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FINAL PERFORMANCE REPORT

FEDERAL AID GRANT NO. F06AF00013 (T-43-P-1)

CONSERVATION PLANNING IN THE OAKS AND PRAIRIES BIRD CONSERVATION REGION

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

October 1, 2006 through September 30, 2012

FINAL PERFORMANCE REPORT

State: Oklahoma

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Grant Program: State Wildlife Grants

Grant Name: Conservation Planning in the Oaks and Prairies Bird Conservation Region

Grant Period: October 1, 2006 - September 30, 2012

Principle Investigators/Project Personnel:
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A. Abstract:

The Oaks and Prairies Joint Venture (OPJV) is a voluntary partnership between government agencies, non-governmental organizations and individuals who share a common interest in the conservation of birds in the Oaks and Prairies Bird Conservation Region (BCR). Through this grant, financial and technical assistance was provided to the OPJV for conservation planning in the Oklahoma portion of the Oaks and Prairies BCR which is synonymous with the Cross Timbers and Tallgrass Prairie regions of the Oklahoma Comprehensive Wildlife Conservation Strategy. Through the Oaks and Prairies Joint Venture, an avian conservation plan was developed for the region. This plan, entitled the Oaks and Prairies Joint Venture Implementation Plan, addresses the habitat needs for all of the bird species that occur regularly in the Oaks and Prairies BCR by linking birds to their specific habitat associations and recommending conservation actions that support the habitat needed by each avian suite. The Implementation Plan formalizes the plan of work for the Joint Venture and it further identifies those species of birds that are in need of special conservation attention because they have limited population sizes, declining population trends, or have their greatest abundances in the Oaks and Prairies BCR as compared to the remainder of their ranges. The species that are in need of conservation attention are given greater weight in the regional planning process and conservation recommendations are designed around their needs with the assumption that we can enhance or maintain the populations of all bird species in each habitat type if we can restore and maintain sustainable populations of those species that are most at risk of endangerment.

B. Objective:

To support the newly created Oaks and Prairies Joint Venture between the states of Oklahoma and Texas, and through this partnership, to promote and expand all-bird conservation in central Oklahoma by developing conservation strategies to reverse or stabilize the declines of bird populations and their habitats so that these species do not become threatened or endangered.

C. Methods:

The Oaks and Prairies Joint Venture hired Jim Giocomo as its coordinator. His initial duties were to promote the Joint Venture concept, encourage conservation agencies and organizations to become active members of the Joint Venture and to gather input from Joint Venture members and technical experts in order to develop an Implementation Plan for the OPJV that addresses the conservation needs of all birds within the Joint Venture's boundaries. To begin the initial development of the OPJV Implementation Plan, he collected existing data regarding land use patterns, habitat distribution, habitat structure and avian distribution and abundance. GIS compatible data were collected for spatial analyses of habitat distributions and land use changes. Shapefiles and associated data were compiled or created for the public lands and conservation lands within the OPJV. Associated data included ownership, acreage, and the habitat types and bird species found in each. U.S. Department of Agriculture data were used to calculate the acreage of cropland, improved pasture and Conservation Reserve Program lands within counties and subregions of the Oaks and Prairies BCR. Information regarding substantial conservation issues within the BCR was obtained by reviewing existing conservation plans and documents. These included national wildlife refuge plans, the state comprehensive wildlife conservation strategies for Oklahoma and Texas, the Northern Bobwhite Conservation Initiative, regional Partners In Flight conservation plans and the recovery plans for the Black-capped Vireo (*Vireo atricapilla*) and Golden-cheeked Warbler (*Dendroica chrysoparia*). Additional bird conservation data were obtained from technical publications, the conservation plans from neighboring joint ventures, and the Partners In Flight national database that is hosted by the Rocky Mountain Bird Observatory.

A database was generated to record information about all of the bird species documented within the Oaks and Prairies BCR with information derived from existing publications and records housed in the e-bird database at the Cornell Lab of Ornithology. The state comprehensive wildlife conservation strategies, the Partners In Flight Landbird Conservation Plan, the U.S. Shorebird Plan and the National Audubon Society's Red List and Yellow List were used to evaluate those species with a special conservation status and a higher need for conservation attention. Breeding Bird Survey data were examined to identify those species that show a declining population trend within the Oaks and Prairies BCR or subdivisions of it. The BBS data were further evaluated to identify the relative quality of the data that were used to make inferences about population trends. For some species, the population trend estimate is robust due to a high relative abundance of the species. But, for other species the trends are insignificant or questionable because of the species' rarity or limited detection using BBS methods.

To learn more about the structure and functioning of other habitat-based avian conservation joint ventures, the OPJV Coordinator met with the staff from neighboring joint ventures and attended their working group meetings. These joint ventures included the Lower Mississippi Valley JV, Rio Grande Valley JV, Central Hardwoods JV and the Playa Lakes JV. Based upon this information, the coordinator recommended that the ODWC and TPWD develop the Oaks and Prairies JV as an independent non-profit organization modeled after the Playa Lakes and Central Hardwoods JVs. These joint ventures have a Management Board and multiple Technical Working Groups based upon geographic and/or avian taxonomic divisions. An Oaks and Prairies Joint Venture Management Board was created in 2008 to provide direction to the Joint Venture Coordinator. The Management Board is comprised of representatives from eleven local and state agencies and organizations. Technical working groups were organized around geographic subdivisions within the Oaks and Prairies BCR. Between 2008 and 2011, six meetings were held with groups of technical experts to collect information, draft text and refine the Joint Venture's Implementation Plan and plans for specific habitat types.

D. Results and Discussion:

The Oaks and Prairies Joint Venture Coordinator, Jim Giocomo, prepared the OPJV's Implementation Plan with input and support from the OPJV Management Board and a regional technical working group comprised of biologists, land managers and stakeholders. The funds from this grant were used to develop and update the Oklahoma portion of the Oaks and Prairies JV Implementation Plan. The current version of this Plan is attached as Appendix A. During the grant period, the Implementation Plan was approved by the U.S. Fish and Wildlife Service's Division of Migratory Bird Management and the Oaks and Prairies Joint Venture was established as an official habitat-based, bird conservation joint venture. Being recognized officially as a joint venture allows the Oaks and Prairies JV to receive conservation partnership funding from the U.S. Fish and Wildlife Service to support the implementation of its conservation plan. The Oaks and Prairies JV's Implementation Plan is the guiding document for the biological planning, conservation design, conservation delivery, outreach, research, and monitoring activities of the Joint Venture and all aspects of the plan will be updated periodically through an adaptive management framework as conditions change and new information is collected.

For planning and implementation purposes, the Oaks and Prairies BCR was divided into three sub-ecoregions that correspond to its three major, landscape-level habitat types. These sub-ecoregions are 1) the Cross Timbers, an area that is dominated by a mosaic of post oak/blackjack oak woodlands and tallgrass prairies in the northern and western portions of the BCR, 2) the Blackland Prairie, an area that was historically dominated by tallgrass prairies and that occupies the south-central portion of the BCR, and 3) the Post Oak Savannah that occurs along the southeastern boundary of the BCR. The Cross Timbers sub-ecoregion encompasses nearly the entire Oklahoma portion of the BCR, although small fingers of the Blackland Prairie and Post Oak Savannah extend across the Red River into the southern-most counties of the state. Widespread conservation issues within the Oklahoma portion of the Oaks and Prairies BCR include: diminished fire frequencies at the landscape scale that have contributed to an increase in

the abundance of Eastern Redcedar (*Juniperus virginiana*) in many native plant communities; conversion of native prairies and woodlands to exotic forage grasses and crops; landscape scale changes in grazing/browsing patterns; habitat fragmentation as a result of land subdivision, urban and infrastructure development and habitat conversion; and encroachment of exotic plant species into native communities.

Approximately 290 species of birds nest, winter or migrate through the Oaks and Prairies BCR. The Joint Venture's avian database identifies all of the birds for which there is a conservation concern at the state, regional or continental level. Additionally, species were identified for which the Oaks and Prairies BCR is a region of high conservation responsibility (containing 8% or more of the world population) or a region of stewardship responsibility as defined in the Partners In Flight National Landbird Conservation Plan. Although the OPJV Implementation Plan addresses all birds, greater emphasis has been placed initially on the conservation of breeding bird populations. Although the Oaks and Prairies BCR extends across only two states, it encompasses a diverse and variable series of bird communities along a north to south gradient. Nearly 140 avian species nest within the Oaks and Prairies BCR and 116 species nest within the Oklahoma portion. The OPJV holds a high degree of conservation responsibility for 26 species, of which 16 are important to the region because 7% or more of their total population occurs within the Oaks and Prairies BCR (Table 1.). These include rare or uncommon species such as the Black-capped Vireo, Bell's Vireo and Painted Bunting, as well as more widespread or common species including the Scissor-tailed Flycatcher, Yellow-billed Cuckoo, Northern Bobwhite, Eastern Meadowlark, Common Nighthawk, Bewick's Wren, Carolina Chickadee and Dickcissel.

Table 1. Selected Breeding Land Birds of the Oaks and Prairies Bird Conservation Region. Conservation Action Codes: CR = Critical Recovery; IM = Immediate Management; MA = Management Attention; PR = Planning and Responsibility

Species	National Responsibility	% of Total Population	Regional Breeding Conserv. Score	Conservation Action
Greater Prairie Chicken	Low	< 1%	20	CR
Black-capped Vireo	High	26.4%	22	CR
Painted Bunting	High	27.4%	20	MA
Scissor-tailed Flycatcher	High	28.3%	18	MA
Bell's Vireo	High	8.0%	17	IM
Yellow-billed Cuckoo	High	10.6%	15	MA
Rufous-crowned Sparrow	Low	1.4	14	
Lark Sparrow	Medium	6.4	15	MA
Eastern Meadowlark	High	8.5	16	MA
Northern Bobwhite	High	7.1	17	MA
Greater Roadrunner	Medium	6.2	14	
Field Sparrow	Medium	5.2	16	MA
Black-chinned Hummingbird	High	9.9	12	
Bewick's Wren	High	8.0	13	
Carolina Chickadee	High	12.2	16	PR
Dickcissel	High	8.5	15	PR
Common Nighthawk	High	7.5	15	MA
Northern Mockingbird	High	9.3	13	
Northern Cardinal	High	8.5	10	
Chuck-wills-widow	Medium	6.5	14	
Wild Turkey	Medium	4.9	12	
Summer Tanager	Medium	2.2	15	MA
Great Crested Flycatcher	Medium	2.7	15	MA
Baltimore Oriole	Low	0.2	14	MA
Prothonotary Warbler	Low	0.5	14	PR
Kentucky Warbler	Low	0.4	14	PR
Chimney Swift	Medium	3.3	15	MA
Red-headed Woodpecker	Low	0.5	15	MA
Purple Martin	High	7.0	14	PR
Loggerhead Shrike	Medium	4.6	16	IM
Mourning Dove	Medium	3.3	12	
Brown Thrasher	Low	1.6	10	
Mississippi Kite	Medium	4.3	14	
Grasshopper Sparrow	Low	1.1	13	PR
Eastern Screech Owl	Medium	5.2	14	
Barred Owl	High	7.1	11	
Eastern Bluebird	Medium	6.4	11	

Red-shouldered Hawk	Medium	5.0	13	
White-eyed Vireo	Medium	4.6	11	
Ruby-throated Hummingbird	Medium	5.3	12	
Tufted Titmouse	Medium	5.2	13	
Blue-gray Gnatcatcher	Medium	3.4	10	
Carolina Wren	Medium	3.4	13	
Red-bellied Woodpecker	Medium	4.0	13	
Louisiana Waterthrush	Medium	2.2	15	
Indigo Bunting	Low	1.3	9	
Downy Woodpecker	Medium	3.0	11	
Cliff Swallow	Medium	3.7	9	
Orchard Oriole	Low	0.3	14	

Based upon population trend, population size and the degree of conservation responsibility, the highest priority bird species within the Oklahoma portion of the Oaks and Prairies BCR appear to be Black-capped Vireo, Scissor-tailed Flycatcher (*Tyrannus forficatus*), Bell's Vireo (*Vireo bellii*), Painted Bunting (*Passerina ciris*), Yellow-billed Cuckoo (*Coccyzus americanus*), Northern Bobwhite (*Colinus virginianus*), Eastern Meadowlark (*Sturnella magna*), Carolina Chickadee (*Poecile carolinensis*) Dickcissel (*Spiza americana*), Field Sparrow (*Spizella pusilla*), Lark Sparrow (*Chondestes grammacus*) and Loggerhead Shrike (*Lanius ludovicianus*). Some avian species, which are strongly tied to tallgrass prairie habitats (e.g. Greater Prairie Chicken (*Tympanuchus cupido*) and Henslow's Sparrow (*Ammodramus henslowii*)) and are under-sampled by the Breeding Bird Survey in this region, may become greater priorities than initially recognized as new data emerge.

The highest priority habitat types within the Cross Timbers sub-region (e.g. most of the Oklahoma portion of the BCR) are native oak savannahs, bottomland hardwood forests, deciduous shrublands and tallgrass prairies. Oak savannahs are defined as landscapes comprised of an overstory that is dominated by oaks - primarily post oak (*Quercus stellata*) and blackjack oak (*Q. marilandica*) - but with a canopy cover of only 5% to 30%. The understory of these savannahs is a mosaic of native, warm-season bunch grasses, forbs and deciduous shrubs. Oak savannahs are important habitats for priority bird species such as Northern Bobwhite, Painted Bunting, Scissor-tailed Flycatcher, Bewick's Wren, Red-headed Woodpecker and Field Sparrow. Bottomland hardwood forests are mature oak and pecan-dominated forests within the floodplains of streams and small rivers. These are important habitats for Prothonotary Warbler, Yellow-billed Cuckoo, Carolina Chickadee and Swainson's Warbler. Deciduous shrublands are comprised of several woody plant communities including post oak shrub/scrub habitats on thin, rocky soils, and plum/roughleaf dogwood/persimmon shrublands in the transitions between prairies and oak woodlands and on old-field sites. Deciduous shrublands are important habitats for the Black-capped Vireo (oak scrub), Bell's Vireo (plum thickets), Northern Bobwhite, Painted Bunting, Field Sparrow and Lark Sparrow. Tallgrass prairies exist on scattered sites throughout the Cross Timbers sub-ecoregion on areas with clay soils. These grasslands are dominated by warm-season bunch grasses such as big bluestem, Indian grass, switch grass and little bluestem,

and they often contain a diverse community of forbs and low shrubs. Priority bird species that are dependent upon tallgrass prairie habitat include Dickcissel, Eastern Meadowlark, Northern Bobwhite, Loggerhead Shrike, Lark Sparrow and Scissor-tailed Flycatcher. In the northern portion of the region, tallgrass prairies may be occupied by nesting populations of Greater Prairie Chicken, Henslow's Sparrow and Upland Sandpiper.

In 2010, the OPJV Management Board elevated the priority that it places on the implementation of habitat improvements to increase habitat quality and bird populations. Based upon habitat priorities, the initial focus of habitat enhancements will be the conservation and improvement of grassland/shrubland habitats that are important to landbirds, in particular the Northern Bobwhite, Bell's Vireo and Black-capped Vireo. This desire to implement soundly developed conservation practices necessitated further conservation planning that is focused on tallgrass prairie and shrubland habitats. Two meetings were held with technical experts draft and refine a conservation strategy for grassland birds and to identify implementation strategies that use existing conservation programs such as those funded through the Farm Bill. A set of focal grassland bird species was selected by the technical team meeting based upon the following criteria:

I. Choose species that use sub-habitat types that overlap several other priority species habitat use
    A. Habitat needs can represent needs for other priority species
    B. Population trend is similar to other priority species
    C. Species expected to respond to management similar to other priority species
II. Choose species that have known basic life history information available for modeling (birds per habitat area and relationships between vital rates and habitat)
    A. Population size estimate
    B. Population trends
    C. Vital rates in different habitats within or near the OPJV region are known to allow species-habitat modeling
    D. Weather effects on survival and productivity (for climate change evaluation)
    E. Relatively easy to monitor
        1. Abundant enough to provide adequate sample size
        2. Expected to be able to detect a response to possible management actions
    F. Partners interested

The species that were selected for the Oaks and Prairies BCR are listed in Table 2. The technical team included the Greater Prairie Chicken and Henslow's Sparrow in the list of focal species because of their relatively high conservation concern. However, these species only nest in the extreme northern portion of the BCR and are not sampled adequately through the Breeding Bird Survey protocol; therefore, there are insufficient data to estimate their population trends. Similarly, the Black-capped Vireo was included as a focal species, but it too is under-sampled by the Breeding Bird Survey protocol because of its rarity; therefore, it is difficult to estimate its population trend on a regional level. The current version of the Grassland/Shrubland Bird Conservation Plan is attached in Appendix B.

