political, and economic conservation drivers, needed to be incorporated into all other activities under the adaptive management framework at different scales. The OPJV partners began a pilot project in one of our focus areas using public data (e.g. US Census Bureau) and GRIP participant data to attempt to build predictive models for landowner participation in conservation

programs. We also developed strategic communication strategies (e.g. targeted landowner workshops, websites, and publications) to reach specific audiences, including individual landowners, land managers, and cooperative quail conservation groups, and surveys to evaluate the effectiveness of those communication tools to cause desired behavioral outcomes (Bogart et al. 2009, Giocomo et al. 2012).

OPJV Grassland Bird Conservation Business Plan and GRIP

Recognizing the complexity and difficulty of restoring grassland bird populations across a large geography of private working lands, the OPJV partners enlisted a full complement of conservation delivery strategies. The OPJV Grassland Bird Conservation Business Plan (Oaks and Prairies Joint Venture 2015) was our main tool to communicate identified the delivery strategies and to estimate costs, risks, and potential contribution to habitat objectives for each strategy. Business plan strategies were implemented through programs made available at the landscape level and delivered locally by OPJV partners, including: financial incentives to private landowners for habitat management, support of landowner conservation cooperatives, market-based conservation delivery, and strategic outreach and communications.

The portfolio of programs employed balanced risk (likelihood of success) by including both innovative approaches that are less proven but have a high potential for conservation gain, with more traditional approaches that have a demonstrated history of success in making modest conservation gains. An example of a more traditional conservation strategy identified in the plan, and implemented by the OPJV partners, was to provide financial incentives for private landowners to conduct habitat management practices on their property through the OPJV Grassland Restoration Incentive Program (detailed below).

An example of a higher risk conservation strategy was to develop an incubator for nascent landowner cooperative groups to develop organizational capacity to identify and pursue conservation resources and communicate successes. Support could be things as simple as helping to develop stable leadership and bylaws, providing website development support, and providing information and contacts for various conservation programs provided by partner agencies and organizations. Although success is not guaranteed, the landowner cooperative groups fostered by this program have the potential to deliver large conservation gains and serve as a force multiplier for efforts to conduct conservation outreach in the OPJV geography. This strategy has not been fully implemented yet in the OPJV.

The OPJV partners implemented GRIP in 2013 to be delivered in parallel with the US Department of Agriculture Natural Resource Conservation Service's (NRCS) Environmental Quality Incentive Program (EQIP) in order to address missed opportunities for conservation projects on private lands due to eligibility issues or landowner reluctance to work with the federal

government. The program was delivered locally by Texas Parks and Wildlife Department, NRCS, US Fish and Wildlife Service, or other partner organization staff. The practices that were incentivized through the program were a subset of the practices incentivized through EQIP and could be categorized into 4 main categories; brush management, native grass reseeding, prescribed burning, and prescribed grazing. Practices incentivized by GRIP were all selected by experts who identified them as the most effective means of improving grassland bird habitat.

Using northern bobwhite as a flagship species, GRIP has been able to deliver a little over \$1.1 million dollars in direct funding for habitat improvements. This spending has resulted in over 24,300 ha of improved habitat at a cost to the program of under \$20 per acre. The functional unit for decision-making for GRIP exists at the focus area scale where local initiative teams made up of agency staff met regularly to discuss GRIP practices, policies and procedures in order to ensure that program dollars are having the greatest impact possible on target bird species.

Funding for GRIP came from various sources (federal, state, and private), but regardless of source, funds were administered by OPJV partner NGOs thereby easing complications that often accompany government contracting. Demand for GRIP consistently exceeded partner expectations and funding availability. We believe that NGO administration was the primary reason that GRIP was received so favorably by landowners and local resource professionals delivering the program.

As successful as GRIP was in gaining interest from landowners thereby facilitating private land habitat improvements, implementing GRIP also identified challenges for our ability to achieve landscape level population objectives. Aside from the obvious needs for increased and more reliable funding as well as increased conservation delivery capacity, it was also apparent that financial incentive programs may only be effective tools for a subset of landowners in a given area. In order to win the battle for the “hearts and minds” of landowners in the OPJV who exhibit diverse motivations and management approaches, it will be necessary to offer an equally diverse set of strategies to encourage conservation action to scale-up management.

CONCLUSION

The Oaks and Prairies Joint Venture partnership is continuing to build upon previous grassland conservation efforts, and join together efforts across scales, agencies, organizations, and species to address grassland habitat needs for northern bobwhites, grassland birds and other grassland species as well as individual private landowners and public land managers. Through our partnership’s application of Strategic Habitat Conservation efforts over the past decade, our biological planning and conservation design helped to guide our initial conservation efforts through the Grassland Restoration Incentive Program supported by over 40 partner organizations. The OPJV has delivered habitat gains by working with partners committed to northern bobwhite and grassland bird conserva-

tion. Since 2013, over 24,300 hectares (60,000 acres) of GRIP conservation practices were supported by over 10,000 bird point counts monitoring efforts through 2016. This effort was the first half of our 10-year plan. With planning, conservation delivery, monitoring, and communications efforts happening at the same time, in the same places, and at the same (county) scale, we were able to leverage partner efforts with the NRCS Regional Conservation Partnership Program (U.S. Farm Bill Program) to scale up habitat management resources and staffing to meet the landowner demand, demonstrated through our partner supported GRIP efforts, through 2021.

More than half of the JVs in the United States have significant responsibility for northern bobwhite populations, and may provide avenues for less traditional conservation measures to address conservation needs for grassland birds. There are also emerging opportunities to combine efforts for other steeply declining grassland dependent species to bridge the traditional divide between game and non-game species. Scaling up of grassland habitat management requires combining the efforts of multiple partners to tie range-wide population and habitat planning efforts with local-scale, on-the-ground conservation actions for northern bobwhite, other grassland birds, butterflies, and grassland pollinators. To make significant progress against seemingly overwhelming conservation challenges, we will need to be willing to tie together different strategies and work across different scales with many partners.

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