Table 2. Percent decrease for focal grassland bird breeding populations from the 1966 to 2009 and 1998-2009 for species with in Oaks and Prairies Joint Venture that are monitored by the Breeding Bird Survey.

Oaks and Prairies Species	% Change per year 1966-2009	Total decrease for 42 years of BBS 1966-2009	% Change per year 1998-2009	Total decrease for 10 years of BBS 1998-2009
Northern Bobwhite	-5.0%	89%	-4.7%	38%
Dickcissel	-0.8%	29%	-2.6%	23%
Eastern Meadowlark	-3.1%	74%	-1.3%	12%
Grasshopper Sparrow	0.0%	0%	0.9%	
Painted Bunting	-0.9%	32%	2.2%	
Lark Sparrow	-3.3%	76%	-0.3%	3%
Loggerhead Shrike	-5.7%	92%	-8.3%	58%
Scissor-tailed Flycatcher	-1.7%	52%	-1.9%	17%
Bell's Vireo	-2.2%	62%	2.0%	
Bewick's Wren	-1.2%	40%	-0.6%	6%
Black-capped Vireo				
Cassin's Sparrow	-0.3%	12%	14.2%	
Rufous-crowned Sparrow	-6.5%	94%	-6.6%	49%
Yellow-Breasted Chat	0.3%		3.6%	
Field Sparrow	-2.0%	58%	-3.3%	29%
Greater Prairie-chicken				
Henslow's Sparrow				
Upland Sandpiper	-3.9%	82%	-9.3%	62%

Based upon previous work by the Northern Bobwhite Conservation Initiative and the Partners In Flight Landbird Conservation Plan, initial population objectives were calculated for the area within the joint venture's boundaries. Published territory size data for individual species were used as a starting point to estimate the number of habitat-acres that would have to be restored or enhanced in order to reach the population objectives for each species. Published territory sizes represent the minimum area of suitable habitat needed to sustain one pair of breeding birds or one male territory. Dividing the population estimates by 2 yields the number of territories. Multiplying by the average territory size yields the minimum amount of habitat needed to support focal populations at objective level (Table 3). This method assumes that there is no unused space between territories and no need for buffer space around the habitat patch that may or may not be unsuitable (e.g., edge habitat). This assumption will have to be addressed on a species by species basis in the future. Additionally, this minimum area of habitat does not take into account habitat that exists in an unusable state due to habitat succession. For example, some birds require later stages of successional habitats and habitat conditions during the first few years after a disturbance event are not suitable until a certain amount of woody vegetation has developed.

Table 3. Number of territories and minimum area of additional usable space needed annually to provide habitat for focal grassland/shrubland bird species at objective levels.

Species	Additional individuals needed to meet population objectives	Number of Territories	Area in suitable habitat/pair (Territory size (Ha))	Minimum Area of new usable space needed (Ha)
Northern Bobwhite	343,425	171,713	6.7	1,144,752
Dickcissel	440,033	220,016	1.1	242,018
Eastern Meadowlark	151,074	75,537	2.8	211,503
Grasshopper Sparrow	34,157	17,079	1.0	17,079
Painted Bunting	33,918	16,959	1.4	24,421
Lark Sparrow	188,259	94,130	1.0	94,130
Loggerhead Shrike	118,097	59,048	9.6	566,863
Scissor-tailed Flycatcher	384,013	192,006	0.5	96,003
Bell's Vireo	11,786	5,893	1.0	5,893
Bewick's Wren	105,697	52,849	1.6	84,558
Cassin's Sparrow	6,356	3,178	2.6	8,262
Rufous-crowned Sparrow	54,734	27,367	1.5	41,050
Field Sparrow	137,246	68,623	0.8	54,898

To date, wetlands have received relatively little attention by the Oaks and Prairies Joint Venture. This is due in large part to the Oaks and Prairies BCR not being considered critical to waterfowl conservation during the development of the North American Waterfowl Management Plan. To remedy this sparse attention, the OPJV Coordinator and the technical working groups developed an initial draft map of important wetland habitats for the conservation of important water bird species. These areas take into consideration the needs of forested wetland and riparian passerines such as the Prothonotary Warbler, as well as waterfowl, shorebirds and wading birds.

The OP JV Coordinator, Jim Giocomo, collaborated with a wide range of partner and stakeholder groups across the Oaks and Prairies BCR. Those agencies and organizations included multiple programs within the Oklahoma Department of Wildlife Conservation, biologists and managers of the National Wildlife Refuge system (e.g. Wichita Mountains NWR, Tishomingo NWR, and Deep Fork NWR), The Nature Conservancy, Noble Foundation, Sutton Avian Research Center, Oklahoma Audubon Council, Quail Unlimited, Oklahoma Ornithological Society, Oklahoma Biological Survey, National Wild Turkey Federation, Ducks Unlimited, ornithologists, biologists, foresters and range management specialists within the state university system (e.g. University of Oklahoma, Oklahoma State University, University of Central Oklahoma, Southeastern Oklahoma State University), the Oklahoma Cooperative Extension Service, and the Natural Resource Conservation Service. Additionally, regular coordination occurred with the staff of the Rio Grande JV, Lower Mississippi Valley JV, Central Hardwoods JV and Playa Lakes JV. Jim represented the Joint Venture partnership at regional conservation meetings that included meetings with the Gulf Coast Prairie Landscape Conservation Cooperative and USFWS Region 2 biologists.

E. Significant Deviations:
None

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H. Date: December 17, 2012

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_____
Wildlife Division Administration
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APPENDIX A. Working Draft of the Oaks and Prairies Joint Venture Implementation Plan

APPENDIX B. Working Draft of the Oaks and Prairies Joint Venture Grassland Bird Conservation Plan

The Oaks and Prairies Joint Venture
DRAFT Grassland Bird Conservation Plan

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Background

The goal of this document is to lay out the focal species of the Grassland Bird Conservation Strategy, compile exiting information about the population status, population trend, and habitat needs for these species, and use this information to create population and habitat objectives for strategic conservation activities. We are basically answering the question, what species?; how many are there?; how many more can be supported?; how much habitat is needed?; where are the priority areas?; what more do we need to know to make informed decisions? Other open questions like "how?" and "who is going to pay for the work?" will be partially addressed, but will not be fully answered in this document. These strategies will evolve over time. Our audience includes land managers, researchers, and land policy makers.

The Plan-Do-Learn (Adaptive Conservation) Cycle

Because of the broad scope and the diversity of habitat needs for grassland bird species, 1) no one conservation entity is ideally suited to the task, and 2) significant knowledge gaps exist, and will continue to exist (due to the complex nature of the problems). Adaptive conservation (Figure 1) can be an effective approach to dealing with large-scale, complex problems. As defined here, adaptive conservation is a model that follows a **plan, do, and learn** cycle to iteratively improve our knowledge of the system, and allows us to evaluate both the success of management practices, as well as the assumptions underlying its direction. In this model, *biological planning* (**Plan**) is used to identify and prioritize conservation needs of bird species, set population objectives, and develop working models that link population abundance to habitat condition. This information serves as the basis for a spatially targeted *conservation design* (**Plan**). Management prescriptions for *conservation delivery* (**Do**) are then put together based on science and experience/intuition with both the natural and social systems in play. *Research* programs (**Learn**) are designed with management prescriptions to test the assumptions underlying biological planning and conservation design. *Monitoring* (**Learn**) before, during, and after management provides a reference for gauging the success of conservation planning and delivery (i.e., accountability). Research and monitoring become an integral part of habitat management.
(See http://www.fws.gov/science/StrategicHabitatConservation.html)

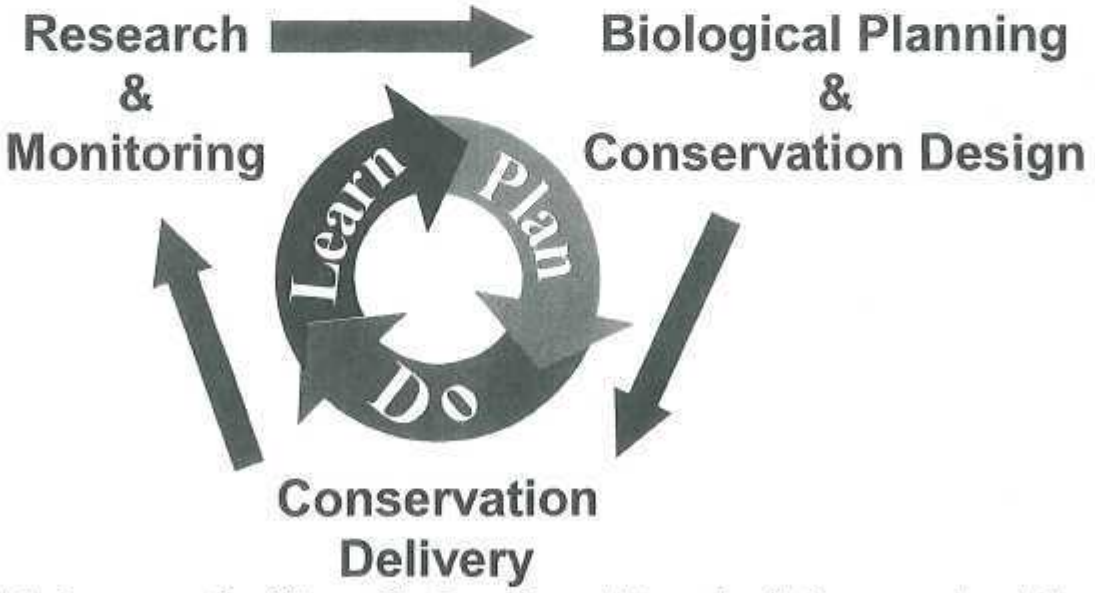


Figure 1. Adaptive conservation follows a Plan-Learn-Do model to continually improve our knowledge of the effectiveness of conservation actions.

The Plan-Do-Learn process results in an increased understanding of the biology and management of bird species, and this increased understanding can be plugged back into the planning and design elements, thus completing the cycle. The important point here is that an approach that embraces adaptive conservation allows us to overcome both of the previously

mentioned difficulties by: 1) laying out a framework for effective partnerships, and 2) using the plan, do, and learn model to create the feedback loop necessary to manage in an uncertain environment. Partners that focus on the "Do," like state and federal agencies, land conservancies, and environmental organizations, work more directly with partners that focus on the "Learn," like universities and other research organizations, to build and improve the "Plan."

Strategic Habitat Conservation is one "brand" of adaptive conservation embraced by the US Fish and Wildlife Service and the US Geological Service (NEAT 2006; http://www.fws.gov/science/doc/SHC_FinalRpt.pdf). Figure 2 provides a breakdown of specific components of Strategic Habitat Conservation and serves as a basis for the organization of this DRAFT document.

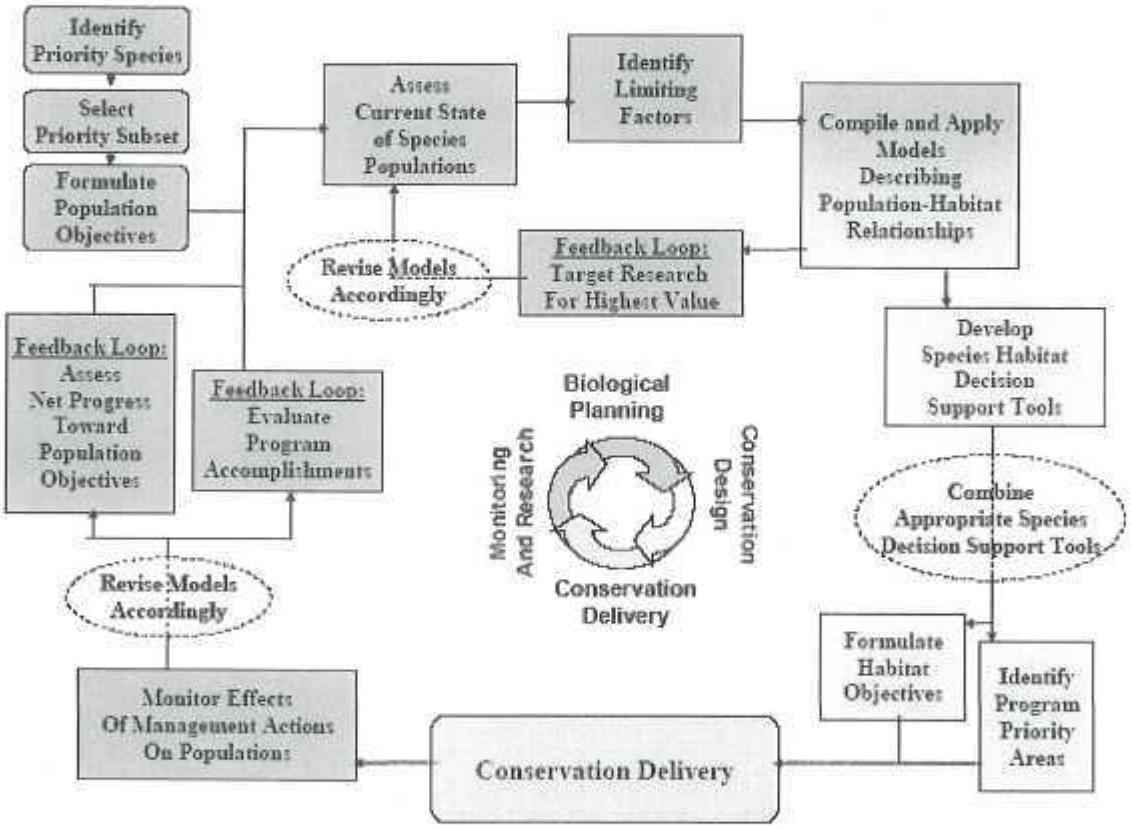


Figure 2. Strategic Habitat Conservation approach to adaptive conservation and components of Biological Planning, Conservation Design, Conservation Delivery, and Monitoring and Research.

Biological Planning
Identify Priority Species

As a part of the initial planning for the Oaks and Prairies Joint Venture, an implementation plan was assembled with partners to establish among many other things, how the Joint Venture works and the initial list of priority species. In August and September 2009 a series of three technical team meetings were held to discuss the initial priorities of the Oaks and Prairies Joint Venture including identifying specific bird species within priority habitats in the Edwards Plateau (BCR 20) and the Oaks & Prairies (BCR 21). Selection of priority species was based upon several criteria starting with the listing of species on existing state (Oklahoma and Texas) and national (Waterfowl, Landbird, Waterbird and Shorebird) plan lists (Appendix 1 & 2 in the OPJV Implementation Plan). Species on those lists were evaluated by the technical team members for their importance in the region by examining information about population trends and estimates based upon Breeding Bird Survey (BBS) trend data, population estimates derived from BBS data (Appendix 3 in the OPJV Implementation Plan), perceived threats, and the possibility that management actions could reverse the negative population trend.

Species were then placed into general habitat types that were ranked highest, medium and lowest priority for conservation actions within each BCR (Appendix 4 & 5 in the OPJV Implementation Plan). All of the habitats listed were considered important for priority bird species, but the ranking allowed the Joint Venture partners to decide where limited conservation resources should focus first (highest ranked habitats), in this case grassland and savannah habitats. As more resources become available, it is anticipated that the lower priority habitats will be become a focus of the Oaks and Prairies Joint Venture.

Priority Species represent species of Conservation Concern in the OPJV region due to significant declining population trend, high regional responsibility, and/or partner interest.

Identify Priority Subset (Focal Species)

A Grassland Bird Technical Team meeting was assembled with interested partners to discuss grassland bird conservation needs and objectives. As a part of this meeting, participants discussed how to reduce the list of priority grassland birds to a list of focal species for breeding (Table 1) and wintering (Table 2) seasons. "The needs of these focal species can be used to develop explicit guidelines regarding the composition, quantity, and configuration of habitat patches and the management regimes that must be applied to the resulting design." We used the following criteria;

I. Choose species that use sub-habitat types that overlap several other priority species habitat use
   - A. Habitat needs can represent needs for other priority species
   - B. Population trend is similar to other priority species
   - C. Species expected to respond to management similar to other priority species

II. Choose species that have known basic life history information available for modeling (birds per habitat area and relationships between vital rates and habitat)
   - A. Population size estimate
   - B. Population trends
   - C. Vital rates in different habitats within or near the OPJV region are known to allow species-habitat modeling
   - D. Weather effects on survival and productivity (for climate change evaluation)
   - E. Relatively easy to monitor
     1. Abundant enough to provide adequate sample size
     2. Expected to be able to detect a response to possible management actions
   - F. Partners interested

Focal Species are a subset of the priority species.
Generally following Lembeck's (1997) definition of species "whose requirements for persistence define the attributes that must be present if that landscape is to meet the requirements of the species that occur there. The approach, while consistent with the concept of umbrella species, differs in that it identifies a suite of species, each of which is used to define the characteristics of different landscape attributes that must be represented in the landscape. The needs of these focal species can be used to develop explicit guidelines regarding the composition, quantity, and configuration of habitat patches and the management regimes that must be applied to the resulting design."

Table 1. Focal breeding species for the Oaks and Prairies Joint Venture in grass dominated habitats including Grassland, Savannah, Shrub Grassland and Cropland habitats in Breeding and wintering seasons. OPJV = Oaks and Prairies Bird Conservation Region (BCR) and Edwards Plateau BCR; EP = Edwards Plateau BCR.

	Grassland			Savannah		Shrub Grassland		Cropland
Species	**OPJV**	**Northern Oklahoma**	**EP**	**OPJV**	**EP and Cross Timbers**	**OPJV**	**EP**	**OPJV**
Breeding								
Northern Bobwhite	X			X		X		
Dickcissel	X							
Eastern Meadowlark	X							
Grasshopper Sparrow	X							
Painted Bunting				X		X		
Lark Sparrow				X				
Loggerhead Shrike				X				
Scissor-tailed Flycatcher				X				
Bell's Vireo						X		
Bewick's Wren						X		
Black-capped Vireo						X		
Cassin's Sparrow			X				X	
Rufous-crowned Sparrow							X	
Yellow-Breasted Chat*							X	
Field Sparrow					X			
Greater Prairie-chicken		X						
Henslow's Sparrow		X						
Upland Sandpiper		X						

*Yellow-breasted Chat was included as a species to indicate habitat for Black-capped Vireo and is not a priority species in the Oaks and Prairies JV.

Table 2. Focal wintering species for the Oaks and Prairies Joint Venture in grass dominated habitats including Grassland, Savannah, Shrub Grassland and Cropland habitats in Breeding and wintering seasons. OPJV = Oaks and Prairies Bird Conservation Region (BCR) and Edwards Plateau BCR; EP = Edwards Plateau BCR.

	Grassland			Savannah		Shrub Grassland		Cropland
Species	**OPJV**	**Northern Oklahoma**	**EP**	**OPJV**	**EP and Cross Timbers**	**OPJV**	**EP**	**OPJV**
Wintering								
Eastern Meadowlark	X							
Henslow's Sparrow (Texas)	X							
LeConte's Sparrow	X							
Northern Harrier	X							
Savanna Sparrow	X							
Sedge Wren (wet habitats)	X							
Western Meadowlark	X							
Field Sparrow				X				
Harris's Sparrow				X		X		
Burrowing Owl								X
Mountain Plover								X
Smith's Longspur								X

Formulate Population Objectives

To formulate population objectives, estimates of current populations using existing data and methods were derived for each of the focal species where possible. Most species are represented in national Breeding Bird Survey data, and estimates were provided in the Partners in Flight Landbird population database (except Upland Sandpiper). These estimates are based upon methods from Bart (2005) and Rosenberg and Blancher (2005). Following is a brief explanation methods for generating population estimates; for a full discussion of the mathematics and assumptions, see Bart (2005) and Rosenberg and Blancher (2005). First, the BBS density average was multiplied by a time of day adjustment, to account for differences in species detectability during the BBS sampling period. This value was then multiplied by the ratio of total area of the BCR (number of routes x 50 points x (3.14 x (Max. Detection distance) x 2)) (Rosenberg and Blancher 2005). The Edwards Plateau and Oak & Prairies BCRs were combined for final population estimates.

The population estimates provided in the Partners in Flight Landbird Plan are based upon BBS data from the 1990s. Population changes during the past ten years (1998-2009) serve as a benchmark for initial planning. As the Joint Venture Partnership develops, population objectives can be modified to reflect socio-economic and political realities as well as current scientific knowledge.

Assess Current State of Species Populations

Focal species populations have experienced declines over the past few decades according to the Breeding Bird Survey. For example Bell's Vireo populations have been reduced by 97% in the Oaks and Prairies BCR, but populations have increased slightly in the Edwards Plateau BCR. Lark sparrow populations decreased by over 70% in both BCRs and Northern Bobwhite populations decreased by over 60%. All three of these species are among the most abundant species in both BCRs (Table 3) indicating severe population declines are not confined to the relatively rare species.

Table 3. Summary of population estimates for the Oaks and Prairies BCR and Edwards Plateau BCR as well as population changes based upon BBS modeling. The difference between the OPJV population estimate and the estimated current population represents the reduction in the number of birds since 1998.

Species	*Oaks and Prairies*			*Edwards Plateau*			OPJV Population Estimate (PIF)	Estimated Current Population	Difference
	BCR 21 Population estimate	% Change per year 1998-2009	Current Population estimate	BCR 20 Population estimate	% Change per year 1998-2009	Current Population estimate			
Northern Bobwhite	660,000	38%	407,824	160,000	57%	68,750	820,000	476,575	343,425
Dickcissel	1,900,000	23%	1,459,967	70,000		70,000	1,970,000	1,529,967	440,033
Eastern Meadowlark	860,000	12%	754,519	70,000	65%	24,407	930,000	778,926	151,074
Grasshopper Sparrow	170,000		170,000	40,000	85%	5,843	210,000	175,843	34,157
Painted Bunting	1,200,000		1,200,000	500,000	7%	466,082	1,700,000	1,666,082	33,918
Lark Sparrow	630,000	3%	611,353	540,000	31%	370,388	1,170,000	981,741	188,259
Loggerhead Shrike	190,000	58%	79,882	19,000	42%	11,022	209,000	90,903	118,097
Scissor-tailed Flycatcher	2,200,000	17%	1,815,987	300,000		300,000	2,500,000	2,115,987	384,013
Bell's Vireo	30,000		30,000	300,000	4%	288,214	330,000	318,214	11,786
Bewick's Wren	500,000	6%	470,797	800,000	10%	723,506	1,300,000	1,194,303	105,697
Black-capped Vireo*	6,010								
Cassin's Sparrow	190,000		190,000	130,000	5%	123,644	320,000	313,644	6,356
Rufous-crowned Sparrow	30,000	49%	15,156	200,000	20%	160,110	230,000	175,266	54,734
Yellow-Breasted Chat	10,000		10,000	160,000		160,000	170,000	170,000	-
Field Sparrow	430,000	29%	307,421	300,000	5%	285,333	730,000	592,754	137,246
Greater Prairie-chicken									
Henslow's Sparrow	-			-					
Upland Sandpiper		62%							

* Derived from Black-capped Vireo population status report (Wilkins et al. 2006).

Table 4. Population trends for focal grassland breeding bird species in the Oaks and Prairies Joint Venture region based upon modeling of Breeding Bird Survey data (Sauer and Link 2011). http://www.mbr-pwrc.usgs.gov/bbs/

			1966-2009 trends		1999-2009		
Species	**N**	**V**	**Trend**	**(95% CI)**	**Trend**	**(95% CI)**	**RA**
Oaks & Prairies BCR							
Northern Bobwhite	67		-5	(-5.6, -4.4)	-4.7	(-6.7, -2.6)	51.9
Dickcissel	68		-0.8	(-1.8, 0.2)	-2.6	(-5.1, -0.1)	42.1
Eastern Meadowlark	68		-3.1	(-3.6, -2.5)	-1.3	(-2.9, 0.4)	102.7
Grasshopper Sparrow	60		0	(-1.6, 1.6)	0.9	(-3.6, 5.6)	1.5
Painted Bunting	68		-0.9	(-1.6, -0.2)	2.2	(0.3, 4.3)	29.5
Lark Sparrow	67		-3.3	(-4.4, -2.2)	-0.3	(-3.1, 2.7)	23.8
Loggerhead Shrike	67		-5.7	(-6.8, -4.6)	-8.3	(-12.4, -4.5)	4.1
Scissor-tailed Flycatcher	68		-1.7	(-2.2, -1.2)	-1.9	(-3.2, -0.5)	45.5
Bell's Vireo	41		-2.2	(-4.2, 0.0)	2	(-4.6, 9.4)	0.6
Bewick's Wren	56		-1.2	(-2.6, 0.1)	-0.6	(-3.7, 2.7)	7.2
Black-capped Vireo							
Cassin's Sparrow	30		-0.3	(-3.0, 2.4)	14.2	(4.7, 25.5)	1
Rufous-crowned Sparrow	14		-6.5	(-9.3, -4.1)	-6.6	(-13.9, -1.1)	0.2
Yellow-Breasted Chat	30		0.3	(-2.4, 2.9)	3.6	(-2.4, 13.8)	0.2
Field Sparrow	40		-2	(-2.9, -1.0)	-3.3	(-6.3, -0.5)	5.9
Greater Prairie-chicken							
Henslow's Sparrow							
Upland Sandpiper	13		-3.9	(-9.3, 1.7)	-9.3	(-27.7, 9.4)	0
Edwards Plateau BCR							
Northern Bobwhite	18		-5.2	(-6.6, -3.8)	-8.1	(-11.7, -4.4)	47.8
Dickcissel	18	V	-2	(-6.3, 2.8)	5.2	(-5.1, 17.0)	12.1
Eastern Meadowlark	14	V	-4.7	(-8.1, -0.9)	-10	(-19.0, -0.2)	9.3
Grasshopper Sparrow	15	V	-5.3	(-10.0, -0.2)	-17.5	(-30.0, -5.1)	1.9
Painted Bunting	18		-2.5	(-3.9, -1.3)	-0.7	(-3.7, 2.7)	68.8
Lark Sparrow	18		-3.8	(-5.2, -2.3)	-3.7	(-5.8, -1.2)	102.7
Loggerhead Shrike	14	V	-0.3	(-3.6, 3.0)	-5.3	(-15.7, 3.4)	0.6
Scissor-tailed Flycatcher	18		0.1	(-0.9, 1.1)	0.4	(-1.6, 2.7)	20.1
Bell's Vireo	18		-0.7	(-2.0, 0.6)	-0.4	(-2.2, 2.0)	7.5
Bewick's Wren	18		-0.9	(-2.3, 0.5)	-1	(-3.4, 1.3)	94.1
Black-capped Vireo							
Cassin's Sparrow	17	V	-3.8	(-6.8, -0.5)	-0.5	(-7.8, 7.9)	13.5
Rufous-crowned Sparrow	18		-2.4	(-4.6, -0.1)	-2.2	(-6.2, 2.9)	11.2
Yellow-Breasted Chat	16		5.8	(3.9, 7.8)	6.3	(3.7, 9.3)	0.7
Field Sparrow	18		-2.2	(-3.6, -0.8)	-0.5	(-3.8, 2.9)	7.5
Greater Prairie-chicken							
Henslow's Sparrow							
Upland Sandpiper							

Assumptions.

BBS relative abundance (birds/BBS route) accurately reflects populations within the regions noted above.

Table 5. Percent decrease for focal grassland bird breeding populations from the 1966 to 2009 and 1998-2009 for species with in Oaks and Prairies Joint Venture that are monitored by the Breeding Bird Survey.

	% Change per year	Total decrease for 42 years of BBS	% Change per year	Total decrease for 10 years of BBS
Species	**1966-2009**	**1966-2009**	**1998-2009**	**1998-2009**
Oaks and Prairies				
Northern Bobwhite	-5.0%	89%	-4.7%	38%
Dickcissel	-0.8%	29%	-2.6%	23%
Eastern Meadowlark	-3.1%	74%	-1.3%	12%
Grasshopper Sparrow	0.0%	0%	0.9%	
Painted Bunting	-0.9%	32%	2.2%	
Lark Sparrow	-3.3%	76%	-0.3%	3%
Loggerhead Shrike	-5.7%	92%	-8.3%	58%
Scissor-tailed Flycatcher	-1.7%	52%	-1.9%	17%
Bell's Vireo	-2.2%	62%	2.0%	
Bewick's Wren	-1.2%	40%	-0.6%	6%
Black-capped Vireo				
Cassin's Sparrow	-0.3%	12%	14.2%	
Rufous-crowned Sparrow	-6.5%	94%	-6.6%	49%
Yellow-Breasted Chat	0.3%		3.6%	
Field Sparrow	-2.0%	58%	-3.3%	29%
Greater Prairie-chicken				
Henslow's Sparrow				
Upland Sandpiper	-3.9%	82%	-9.3%	62%
Edwards Plateau				
Northern Bobwhite	-5.2%	90%	-8.1%	57%
Dickcissel	-2.0%	58%	5.2%	
Eastern Meadowlark	-4.7%	87%	-10.0%	65%
Grasshopper Sparrow	-5.3%	90%	-17.5%	85%
Painted Bunting	-2.5%	66%	-0.7%	7%
Lark Sparrow	-3.8%	81%	-3.7%	31%
Loggerhead Shrike	-0.3%	12%	-5.3%	42%
Scissor-tailed Flycatcher	0.1%		0.4%	
Bell's Vireo	-0.7%	26%	-0.4%	4%
Bewick's Wren	-0.9%	32%	-1.0%	10%
Black-capped Vireo				
Cassin's Sparrow	-3.8%	81%	-0.5%	5%
Rufous-crowned Sparrow	-2.4%	65%	-2.2%	20%
Yellow-Breasted Chat	5.8%		6.3%	
Field Sparrow	-2.2%	62%	-0.5%	5%
Greater Prairie-chicken				
Henslow's Sparrow				
Upland Sandpiper				

Table 6. Top 30 species in Edwards Plateau Bird Conservation Region (BCR), and Oaks & Prairies BCR based upon relative abundance from the Breeding Bird Survey Analysis modeling for 1966-2009. Grassland focal species are highlighted in yellow.

Rank	Edwards Plateau BCR	RA*	Oaks & Prairies BCR	RA*
1	Northern Mockingbird	113.9	Eastern Meadowlark	102.7
2	Lark Sparrow	102.7	Northern Mockingbird	97.4
3	Bewick's Wren	94.1	House Sparrow	64.3
4	Mourning Dove	71.7	Cliff Swallow	62.6
5	Painted Bunting	68.8	Mourning Dove	57.7
6	Turkey Vulture	63.7	Northern Cardinal	54.6
7	Northern Cardinal	59.6	Northern Bobwhite	51.9
8	Cliff Swallow	48.3	Scissor-tld. Flycatcher	45.5
9	Northern Bobwhite	47.8	Dickcissel	42.1
10	Brown-headed Cowbird	30.9	Cattle Egret	38
11	House Sparrow	20.3	American Crow	38
12	Scissor-tld. Flycatcher	20.1	Red-winged Blackbird	32.2
13	Tufted Titmouse	18.8	Common Grackle	30.1
14	Yellow-billed Cuckoo	14.2	Painted Bunting	29.5
15	Cassin's Sparrow	13.5	Brown-headed Cowbird	28.3
16	Dickcissel	12.1	Great-tailed Grackle	27.7
17	Rufous-crowned Sparrow	11.2	Lark Sparrow	23.8
18	Lesser Goldfinch	10.1	Turkey Vulture	19.6
19	Eastern Meadowlark	9.3	Barn Swallow	18.5
20	Cave Swallow	7.8	Purple Martin	16
21	Bell's Vireo	7.5	European Starling	15.8
22	Field Sparrow	7.5	Yellow-billed Cuckoo	13.8
23	Purple Martin	7	Common Nighthawk	10.5
24	Common Nighthawk	5.6	Carolina Chickadee	10
25	Ladder-back. Woodpecker	5.3	Tufted Titmouse	8
26	Orchard Oriole	5.1	Bewick's Wren	7.2
27	Ash-throated Flycatcher	4.8	Eastern Bluebird	7
28	Black Vulture	4.4	Chimney Swift	6.9
29	Summer Tanager	4.1	Killdeer	6.5
30	Killdeer	4	Field Sparrow	5.9

*Relative Abundance

"The value is the annual index for the region from year 22 (~1988). The quantity differs from the relative abundance measure provided in earlier analyses as it is model-based, produced as part of the hierarchical model analysis. As such, it is a predicted index for year 22 (~1988), that is adjusted for observer and other effects. Earlier abundance measures were simple route averages within state-strata areas, area-weighted to get regional means."

Identify Limiting Factors

Threats/Limiting Factors
Lack of fire – leading to Juniper encroachment
Loss of historic grazing patterns (grazing continuous rather than seasonal)
Exotic/Invasive plants
Climate change
Patch size
Soil and geology
Urban development
Land Conversion – clearing of land and conversion to crop or exotic pasture grasses
Water Development
Energy Development (Wind power, transmission lines)
Oak Wilt (not Post Oak)
Surface mine lands
Small-scale land management conducted for aesthetics (e.g. mowing, spraying for "weeds")
Cowbird parasitism
    Linked to changes in habitat condition, patch size and grazing management practices
    May require lethal control measures/removal and alteration of foraging habitat
Agriculture conversion to development

Population-Habitat Relationships

Initial population-habitat relationships are based upon published territory sizes for individual species. Published territory sizes represent the minimum area of suitable habitat needed to sustain one pair of breeding birds or one male territory. Dividing the population estimates by 2 yields the number of territories. Multiplying by the average territory size yields the minimum amount of habitat needed to support focal populations at objective level. This method assumes there is no unused space between territories or no need for buffer space around the habitat patch that may or may not be unsuitable (e.g., edge habitat). This assumption will have to be addressed on a species by species basis.

Other methods use bird densities to convert populations to habitat area, but using densities has a different set of assumptions. Also density is the number of birds per unit area and territory size is the unit area needed for one territorial bird. At minimum density is the reciprocal of territory size.

Parameters for future population-habitat models will linking abundance or vital rates (e.g., productivity or survival measures) with habitats that can be mapped with existing or new GIS data layers will be the focus of research and monitoring efforts. This minimum area of habitat does not take into account habitat that is in an unusable state due to habitat succession. For example, for some birds early successional habitats right after disturbance are not suitable until a certain amount of woody vegetation develops in an area that was set back to bare ground.

Table 7. Number of territories and minimum area of additional usable space needed annually to provide habitat for focal grassland bird species at objective levels.

Species	Additional individuals needed to meet population objectives	Number of Territories	Area in suitable habitat/pair (Territory size (Ha))	Minimum Area of new usable space needed (Ha)
Northern Bobwhite	343,425	171,713	6.7	1,144,752
Dickcissel	440,033	220,016	1.1	242,018
Eastern Meadowlark	151,074	75,537	2.8	211,503
Grasshopper Sparrow	34,157	17,079	1.0	17,079
Painted Bunting	33,918	16,959	1.4	24,421
Lark Sparrow	188,259	94,130	1.0	94,130
Loggerhead Shrike	118,097	59,048	9.6	566,863
Scissor-tailed Flycatcher	384,013	192,006	0.5	96,003
Bell's Vireo	11,786	5,893	1.0	5,893
Bewick's Wren	105,697	52,849	1.6	84,558
Black-capped Vireo			3.6	
Cassin's Sparrow	6,356	3,178	2.6	8,262
Rufous-crowned Sparrow	54,734	27,367	1.5	41,050
Yellow-Breasted Chat			1.2	
Field Sparrow	137,246	68,623	0.8	54,898
Greater Prairie-chicken			0.4	
Henslow's Sparrow			0.5	
Upland Sandpiper				

Conservation Design
Formulate Habitat Objectives

Using the basic habitat types from Table 1 and the Minimum Area of new usable space needed (Ha) from Table 7, we can start to look at area of individual habitat types depending upon focal species needs. Northern Bobwhite populations need the most habitat area, but they use all three types of habitats. If we fill the needs of habitat specialists first and then see how much habitat need is not filled by other species' needs, we can figure out the minimum target useable habitat area for land managers as well as provide a hypothesis for researchers to test (Table 8).

Table 8. Minimum annual usable habitat needed to meet population objectives in the Oaks and Prairies Joint Venture. The additional habitat category could include any one of the three habitat types. The habitat within the Edwards Plateau BCR is included in the OPJV wide total in each category.

	OPJV wide	Edwards Plateau
Grassland	242,018	
Savannah	566,863	54,898
Shrub Grassland	84,558	41,050
Additional habitat*	251,313	
Total	1,144,752	95,949

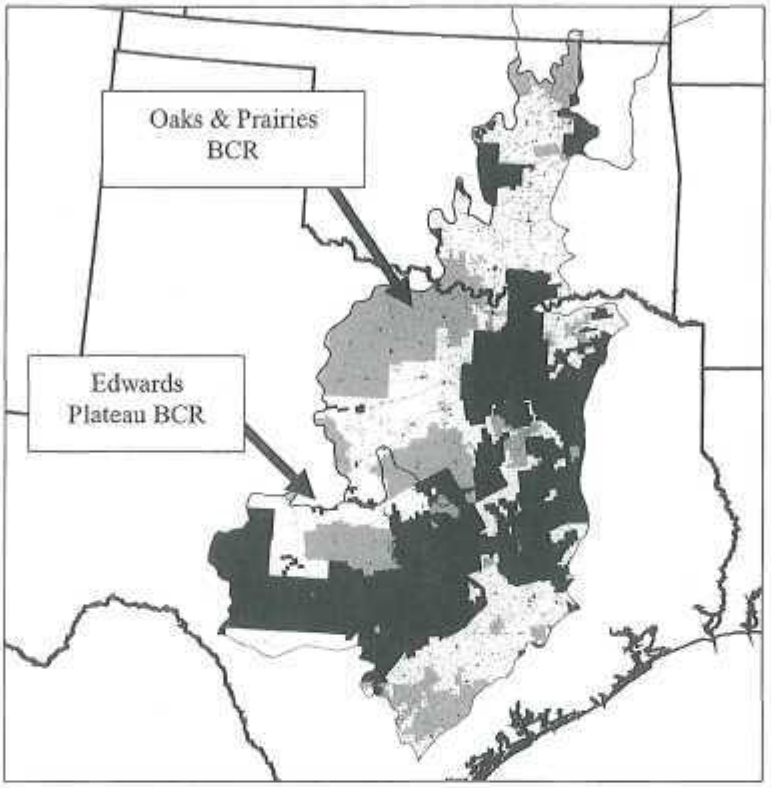
Using these calculations for initial targets a total of 1.1 million Ha of grass habitats are needed to meet the basic needs for our focal species without accounting for succession and continued management. This is represents about 5% of the OPJV's 24 million Ha (60 Million acre) land area, and about 10% of these new or restored habitat areas need to be in the Edwards Plateau BCR.

Within the basic habitat types, each species may require specific habitat needs that are not met by creating or restoring the general habitat. We can identify "bad" habitat, but identifying "good" habitat is much more difficult. Usually improving "bad" habitat is possible with existing knowledge, but know when "good" is "good-enough" will be the target of research and monitoring in cooperation with land managers.

Identify Priority Areas

Once the amount of habitat needed is established, we need to think about best places for the habitat. Luckily, a group interested in grassland habitats has already started thinking about and mapping potential focal areas for providing habitat for Northern Bobwhites. The Northern Bobwhite Conservation Initiative (http://www.bringbackbobwhites.org/) assembled meetings for local experts in each state to map areas of potential grassland habitat restoration and management using their best judgment of the biological, social, political and economic conditions. We can use this map as a hypothesis for ideal grassland bird focal areas to examine if these areas identified for Northern Bobwhite will work for the other focal species in the OPJV (Figure 1).

Figure 1. Potential focal areas for grassland bird conservation based upon mapping done by the Northern Bobwhite Conservation Initiative (NBCI Ver 2. 2010). The green areas are high potential for grassland conservation, yellow is medium, and red is low potential. Black areas are urban areas.



Of the 14.5 Million acres in the Edwards Plateau BCR, 15% was considered high (green) potential for grassland conservation and 26% medium (Yellow) with 2% urban (Black). "Biologists identified 5 major land use and management opportunities, which included brush management (38%), prescribed fire (32%), grassland habitat restoration (23%), and conversion of pastures to native warm season grass habitats." Of the 41 million acres in the Oaks and Prairies BCR, 25% was considered high potential and 33% medium with 4% urban (black). "Primary conservation opportunities identified by biologists were brush management and prescribed fire to help restore habitats. Other opportunities included conversion of pasture grasses to native warm season grasses and field borders.

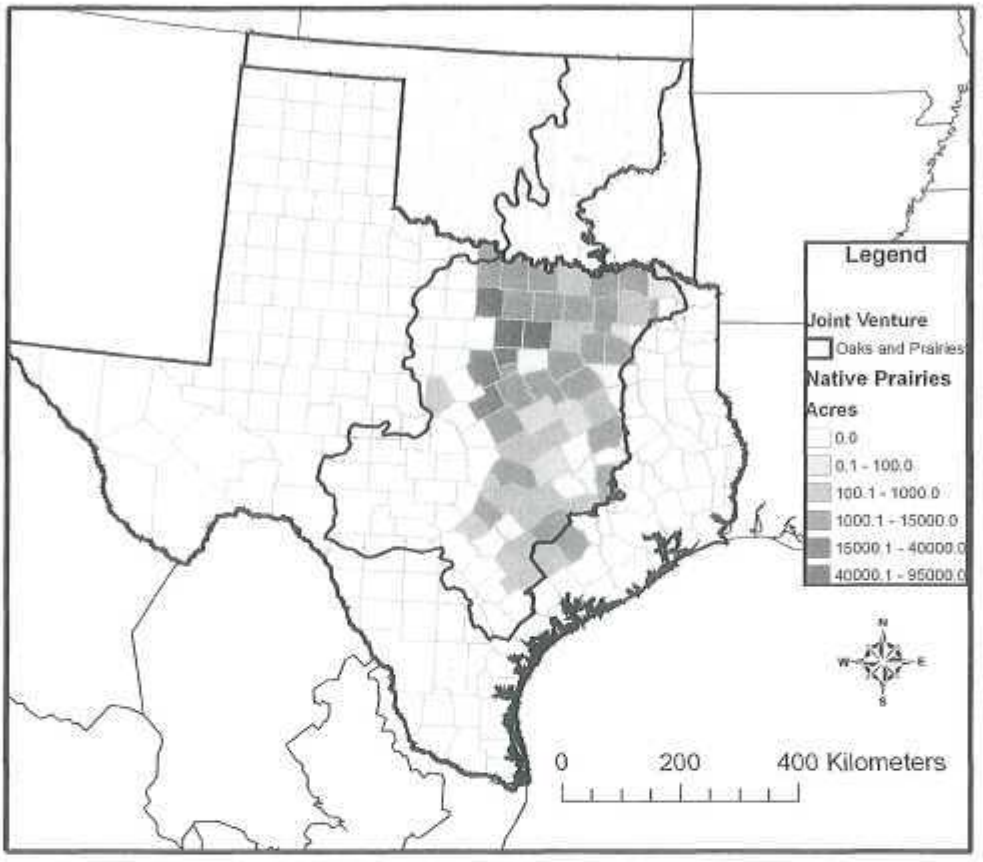
There are many other GIS data layers that can be used to link to bird and other wildlife populations and refine conservation targets. Below is a list of a few that are currently available. We need to think about how we can use existing data sets and what new data sets would be helpful as the plan and the partnership develops.

Table 9. Example GIS data layers available for future Conservation Design through the Oaks and Prairies Joint Venture. The OPJV staff can provide locations for any of these data-sets.

Category	Name	Category	Name
Bird data	Breeding Bird Survey	**Geographic layers**	Texas Rivers
	Avian knowledge network		Oklahoma Rivers
	National Bobwhite Conservation Initiative		Oklahoma Lakes
			Texas Reservoirs
Ecoregion Boundaries	North American Joint Ventures		Urban areas
	Bird Conservation Regions		Oklahoma Major Rivers
	Texas Ecoregions		Texas Major Rivers
	Oklahoma Ecoregions		Texas Water Basins
			Oklahoma Major Aquifers
Political Boundaries	Country		1st and 2nd order streams (By county)
	States		
	Texas Counties	**Landcover**	Texas Vegetation Map
	Oklahoma Counties		National Landuse/ Land-cover Data (NLCD)
	Federal Land		Landfire
	Oklahoma Protected Lands		EPA Integrated Climate and Land-use Scenarios (ICLUS)
	Texas Public Lands		
	US Congressional districts		
	School districts	**Land Development**	Cellular Towers
	TPWD parks and WMAs		Power lines
			Roads and highways
Weather and Climate	Drought impacts (Bi-weekly maps)		Dams (TX)
	Historical Hurricane tracks		

In addition to these data sets, there are new data sets that will be available soon including the results of the Native Prairies Association of Texas's native prairie surveys for most of the Texas portion of the Oaks and Prairies BCR.

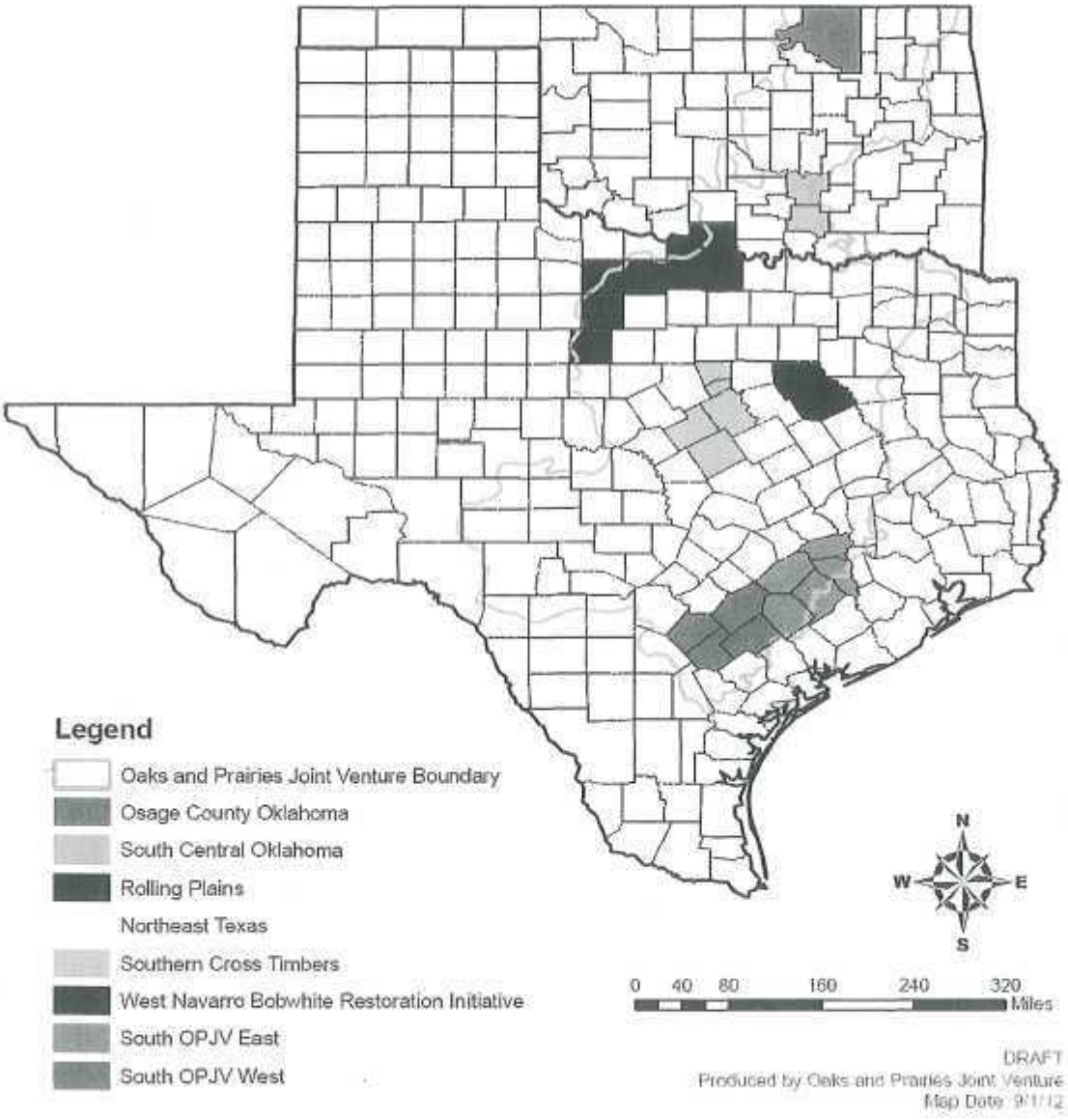
Acres of Native Prairies by county within the Oaks and Prairies Joint Venture



Beginning with work from the OPJV Technical Team who met in 2011, a draft map of counties representing focal landscapes for grassland birds has been discussed by various partners including NRCS and regional biologists TPWD. The Map below represents the focal landscapes in their current form.

Oaks and Prairies
Joint Venture

DRAFT Grassland Bird Restoration Focus Areas



OPJV focal areas and species distibution index for focal grassland/shrubland species. 0 = not present, 1 = rare, 2 = some observations, 3 = found in most of the focal area. Based upon Breeding Bird Survey distribution maps (2006-2010) and Ebird detection (ebird.org).

Species	South A	South B	Navarro/Ellis	Middle Texas	Northeast	Cross Timbers	Middle Oklahoma	North Oklahoma
Breeding								
Northern Bobwhite	2	2	1	2	2	2	1	3
Dickcissel	2	1	3	2	3	2	1	3
Eastern Meadowlark	2	2	2	1	3	2	1	3
Grasshopper Sparrow	0	1	1	1	1	1	1	2
Painted Bunting	1	2	2	2	3	2	2	2
Lark Sparrow	2	1	2	2	3	2	2	2
Loggerhead Shrike	2	1	1	2	1	1	1	1
Scissor-tailed Flycatcher	3	3	3	3	3	3	2	3
Bell's Vireo	0	0	0	2	2	2	1	2
Bewick's Wren	0	2	0	2	0	2	1	1
Black-capped Vireo	0	0	0	3	0	2	0	0
Cassin's Sparrow	1	2	0	1	0	1	0	0
Rufous-crowned Sparrow	0	0	0	2	0	1	0	0
Yellow-Breasted Chat*								
Field Sparrow	0	0	0	1	1	1	1	3
Greater Prairie-chicken	0	0	0	0	0	0	0	3
Henslow's Sparrow	0	0	0	0	0	0	0	3
Upland Sandpiper	0	0	0	0	0	0	0	3
Wintering								
Eastern Meadowlark	3	3	2	2	3	2	1	2
Henslow's Sparrow (Texas)	1	0	0	0	1	0	0	0
LeConte's Sparrow	2	1	1	0	2	1	0	0
Northern Harrier	3	2	2	2	3	2	1	2
Savanna Sparrow	3	3	3	2	3	3	2	1
Sedge Wren (wet habitats)	2	1	1	1	1	0	0	0
Western Meadowlark	1	2	1	2	2	2	1	0
Field Sparrow	2	2	2	2	3	2	1	1
Harris's Sparrow	2	1	2	2	2	2	1	2
Burrowing Owl	0	0	0	0	0	1	0	1
Mountain Plover	0	0	0	0	0	0	0	0
Sprague's Pipit	2	1	0	1	1	1	0	1
Smith's Longspur	0	0	0	0	1	0	0	1

* Included as a species that could be monitored to indicate possible Black-capped Vireo habitat.

The above table represents the relative density of grassland species in each of the identified focal landscapes. It can be interpreted as a first cut for those species that are abundant enough to monitor within any one of these areas and across all the areas in the breeding and winter seasons. For example, Northern Bobwhite, Dickcissel, Eastern Meadowlark, Grasshopper Sparrow, Painted Bunting, Lark Sparrow, Loggerhead Shrike, and Scissor-tailed Flycatcher could serve as our main focal species if they can represent the habitat needs of the other species on the breeding season list.

Research Priorities

(Edited from TPWD upland gamebird plan)

Basic Life History and Population Ecology

1. Conduct research to fill holes in the basic ecology knowledge base of less known focal grassland bird species in Texas (food habits, survival, distribution, and reproduction).

2. Determine the limiting factors for focal grassland bird species populations. Examine recruitment, survival, nest success and juvenile mortality where these birds occur in high densities compared to areas where they occur in low densities.

Habitat management and population level impacts of management

1. Develop a landscape level habitat assessment and decision support tools for quality grassland bird habitat. Can restored sites support more focal grassland bird species? Create models to tie populations of focal grassland bird species to habitat management outcomes.

2. Evaluate the impact of the exotic and invasive vegetation on bobwhite quail and other focal grassland bird species density and viability. In cases where impacts are detrimental to focal species populations, evaluate methods to alter these plant communities to favor native warm season grasses, and associated forb species to increase plant and microhabitat diversity. Create decision support tools to predict population level impacts of management.

3. Evaluate brush management systems for sustaining grassland bird populations. Create decision support tools to predict population level impacts of management.

4. Evaluate the impacts of patch size, shape, and land management practices in focal grassland bird species populations in human altered landscapes. Promote field studies that use infrared video technology and other emerging technology (GPS transmitters) to compile a comprehensive set of predation events and use these data to model predation as a process that can be applied to grassland management in relation to landscape fragmentation.

5. Evaluate the impacts of pre and post construction of wind farms, power lines, pipe lines, gas drilling locations, roads, and other infrastructure on focal grassland bird species. Create decision support tools to predict population level impacts of wind farm construction.

Weather and Climate Change Impacts

1. Evaluate potential impacts of increased frequency of catastrophic weather events (in relation to focal grassland bird species survival and productivity) using population viability analysis. Funding sources for this research may include federal climate change and Landscape Conservation Cooperative grants.

Socio/economic

1. Determine the economic effects of land management for quail hunting. What landscape components are needed to support quail hunting and how does this impact habitat for grassland birds?

2. Develop a comprehensive assessment of landowner attitudes toward grassland bird conservation including quail. This should focus on determining the kinds of incentives and policies (economic and otherwise) that will promote grassland habitat improvement and conservation.

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The Oaks and Prairies Joint Venture

IMPLEMENTATION PLAN

Monday, May 04, 2009

Oaks and Prairies
Joint Venture

We, the Management Board of the Oaks and Prairies Joint Venture, commit to advance bird conservation throughout the Oaks and Prairies in Oklahoma and Texas and the Edwards Plateau in Central Texas according to the strategy articulated in this Implementation Plan. We, and the organizations and partners we represent, endorse the mission and vision of the Oaks and Prairies Joint Venture and affirm our commitment to this partnership.

April 2, 2009

Signed Oaks and Prairies Joint Venture Management Board

/s/ Timothy Connolly
Timothy Connolly, Chair
Quail Unlimited

/s/ Russ Horton
Russ Horton, Vice-Chair
Oklahoma Department of Wildlife Conservation

/s/ Jeff Raasch
Jeff Raasch
Texas Parks and Wildlife Department

/s/ Tom Bauer
Tom Bauer
U.S. Fish and Wildlife Service

/s/ Russell Castro
Russell Castro
USDA- Natural Resource Conservation Service

/s/ Andrew Kasner
Andrew Kasner
Audubon

/s/ John S.C. Herron
John S. C. Herron
The Nature Conservancy

/s/ Ross Huffman
Ross Huffman
National Wild Turkey Federation

/s/ Dalmara Bayne
Dalmara Bayne
Native Prairies Association of Texas

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Appendix 2: Species of conservation concern in the Oaks and Prairies Bird Conservation Region. The list includes species in the Oklahoma and Texas Comprehensive Wildlife Conservation Strategies (ODWC 2005, TPWD 2005) , Texas and Oklahoma state Endangered Species lists (Campbell 1995, ODWC 2008) , national bird conservation plans (landbird [Rich et al. 2004], waterfowl [North American Waterfowl Management Plan Committee 2004], waterbird [Kuslan et al. 2002], and shorebird [Brown et al. 2001]), National Audubon Society's Watchlist (2007) and the US Fish and Wildlife Service's species of conservation concern (USFWS 2008). 58

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Introduction

An Oaks and Prairies Joint Venture

The Oaks and Prairies Joint Venture (OPJV) is a voluntary partnership of public and private organizations and individuals interested in strategically coordinated conservation of birds and their habitats in the Oaks and Prairies and Edwards Plateau Bird Conservation Regions (BCR) of central Texas and Oklahoma. The Edwards Plateau BCR (20), and Oaks and Prairies BCR (21) encompass almost 60 million acres (24.3 million Ha) of prairies, shrublands, and forests supporting a diverse assemblage of migrant and resident avian species (Figure 1).

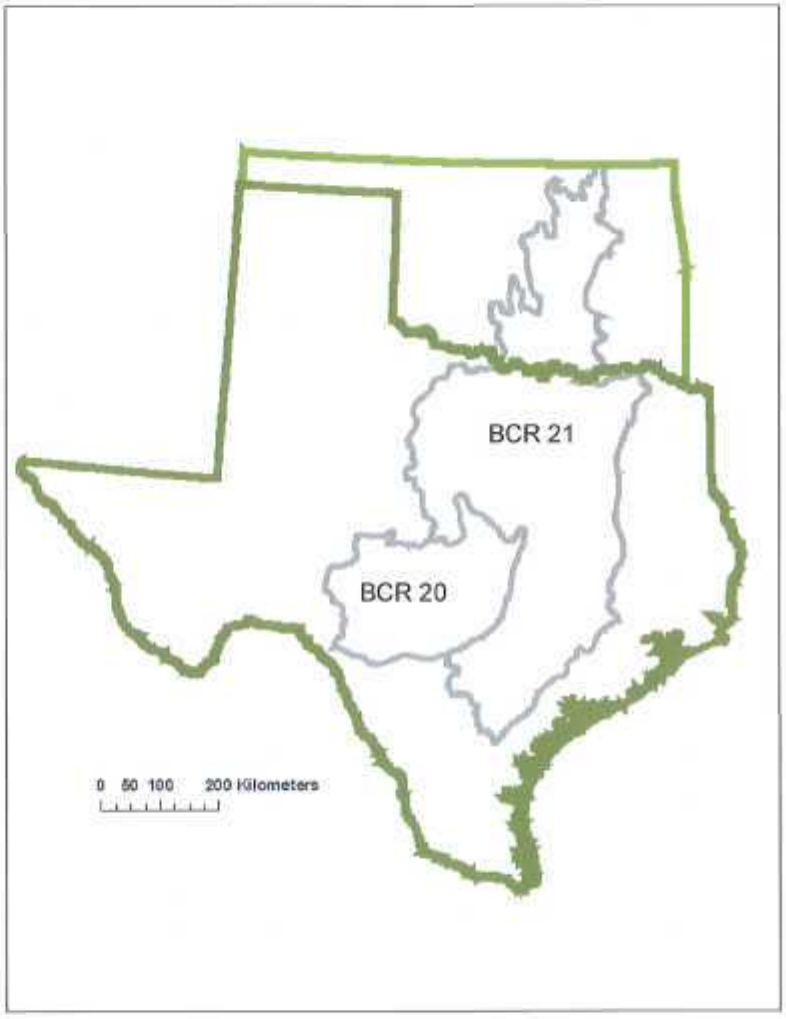


Figure 1. The Oaks and Prairies Joint Venture region includes the Edwards Plateau Bird Conservation Region (BCR 20), and the Oaks and Prairies BCR (21).

Altered ecology, changing land uses, and gaps in our knowledge of species/habitat relationships have made maintaining these species and their habitats difficult in the present day context. Both Texas and Oklahoma have a diverse array of existing avian-related conservation initiatives. However, if these efforts were tied together with a unifying vision, common goals, and a collective approach to landscape planning and delivering on-the-ground conservation, work to overcome management challenges would become more efficient and far reaching. The Oaks and Prairies Joint Venture will provide the opportunity to affect avian habitat conservation at the landscape scale to help solve some of the most pressing conservation challenges through the official formation of a Habitat Joint Venture.

Habitat Joint Ventures are regional, self-directed partnership 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. Habitat Joint Ventures are organized into Bird Conservation Regions (BCR) that encompass landscapes having similar bird communities, habitats, and resource issues. Joint Ventures (JVs) work to implement national and international bird conservation plans (i.e., waterfowl [North American Waterfowl Management Plan Committee 2004], landbird [Rich et al. 2004], waterbird [Kuslan et al. 2002], and shorebird [Brown et al. 2001]) by "stepping down" the population goals of the larger plans to regional or landscape habitat goals, while feeding local information up ("rolling up") to the national and international planning groups. This process helps to bring national- and international-level priorities and resources to address local-level conservation issues, while working to ensure local-level conservation issues are incorporated into national and international policy making. JVs help to bridge the gap between national level planning and local level actions of conservation organizations and agencies. To that end, the Oaks and Prairies Joint Venture will focus on a broad spectrum of activities including conservation planning, conducting "on-the-ground" projects, organizing outreach, research, and monitoring, creating decision support tools, and raising money for these activities through partner contributions and grants for conservation activities within the Oaks and Prairies BCR and the Edwards Plateau BCR.

Purpose of the Implementation Plan

The purpose of this document is to formalize the plan of work and administrative structure of the Oaks and Prairies Joint Venture for review by the USFWS Division of Bird Habitat Conservation. This document does not represent an end-point, but rather the beginning. As such, specifics of planning, implementation, and research will, by design, evolve over time and conform to the best available information. We will, however, provide an accurate portrayal of the process, direction, and conservation tools that we believe will result in improved habitat resources and increased bird populations of priority bird species.

The need and purpose for an Oaks and Prairies Joint Venture

The complexity of avian conservation is set within an atmosphere of changing expectations from our conservation enterprises. Recently, the National Ecological Assessment Team (NEAT 2006) identified 3 primary drivers of changing expectations including advances in conservation theory, emerging geospatial technology, and increasing accountability. Changes in expectations resulting from these drivers include moving from site-scale conservation to a focus on producing sustainable populations and landscapes, and from activity-based conservation (where "more of everything is better") to science-based activities with measurable objectives (NEAT 2006). These increasing expectations relate less to any one taxonomic group or type of wildlife habitat, and more to a general trend in natural resources conservation.

The reality is that conservationists of all stripes are embarking on a journey to manage complex issues at large spatial scales...and the question is "how do we best get there?" The formation of the Oaks and Prairies Joint Venture will provide the framework for bringing together partners with overlapping interests in habitat conservation to share resources and knowledge to address the large-scale and complex issues through the creation of science-based bird population and habitat objectives.

History and Mission of the OPJV partnership

In 2005, the Texas Parks and Wildlife Department and the Oklahoma Department of Wildlife Conservation joined forces to address regional avian conservation needs by forming the **Oaks and Prairies Joint Venture, whose mission is to *plan for and facilitate bird habitat conservation, research, and outreach in an effort to ensure sustainable populations of priority bird species in the Edwards Plateau and Oaks and Prairies BCRs in Oklahoma and Texas.***

In March of 2005, a Coordinator (Chad Boyd) was hired to begin the organizational and planning process for the Oaks and Prairies Joint Venture. In September of 2007, a new Coordinator (Jim Giocomo) was hired to oversee this JV's evolution. A management board composed of regional conservation entities interested in sustainable bird populations was organized in October 2008 and bylaws were drafted to codify the board's activities. The Coordinator worked closely with Management Board and partners to craft a conservation model that incorporates the collective vision of regional conservation players. This model emphasizes a repeating cycle of planning, doing, and learning to enhance the effectiveness of existing conservation entities, and expands our vision of avian conservation by identifying and acting on unfilled or underserved conservation niches. These activities will be carried-out in support of the North American Bird Conservation Initiative (NABCI), which supports integrated bird conservation through regional implementation of national and continental-scale avian initiatives, namely, the North American Waterfowl Management Plan, the Partners in Flight Landbird Conservation Plan, the US Shorebird Conservation Plan, and the North American Waterbird Conservation Plan, as well as national species plans like the Northern Bobwhite Conservation Initiative.

The Plan-Do-Learn (Adaptive Conservation) Cycle

Because of the broad scope and the diversity of habitat needs for bird species, 1) no one conservation entity is ideally suited to the task, and 2) significant knowledge gaps exist, and will continue to exist (due to the complex nature of the problems). Adaptive conservation (Figure 2) can be an effective approach to dealing with large-scale, complex problems. As defined here, adaptive conservation is a model that follows a **Plan, Do, and Learn** cycle to iteratively improve our knowledge of the system, and allows us to evaluate the success of management practices, as well as the assumptions underlying its direction. In this model, *biological planning* (**Plan**) uses best available scientific knowledge to set population objectives and identify and prioritize

conservation needs of bird species by identifying limiting factors and developing working models that link bird populations to habitat condition and specific management actions (Johnson et al. 2009). This information serves as the basis for a spatially-targeted *conservation design* (**Plan**) where habitat objectives are formulated, the current state of the ecosystem is assessed, and spatially explicit management plans are formulated. Management prescriptions for *conservation delivery* (**Do**) are then put together based on science and experience/intuition with both the natural and social systems in play. Assumption-based *Research* programs (**Learn**) are designed with management prescriptions to test the assumptions underlying biological planning and conservation design. Mission-based *Monitoring* (**Learn**) before, during, and after management provides a reference for gauging the success of conservation planning and delivery (i.e., accountability). Research and monitoring then become an integral part of the adaptive conservation cycle instead of a costly luxury that can be cut when budgets are constrained.

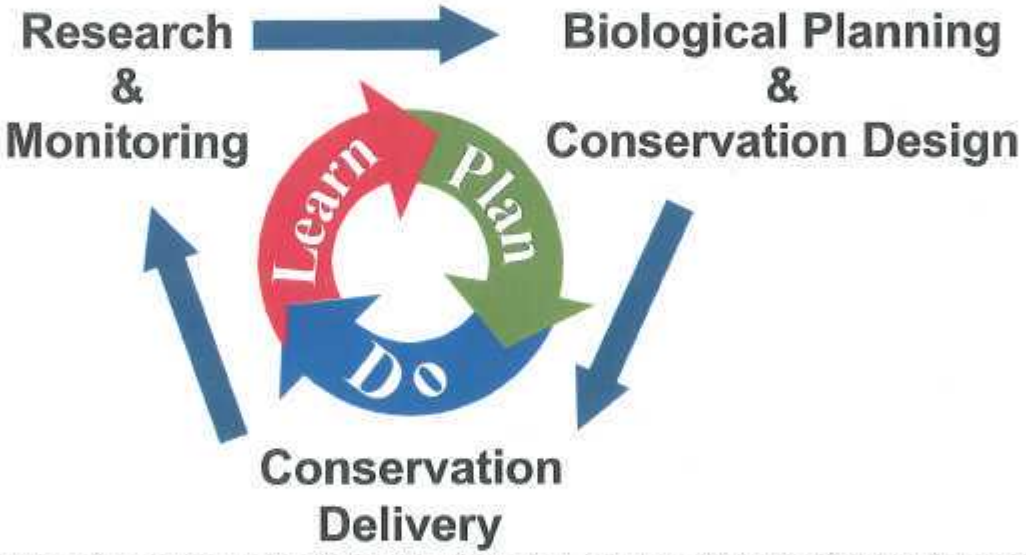


Figure 2. Adaptive conservation follows a Plan-Do-Learn model to continually improve the effectiveness of conservation actions.

The Plan-Do-Learn process will help encourage communication among partners throughout the process and eventually create an interdependency among partner organizations working to complete the cycle. Partners that focus on the "Do," like state and federal agencies, land conservancies, and other environmental organizations, will work more directly with partners that focus on the "Learn," like universities and other research organizations, to build the "Plan." Then all will have a stake in ensuring the success of the whole process. The Plan-Do-Learn process also results in an increased understanding of the biology and management of bird species, and this increased understanding can be plugged back into the planning and design elements, thus completing the cycle. The important point here is that an approach that embraces adaptive conservation allows us to overcome both of the previously mentioned difficulties by: 1) laying out a framework for effective partnerships, and 2) using the

Plan-Do-Learn model to create the feedback loop necessary to maintain sustainable bird populations in an uncertain environment.

The Oaks and Prairies Joint Venture will bring together organizations (e.g., The Nature Conservancy) and individuals (e.g., state and federal agency personnel that focus on large-scale planning for wildlife) who focus on "**Plan**" parts of the cycle to build a cohesive plan with input from organizations that focus on "**Do**" (e.g., state agency land managers) and "**Learn**" (e.g., university researchers) activities. In this way, the on-the-ground conservation, research, and monitoring efforts of partners will clearly add to the larger goals of the region, and fill information gaps to drive the next iteration of the planning effort, effectively increasing efficiency and providing accountability. At present, there is no organized effort across BCRs 20 or 21 to implement large-scale adaptive conservation measures for avian conservation. **The central purpose of the OPJV will be to design and implement a landscape-scale model for adaptive avian conservation (i.e., Strategic Habitat Conservation), focusing individual efforts by partner organizations to conserve, restore, or create habitat for sustainable priority bird populations.**

Adaptive Conservation Challenges

While adaptive conservation can be a useful approach to dealing with challenging conservation issues, there are barriers to its implementation. One of these barriers is the "programmatic challenge". At present, natural resources conservation agencies often compartmentalize their various functions into discrete programs. This can work well from an administrative standpoint, but does not lend itself to adaptive conservation. Under the programmatic model, a body of knowledge is synthesized into what is believed to be true (i.e., the "state of our knowledge"), and that "truth" is then translated into programmatic initiatives and objectives for those initiatives. Once started, however, this model may not contain mechanisms for improving knowledge over time. In other words, it treats knowledge acquisition as a point-in-time event, not the evolutionary learning process that is required to manage complex problems at large spatial scales. Reliance on point-in-time knowledge can in turn lead to dangerous overgeneralizations and continuance of marginally effective management practices. Both of these problems relate to a disconnect between biological and programmatic success. A simple litmus test for this disconnect is to ask the question: "Is it possible to simultaneously experience biological failure and achieve a programmatic success?" If the answer is yes, there is a problem; and that problem stems from the fact that *programmatic* outcomes have become the management objectives (as opposed to a more appropriate focus on *biological* outcomes). Switching from the programmatic to the adaptive model for conservation is not going to happen overnight. **The OPJV will use mission-based monitoring and assumption-based research to provide meaningful metrics of success (or lack thereof) for our management efforts, and will do so in an iterative fashion to link what we know/learn with what we do. Such an approach will encourage reliance on biological (vs. programmatic)**

measures of success, and provide the basis to address increasing accountability for conservation actions.

Because no one conservation entity is ideally suited to the large and complex task of avian conservation, a second challenge to adaptive conservation is the necessity of conservation partnerships. Implementing the above model (Figure 2) within the OPJV administrative area will require cooperation among a diverse set of professional expertise including those skilled in avian ecology, vegetation ecology, landscape ecology, grazing, fire, GIS, water management, agriculture, economic, politics, etc. Ultimately our ability to develop and leverage meaningful cross-professional partnerships depends on trust; and that trust is predicated on repeated, positive interactions. **The OPJV will cultivate the tradition of interaction that predicates meaningful levels of trust among conservation partners.**

Some would argue that we have now moved beyond the need for simple partnerships and into an era in which our conservation successes will depend on networks of partners that could be collectively considered as a "conservation partner ecosystem". In their recent book "The Keystone Advantage", Iansiti and Levien (2004) applied the concept of a biological ecosystem to a variety of business ventures. Their work suggests that many businesses are successful today, not only because of their core competencies, but also because of their linkages to other ventures in the larger business community. For example, computer manufacturers in today's market depend on a long list of suppliers to manufacture the components necessary to assemble a finished machine. This interdependency in turn creates a shared fate among companies within their business ecosystem. Ultimately, if natural resources professionals are to be judged based on our ability to effectively deal with the major challenges of our time, we will certainly be collectively judged for our handling of issues relating to avian habitat conservation. We submit that shared fate among those players in avian habitat conservation is real, and that successful adaptive management of the broad-based and complex issues facing us today requires that we be wise stewards of our conservation partner ecosystem. At present, there is no unifying, region-wide effort to foster the diverse partner network needed to address large-scale avian conservation. **The OPJV will provide an organized platform for developing a conservation partner network and putting that network to work on conservation issues relevant to on-the-ground conservation.**

A third challenge to adaptive conservation is the successful linkage of science and management; a relationship that is necessary to function in an adaptive fashion. However science and management can have different focuses. Science is often concerned with describing the complexity of systems (i.e., knowledge acquisition) whereas management is primarily focus on turning that knowledge into actionable management alternatives (i.e., knowledge distillation). This distillation process is made more difficult given that in today's world, ecosystems have come to be associated with concepts (e.g., biodiversity), regulatory statues (e.g., the Endangered Species Act) and politics in ways that underscore the embedded intricacies of links between system components. Meanwhile technology, particularly in the form of remote sensing, has

reinforced this tendency by providing enormous quantities of data on all manner of biological and physical properties at vast spatial scales. Combine this with a world in which money, time, and human resources are in limited supply and the importance of effective knowledge distillation becomes readily apparent. **The OPJV will iteratively synthesize the best available scientific knowledge into decision support tools that integrate available social, political, and economic knowledge and can be used as models for guiding management actions in the face of information and expectation overload.**

Decision support tools alone do not necessarily focus management effort in the direction of greatest impact. Emphasizing management trajectories that matter can be synonymous with re-discovering the idea that complex problems can often be solved with *elegant* solutions. Sometimes elegant avian management solutions may come from non-traditional directions. For example, given that a) woody plant increases on the Edwards Plateau are limiting grassland bird habitat, and b) organizing landowners into prescribed burning cooperatives has proven to be an effective tool for promoting the use of prescribed fire to decrease woody plant abundance, an elegant tool for increasing grassland bird habitat availability may be to promote prescribed burning cooperatives. One of the pitfalls in defining elegant management trajectories is mistaking simplistic, quick fixes for solutions that are both simple *and* powerful (i.e., elegant). The best way to avoid this trap is to employ adaptive conservation. Conservationists must ultimately ground their efforts in the iterative processes of Plan-Do-Learn. **The OPJV will provide leadership in using adaptive conservation to differentiate and refine elegant solutions to complex avian management issues.**

Throughout the Plan-Do-Learn cycle, there is a constant need for communication, education, and marketing, (OUTREACH) among the OPJV partners, and through the OPJV partners to the larger conservation community and the public (Figure 3). One major challenge will be to develop ways to allow partners to participate in the development of Joint Venture products collaboratively across large geographic areas while reducing travel costs. Using interactive web-based technology (Web 2.0) that moves beyond websites merely providing information, similar to opening a book, web tools can be developed to allow the users to provide the materials needed to build larger products (e.g., decision support tools) that the users need, like an online encyclopedia (Wikipedia). This reduces the workload of individuals, creating a "distributed workforce." The products can then be distributed among partners and the public through traditional methods (i.e. pamphlets, reports, presentations) and interactive media (i.e. interactive websites, online videos [e.g., YouTube],...). The distribution of useful products will help to increase the visibility and awareness of the OPJV, thus strengthening the partnership by attracting new potential partners. **The OPJV will cultivate a "distributed workforce" for biological planning, conservation design, research, and monitoring, and will develop appropriate communication, education, and marketing (outreach) materials and interactive mechanisms to develop and publicize products and activities of the Joint Venture.**

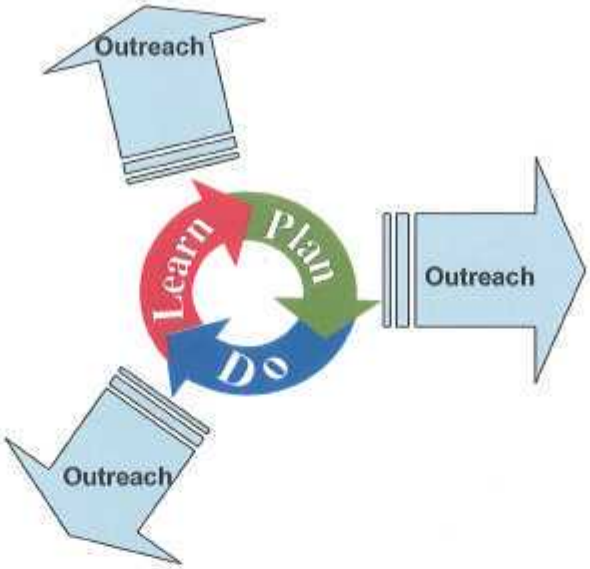


Figure 3. The Plan-Do-Learn cycle integrating communication and education (Outreach).

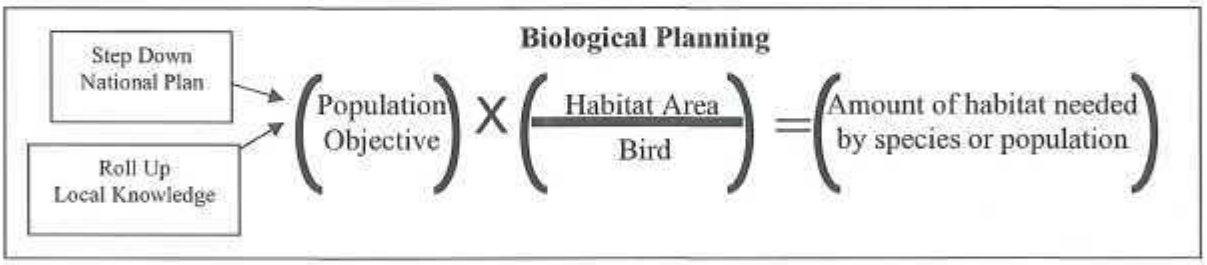
Finally, the largest challenge facing organizations interested in bird conservation is the influence of larger external forces to create an ever changing background for conservation activities. These external forces can include everything from social and political influences like changes in U.S. Farm Bill policies or human population growth to large scale environmental changes like global climate change. The Adaptive Conservation approach is designed to accept new information as it becomes available because of the built-in nature of research and monitoring, thus the OPJV partners will be able to recognize a particular influence and respond to changing conditions more rapidly and efficiently. There will be a need to document models and management prescriptions that may not have worked as efficiently as planned under current conditions (lessons learned), and that may not be considered publishable in a traditional scientific journal. These "failed" experiments are valuable in that they can provide an indication of where not to go, or as external conditions change, the "failed" models and management prescriptions may become viable options that may need to be revisited. **The OPJV will ensure the relatively quick and responsive planning through the Plan-Do-Learn cycle, and the incorporation of lessons learned from successful and unsuccessful management prescriptions into the Plan-Do-Learn cycle.**

PLAN—Biological Planning and Conservation Design

In recent years there has been general acknowledgement that local-scale conservation efforts have not been sufficient to reverse declining populations of many avian species. At the same time, advances in conservation theory and geospatial

technology along with an increasing need for accountability has pushed conservation practitioners to work at larger scales. Managing at landscape and larger scales requires an elegant approach and a solid vision of the desired result. The OPJV will work to: 1.) Develop and disseminate spatially explicit population-habitat models and other decision support tools for priority species habitat management through **biological planning**, 2.) Promote change from "opportunity-based" to "biologically-based" conservation by identifying ecologically important focus areas, and a vision of a realistic "desired landscape" based on the needs of key bird species (biologically-based) as modified by social, land-use, and ecological constraints (opportunity-based) through **conservation design**.

Biological Planning is the process of linking population objectives (stepped down from national conservation plans and modified by local knowledge) to habitat needs through the creation of population-habitat models for priority species to answer how much and what type of habitat will be needed to sustain viable populations of priority birds at prescribed levels (population objective). Basically the population-habitat models create a conversion factor from population objectives to habitat goals by calculating the amount of habitat needed to support one bird (or population) multiplied by the total population goal for the BCR.



This simple equation gets complicated in the "Habitat Area per Bird" relationship. One can start with an average territory size or home range, and increase Habitat Area per Bird accounting for the known impacts on territory "quality" for a particular species. These impacts could include everything from large scale factors like weather cycles and climate change to patch-scale factors like habitat impacts at edges or through succession, and interactions (and uncertainties) within and among these large- and small-scale factors. Population objectives can be supplemented with target for vital rates (i.e., productivity and survival) to account for habitat "quality." As the relationships become more complicated, population-habitat models can be used to help understand the interaction of factors on the "Habitat Area per Bird" relationship and account for uncertainties. Sensitivity and elasticity analysis can be used to help identify the factors in the models that are having the largest effects on the populations, thus providing a prioritized list of assumptions that can to be tested. Considerations of overlapping habitat needs for two or more priority species that use similar habitats can be incorporated to modify habitat goals where multiple species needs can be addressed with the same habitat management. This will require careful characterization of local habitat needs for priority bird species and tests of major assumptions.

Conservation Design is the process of taking the habitat goals from the biological planning and subtracting the amount of existing habitat to calculate the habitat need.

Conservation Design

$$\left(\begin{array}{c}\text{Amount of habitat needed}\\ \text{by species or population}\\ \text{(Habitat Goal)}\end{array}\right) - \left(\begin{array}{c}\text{Existing}\\ \text{Habitat}\end{array}\right) = \left(\begin{array}{c}\text{Habitat Need}\\ \text{(Location and}\\ \text{Configuration)}\end{array}\right)$$

This process is complicated first when calculating existing habitat. In most cases, existing protected lands do not have habitat inventories related to bird populations, and in some cases a complete species list is not available. Second, landscape-level habitat datasets can be used to characterize existing habitat, but habitat classifications used in the biological planning will have to be fit into data classifications that were not intended for bird habitat modeling, requiring some generalization. In many cases, landscape configuration and patch size and shape can be factored into spatial models to create possible "desired landscapes." Finally, risk of habitat change by either human land use or climate change (and the associated uncertainty) can be incorporated to account for social, political, land-use, economic, and ecological constraints (opportunity-based).

The Oaks and Prairies Joint Venture will use GIS to create, maintain, and analyze spatially explicit bird population-habitat models or other decision support tools to prioritize conservation potential for priority bird species and habitat types. Assumptions and uncertainties built into these models will be noted and serve as a focus for future research to test the implications of our assumptions on the results of the population-habitat models. Every effort will be made to include land managers and researchers in the conservation design process.

As a starting point for conservation, potential focus areas are being identified to concentrate efforts of OPJV partners to enhance priority bird populations. These focus areas seek to marry optimum areas for bird conservation from a biological standpoint, with areas of maximum socio-economic opportunity (i.e., where are landowners likely to be accepting of conservation practices given existing conditions and incentives?). The intersection of biological and socio-economic constraints should provide the most fruitful locations for conservation of priority species and may be used to target private landowner incentive programs and wildlife cooperatives.

The **biological planning** objectives for the Oaks and Prairies Joint Venture are...

1) Use our initial list of priority bird species to establish population and habitat objectives by using international and regional population assessments by the bird conservation initiatives and State Wildlife Action Plans. Appropriate Technical Teams will be assembled to refine population objectives by habitat type.

2) Compile data relevant to population status, conservation status, habitat characteristics, abundance, and ease of monitoring to evaluate bird species relative to their usefulness as focal species following suggestions from Chase and Geupel (2005). We will summarize available information to identify species that: 1) use the focal habitats, 2) warrant special management status or have experienced reduction in breeding range or population declines, and 3) are useful for monitoring the effects of management actions. Species useful for monitoring include those that are a) abundant breeders to *provide adequate sample size*, b) relatively *easy to monitor*, and most importantly c) *respond to management*.
3) Use knowledge of local experts and the scientific literature to identify limiting factors for priority species. Where information gaps exist, identify and prioritize research needed to improve the biological foundation.
4) Develop the geographic information system (GIS) and data management capability to meet the needs of the OPJV partnership. The initial needs include mapping existing protected areas (see existing conservation potential), identifying habitats associated with priority bird species at the landscape level, modeling possible future habitat configurations under multiple possible management regimes, and tracking OPJV accomplishments. The technical teams will develop priorities for information needs and the OPJV management board will provide organizational and financial support for development of these technical capabilities.

Conservation design objectives for the Oaks and Prairies Joint Venture Partners include...

1) Develop and map (where possible) spatially-explicit habitat objectives for focal species.
2) Develop and map multiple alternatives for future desired conditions to provide sustainable habitats for priority species. The alternatives will allow examination of uncertainties inherent in planning processes beyond the control of bird conservation planning (e.g., climate change, socio-political conditions...).
3) Identify and prioritize conservation projects for development and implementation.
4) Create decision-support tools to help understand choices for management actions including, but not limited to...
    a. assessing the capability of the current landscapes to support populations of priority species at desired levels;
    b. identifying and prioritizing local-scale conservation activities;
    c. predicting the effects of landcover change due to management choices or other causes (e.g., succession, urbanization...) on priority bird species;
    d. assessing the implications of changes in landowner incentive programs to provide cost-effective changes in habitat management.

Existing conservation potential

Oklahoma and Texas contain very little state or federally managed land (less than 3%). Much of the area that is federally managed within the OPJV is found on

military bases and reservoirs managed by the Army Corps of Engineers. State-owned lands include at least 117,618 acres (47,598 Ha) of wildlife management areas and 90,316 acres (36,549 Ha) of state parks in the Texas portion of the OPJV with an additional 23,977 acres in Oklahoma state parks and 147,880 acres (59,844 Ha) in Oklahoma wildlife management areas. There are very few natural lakes in Texas and Oklahoma, but there are at least 621,639 surface acres (251,568 Ha) of large man-made lakes in Texas and 192,417 surface acres (77868 Ha) of large man-made lakes in Oklahoma as well as thousands of acres in smaller stock-tanks and farm ponds. There are many additional protected lands including two national grasslands (USFS) and landholdings and conservation easements held in cooperation between private landowners and OPJV partner groups including The Nature Conservancy and the Native Prairies Association of Texas (see Appendix 6).

Conservation potential in the OPJV will be complicated by the expected growth in human population over the next few decades. The OPJV region contains several major metropolitan areas in Texas and Oklahoma including parts or all of Tulsa and Oklahoma City in Oklahoma, and Dallas, Fort Worth, Killeen, Austin, San Antonio, and Bryan/College Station in Texas. These areas have seen growth of 13 to 47% from 1990-2000 and are expected to continue to grow at a rapid pace (US Census Bureau).

As human populations in Texas and Oklahoma increase over the next 50 years, we will need to recognize important habitat resources for priority bird species are present in both rural and urban (including suburban) contexts. For example, both the Golden-cheeked Warbler and Black-capped Vireo are associated with rural, lightly populated habitats of the Edwards Plateau, but also breed in predominately urban areas of Travis County, Texas. Effective conservation design will differ between these two disparate habitat resources. Within the urban context, focus will be on working with biologists and urban/county planners to identify those areas of the landscape where urban development and critical habitat overlap. Conversely, conservation design in the rural landscape will focus on identifying large blocks of undisturbed habitat that need to be maintained. Where appropriate we will differentiate planning activities oriented toward rural vs. urban landscapes.

DO—Conservation Delivery

Conservation Delivery (Do) will involve delivering efficient and effective on-the-ground conservation by *focusing* the technical, funding, and outreach capacities of each of the OPJV partner organizations that are needed to protect, enhance, and restore habitat *through landscape-level planning* of local-scale activities. The OPJV partners will play a number of important habitat conservation roles. Most OPJV partners already "Do" a great deal of Conservation Delivery activity that is very effective at the local scale. For example, to protect existing habitat OPJV partners, including local land conservancies and government agencies, are working to identify important avian habitats that need to be protected, to develop informational workshops for landowners interested in pursuing conservation easements and wildlife habitat planning, and to help

finance conservation easements on key habitats. The "Plan" process will allow those organizations and individuals that "Do" on-the-ground projects to take a step back to see the wider implications of their actions at the landscape level.

Using the products produced in the "Plan" process, the OPJV will promote existing and emerging landowner incentive programs for conservation of avian habitat to enhance or maintain the condition of existing habitat, and leverage partner and outside funding to enhance the condition of key habitats. We will also work to promote wildlife cooperatives that bring together local landowners to enhance habitat, mostly for game species. These cooperatives can improve habitat conditions for other priority bird and wildlife species, and create a larger impact at the landscape scale. To help restore fire regimes, we will also support (through technical and financial assistance) and organize prescribed burning cooperatives as a tool to restore and maintain avian habitats, and inform policy makers of the beneficial uses of fire in ecosystem, wildlife, and fuels management. To promote conservation in agricultural settings, the OPJV will help organize informational Farm Bill workshops for action agencies and interested landowners.

Finally, the OPJV and its partner organizations will focus financial, technical, and outreach support to state-level programs for re-vegetating non-native pastures and croplands with appropriate native species (e.g., the Texas Parks and Wildlife Department's "Pastures for Upland Birds Program"). Joint Ventures have proven they can deliver on-the-ground habitat conservation. Our goal will be to engage, facilitate, and coordinate the focusing of partners' collective capabilities and expertise to maximize the potential to positively affect landscape change and population status of priority species.

The objectives **Conservation Delivery** (Do) of the Oaks and Prairies Joint Venture partners include...

1) Use Biological Planning and Conservation Design products to help strategically focus current local-scale activities of OPJV partners at the landscape-level, and to leverage additional funding for high priority conservation projects.
2) Facilitate the development, funding, and implementation of conservation delivery efforts of OPJV partners, ensuring projects strive to fulfill the JV's mission of achieving sustainable populations of OPJV priority bird species.
3) Develop strategies and appropriate decision support tools that integrate OPJV population and habitat conservation objectives into delivery programs (e.g., private lands) or plans (e.g., state wildlife plans, federal lands).
4) Develop and coordinate conservation delivery efforts of mutual interest (e.g., similar avifauna or wildlife habitat needs) across agencies, organizations, and jurisdictional boundaries within the OPJV (e.g., state lines), among adjacent JVs/BCRs, or on wintering grounds that support priority species (see Appendix 8).
5) Develop the technical capability to track partner accomplishments and progress towards achieving habitat objectives at multiple scales.

6) As the joint venture develops, monitor and evaluate current and developing policies that directly affect conservation delivery efforts, using science-based analyses to examine potential impacts to priority bird populations under various scenarios and to discuss among OPJV partners.

LEARN— Research, Monitoring, and Evaluation

"The enemy of knowledge is not ignorance...it is the illusion of knowledge"

Stephen Hawking

Our ability to monitor, understand, and evaluate both species abundances and changes in the structure, composition, and availability of avian habitat at the regional scale is lacking (particularly with habitat). Breeding Bird Survey data are and will continue to be the primary tool used to index changes in the abundance in priority species at the national and ecoregion scale for most birds. Where possible, other state and national data like state winter waterfowl surveys and National Audubon Christmas Bird Counts will be used for population estimation and monitoring within the Joint Venture. These data are not perfect, but, at minimum, they represent a meaningful qualitative metric of population change and trend over time.

Monitoring populations and habitats at the sub-ecoregion to local scale represents a more difficult proposition. The central challenge with habitat monitoring will be designing a monitoring system that allows us to evaluate "net" changes in habitat over time. In other words, with the disturbance-based ecology of the grass-dominated habitats present within both BCRs, application of a treatment does not "fix" the bird habitat...it postpones the inevitable plant succession to an undesired state. This is different than, say, wetland and interior forest conservation, where habitats are often fairly easy to remotely identify and they either are, or are not habitat (i.e., binomial). With the terrestrial habitats described above, the process will be much grayer and much more complicated due to changes in habitats over time following treatment. The reality here may be that a true evaluation of "net" change in bird habitat over time may only be feasible within the context of gross categories (e.g. grassland vs. woodland landcover, or urban vs. rural), and at extended time intervals. Those time intervals could run up to a decade, which happens to be the approximate interval between iterations of available national land cover data sets from satellite images. However such data could prove very useful in that these "gross" categories can be extremely important measures of changes in the capacity of BCRs 20 and 21 to produce habitat for priority species. In lieu of regional scale measures of net bird habitat change over periods shorter than, say, a decade, immediate efforts of the JV will be to focus on developing an accomplishment tracking system for acres impacted by OPJV activities. This will serve as a qualitative measure of impact of the JV for reporting purposes.

Research will be used as a tool to minimize the uncertainty in the assumptions used in biological planning and to evaluate competing management strategies by

testing the assumptions of biological planning. The most basic assumptions of biological planning are that priority species are habitat limited, and that change in breeding habitat condition to that habitat structure and composition we believe is "required" by the species will promote increases in vital rates of priority species. These assumptions will be evaluated, to the extent possible, by taking advantage of existing habitat manipulation projects, with distributed experiments carried out at the local-scale to represent the landscape-scale.

Ideally, population-habitat models would serve as a tool for generating hypotheses to be tested using replicated experiments (see below). All too often research is conducted without clear plans for linking what we learn to what we do, or the two meet only episodically. Whenever possible, conservation actions will be carried using the Plan-Do-Learn adaptive conservation framework that allows for statistical evaluation of conservation practices. The basic idea is to implement management in multiple "blocks" (replication), and to simultaneously monitor bird populations and/or habitat responses on untreated areas (control sites). The use of replicate treatments allows estimation of experimental error (i.e. variability in response to treatment), which then allows statistical comparisons either between competing treatments, or treated vs. non-treated areas; effectively combining (and streamlining) research and management into a more elegant single process. In this sense we make a clear distinction between "monitoring" and "adaptive management". The former involves measurement of biological phenomena over time and data are generally meant to provide metrics of success relative to management objectives. Adaptive management differs in that it provides a format for iterative experimental learning based on statistical comparisons between competing alternatives, can be used to test assumptions/hypotheses associated with biological planning, and is carried out in an iterative fashion that allows for continual refinement of management approach. Monitoring programs can be put in place at any time, however adaptive conservation approaches should be designed before the management action (*a priori*) to be of maximum utility and generally include pre-treatment data. Overall the adaptive management process is a key component of effectively linking what we learn with what we do.

Ultimately, research will result in a data-based biological foundation that will be made into decision support tools for linking management actions with predicted species responses, and for deriving estimates of the amounts and conditions of habitat needed to provide sufficient habitat area and quality for attaining priority species population goals. For research to increase our understanding of the effects of our management actions, planning and funding of research activities will need to be considered as important as the habitat management.

The research, monitoring, and evaluation objectives of the Oaks and Prairies Joint Venture partners include...

1) Identify and implement priority research and monitoring programs to compliment priority conservation (Do) programs and actions (Dunn 2005).

2) Identify basic assumptions that need to be tested and information gaps for priority bird species in the OPJV.
3) Develop an accomplishment tracking system for acres impacted by OPJV activities and build the capacity for statistical evaluation of conservation practices.

OUTREACH—Communication, Education, and Marketing

Communication among partners and to outside constituencies is key to the success of any collaborative Joint Venture. The Oaks and Prairies Joint Venture Coordinator and future staff will facilitate communication among the many partner organizations and the JV management board through various means including electronic newsletters, email and an updated website (www.opjv.org). Where possible, the partner organizations will represent the Joint Venture to the broader conservation community, other resource agencies, and government officials (regionally and nationally) where appropriate.

As the Oaks and Prairies Joint Venture develops, appropriate staff from the JV office and partner organizations will develop outreach tools and products to identify and engage priority audiences to support bird habitat conservation within the Joint Venture area. An outreach plan incorporating information and products produced in the Plan-Do-Learn cycle will be created and implemented to target information to the appropriate priority audiences. The outreach plan will include an evaluation of audience objectives and will be guided by an audience assessment to determine if and what changes in awareness, behaviors, and attitudes have occurred in response to the communication, education, and marketing tools and products. This information will then be fed back into the Plan-Do-Learn cycle to help further increase the efficiency and effectiveness of the conservation strategies.

Finally, as the Joint Venture develops and resources become available, new interactive web-based tools will be developed to allow partners to participate in the development of Joint Venture products collaboratively across large geographic areas while reducing travel costs. This technology will allow outreach efforts to move beyond merely providing information to allowing users to become developers of the information they need to do their jobs. In this way many users provide the materials needed to build larger products (e.g., decision support tools). This reduces the workload of individuals, by creating a "distributed workforce." The products can then be distributed among partners.

The communication, education, outreach and marketing objectives of the Oaks and Prairies Joint Venture partners include...

4) Develop the capacity to provide timely information concerning the activities of OPJV partners and others involved in avian conservation issues in the OPJV region through update websites, e-mail newsletters, and printed materials.

5) Work with partners to develop informational workshops for groups like land managers, educators, and landowners interested in conservation of avian and other wildlife species.
6) As the Joint Venture develops, build the capacity through an outreach plan to identify target audiences, evaluate audience objectives, and conduct audience assessments to determine the effectiveness of the outreach plan to contribute to the overall goal of creating sustainable priority bird populations.
7) Develop web-based methods for collecting, organizing, and editing information (e.g., PDF forms) needed to produce things like planning documents, models, and decision support tools that require the input of many geographically distributed people within the Joint Venture area.

The Biological Foundation

Overview

The OPJV includes two Partners in Flight Bird Conservation regions: the Edwards Plateau (BCR 20) in Central Texas, and the Oaks and Prairies (BCR 21) in Texas and Oklahoma (Figure 4). The OPJV is bordered to the southwest by the Rio Grande Joint Venture, to the northwest by the Playa Lakes Joint Venture, to the north by the Upper Mississippi River/Great Leaks Joint Venture, to the east by the Lower Mississippi Valley Joint Venture, and the Gulf Coast Joint Venture to the southeast. The bird conservation regions are base upon Omernik's (1998) Level III ecoregional boundaries. The OPJV is consulting with surrounding Joint Ventures to make minor administrative border adjustments that reflect our current understanding of ecoregional boundaries (USEPA 2007), consolidate conservation efforts for key priority species (e.g., Black-capped Vireo), and consider state partners attempting to manage involvement in multiple Joint Ventures, if needed. The OPJV is committed to working with surrounding Joint Ventures and overlapping conservation partnerships and organizations to ensure conservation activities are integrated as much as possible.

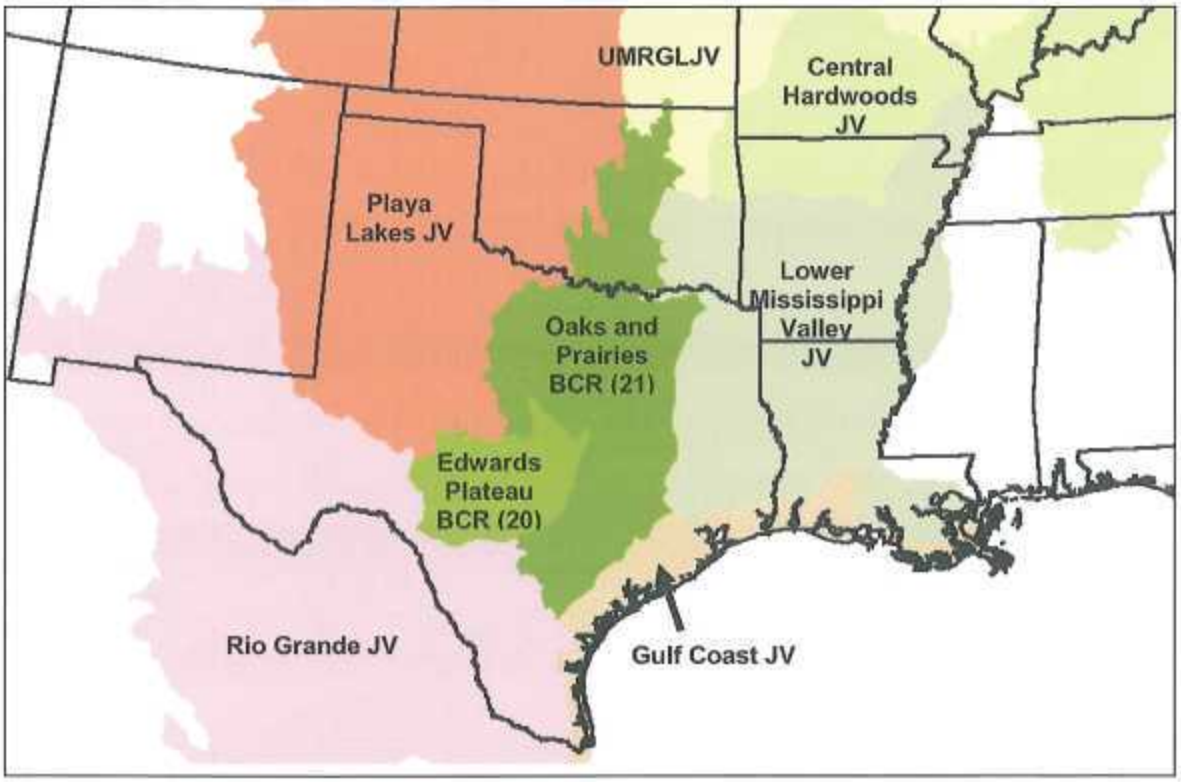


Figure 4. The administrative area of the Oaks and Prairies Joint Venture (OPJV) encompasses 2 Bird Conservation Regions (BCRs): The Edwards Plateau in Texas (BCR 20) and the Oaks and Prairies in Texas and Oklahoma (BCR 21). The OPJV is surrounded by the Rio Grande JV, the Playa Lakes JV, the Upper Mississippi River/Great Lakes JV (UMRGLJV), the Lower Mississippi Valley JV, the Gulf Coast JV, and the Central Hardwoods JV.

Edwards Plateau, BCR 20

Covering nearly 14 million acres (5.7 million Ha), the Edwards Plateau BCR is the southernmost extension of the Great Plains. This area is a complex mix of savannah, grass and woodland habitats. Grass and savannah habitats are associated with mixedgrass (e.g. side-oats grama [*Buteloua* curtipendula] and little bluestem [*Shizachyrium scoparium*]) and tallgrass (e.g. big bluestem [*Andropogon gerardii*] and Indian grass [*Sorghastrum nutans*]) prairie species that were historically maintained by fire (Smeins 1980). Mixedgrass species are replaced by short grasses (e.g., *Bouteloua gracilis* and *Buchloe dactyloides*) under heavy grazing by livestock or increased aridity (Smeins et al. 1976). Elevations on the plateau range from 700m in the western region to 170m in the south. Rainfall ranges from 35 – 81cm/yr along a west to east gradient (Hatch et al. 1990) and average frost-free period from 230 days in the north to 260 days

in the south (Larkin and Bomar 1983). High and low temperatures in July range from 35°C to 22°C, respectively. January low temperatures range from 0°C to 4°C (Riskind and Diamond 1988). Growing conditions for plants can vary severely from year to year; one author noted that only in May is the long-term mean monthly rainfall in Austin greater than the standard deviation (Unpublished document, University of Texas at Austin). Prolonged droughts can and have impacted species composition, plant structure and habitat quality, particularly in the face of interacting disturbances such as livestock herbivory (Fuhlendorf and Smeins 1998).

Subregions

The Edwards Plateau is comprised of 5 distinct ecological subregions (Figure 5). The southern and southeastern boundaries of the Plateau are marked by the Balcones Canyonlands subregion, separating the Plateau from the adjacent South Texas Plains, and Blackland Prairies. The Balcones Canyonlands are an ancient (inactive) fault zone (i.e., the Balcones Escarpment) and elevations on the down-thrust side of the Escarpment drop sharply to < 190m (compare to Mason in the central Edwards Plateau at about 500m elevation, Riskind and Diamond 1988). Much of this area is dissected by deep canyons and rugged terrain underlain by Cretaceous limestone that gives rise to shallow, rocky or gravelly soils on hillsides (Inceptisols) with deeper soils in alluvial valleys (Mollisols, Riskind and Diamond 1988). Soils are generally clayey, high in ph, and are often underlain by caliche layers. Over much of the Edwards Plateau, present-day dominance of ash juniper (*Juniperus ashei*) is a function of altered fire regimes resulting from human interventions (Fuhlendorf and Smeins 1997). However, in the Balcones Canyonlands, shallow soils on steep-sided canyons provide sites relatively free from the influence of fire and these areas are capable of supporting "old-growth" juniper communities that co-occur with deciduous hardwoods such as Texas oak (*Quercus texana*), live oak (*Q. Virginiana* var. *fusiformis*) and black cherry (*Prunus serotina*) (Riskind and Diamond 1988, Diamond 1997). Occurrence of the deciduous component has been related to aspect and soil factors, with these communities occurring most often on deeper soils and more mesic northerly aspects (Van Auken et al. 1981). Shin oak is often dominant or co-dominant on more moderate slopes (McMahan et al. 1984).

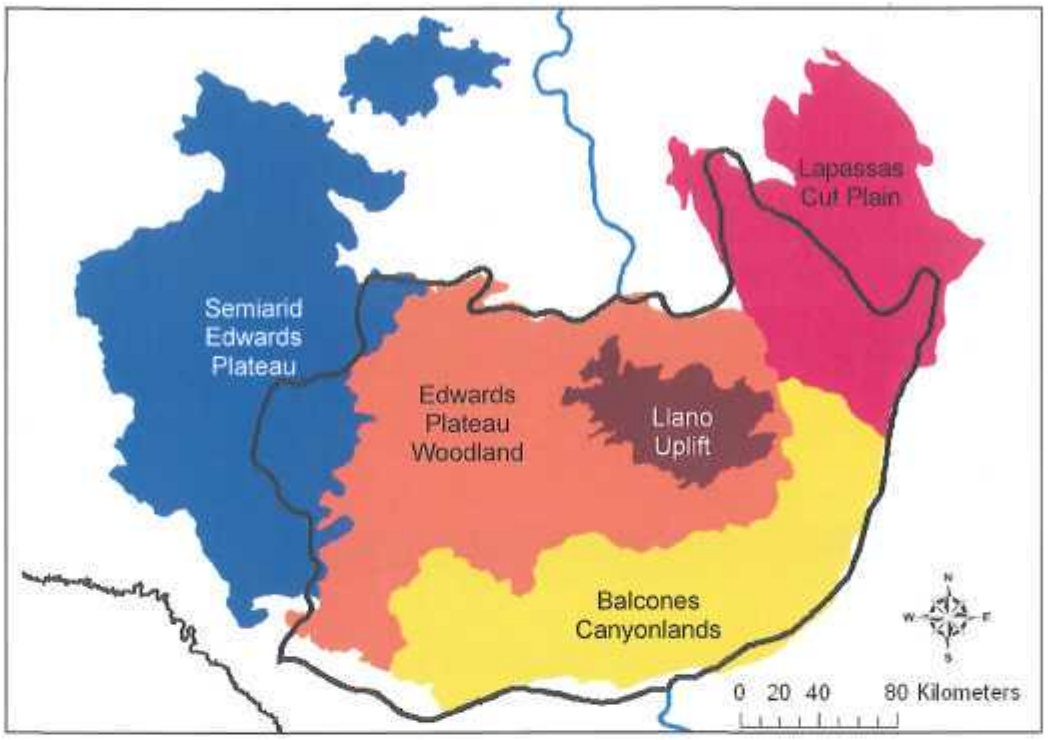


Figure 5. The Edwards Plateau sub-ecoregions.

To the north and west of the Balcones Canyonlands and surrounded by the Edwards Plateau Woodland lies the Llano Uplift Subregion (Figure 5). Occurring predominately in Mason, Gillespie, Burnet and Llano Counties, this area was uplifted during the Late Cretaceous and Early Tertiary periods. Over time, erosive forces exposed and weathered the Precambrian granite (some of the oldest exposed rocks in Texas, Bezanson and Wolfe 2001) and today the region exists as a basin of Precambrian metamorphic rock and granite surrounded by Cretaceous limestone (Walters and Wyatt 1982). Where the granite is not exposed it is overlain with sedimentary rocks deposits. Topography is flat to rolling and punctuated by tall granite outcroppings and soils are loamy Alfisols or sandy Inceptisols (riparian areas or near granite outcrops). The Llano Uplift supports a variety of shrub, and mixed shrub/grass communities, but the abundance of conifers and Texas oak is reduced compared to much of the remaining Plateau; perhaps due to acidic soil conditions of the Uplift (Riskind and Diamond 1988). Important upland woody plants are post oak (*Quercus stellata*), cedar elm (*Ulmus crassifolia*), whitebrush (*Aloysia gratissima*), narowleaf elbowbush (*Forestiera pubescens*), Mexican persimmon (*Diospyros texana*), and honey mesquite (*Prosopis* glandulosa), while dominant grasses include little bluestem, grama (*Boutelua sp.*), Texas wintergrass (*Stipa leucotricha*) and purple threeawn (*Aristida purpurea*) (McMahan et al. 1984).

Farther north, are the broad valleys and relatively flatter (although punctuated with numerous limestone scarps) terrain of the Lampasas Cut Plain (LCP, a.k.a. Limestone Cut Plain, Figure 5). Geologically, the LCP is a modified northern extension

of the Edwards Plateau (Hill 1901) and a diagrammatic representation of its underlying geology provides a useful context for that of much of the rest of the plateau. The Caprina limestone is analogous to the Edwards formation that underlies much of the remaining Edwards Plateau. The broken topography of the LPC was formed by erosion of a pre-historical plain; the remaining scarps represent the original stratum and the dissected topography of the area led Hill (1901) to label it as the "cut" plains. Soils of the LCP are highly variable owing to differential rates of erosion; and this variability in soil structure and morphology translates into a high diversity of plant community types. Where Trinity sands have been exposed, vegetation is similar to that of the Cross Timbers (Riskind and Diamond 1988) with post oak and blackjack oak (*Q. marilandica*) being common. The clayey soils of the Walnut formation yield tall/mixed grass prairies (Dyksterhuis 1948), while shallow soils occurring between layers of Trinity sands yield shortgrass prairie with oak savannah and juniper (Diggs et al. 1999). Important grasses include tall grass species like little bluestem, Indian grass, sideoats grama and silver bluestem (*Bothriochloa saccharoides*), and short-grasses including hairy grama (*Bouteloua hirsuta*) and blue grama (Farquhar and Lockwood 2003, Smeins 2004).

The central and western portions of the Plateau comprise the largest subregions of the Edwards Plateau, the Edwards Plateau Woodlands and the Semi Arid Edward Plateau, bounded on the west by the Chihuahuan Desert, and the North by the High Plains, Osage Plains, and Red Rolling Plains. Soils here are often high in clay content due to their limestone origin. Soil depth varies greatly with topographic position and slope and profiles often include a caliche layer(s). Across much of these subregions soil depth is very shallow, often with exposed bedrock, and in some areas profiles no longer display an A horizon due in part to soil loss during mid-twentieth century droughts (Fuhlendorf and Smeins 1997). The variability in soil attributes may be partly responsible for the patchy, woodland/grassy mosaic present over much of this subregion (Rosiere 2006). Associated grasses include little bluestem, Indian grass, switchgrass (*Panicum virgatum*), Texas wintergrass, sideoats grama and green sprangletop (*Leptochloa dubia*) while shallow clay sites may give rise to increased abundance shortgrasses such as curly mesquite (*Hilaria berlangeri*) and buffalograss (*Buchloe dachtyloides*) (Fuhlendorf and Smeins 1998). Live oak is the dominant woody species, but woody plant composition varies along soil and moisture gradients, with shallow-soil, more arid sites (e.g., south facing slopes) having higher evergreen (e.g., Ashe Juniper) abundance and deeper-soil, more mesic sites having a greater deciduous species (e.g. Texas oak, Lacey oak [*Q. glaucoides*]) abundance (Van Auken et al. 1981). Other common woody species include Mexican persimmon, honey mesquite, cedar elm and elbow-bush (*Forestiera pubescens*) (McMahan et al. 1984). On the western edges of the Edwards Plateau, juniper/oak savannahs co-occur with more open grasslands composed of sideoats grama, little bluestem, slim tridens (*Tridens muticus*), Texas cupgrass (*Eriochloa sericea*), meadow dropseed (*Sporobolus asper*), hairy tridens (*Erioneuron pilosum) and* purple threeawn (Bezanson 2000).

Historical Vegetation and Bird Habitat Change

The earliest explorers of the Edwards Plateau found a landscape composed of savannah and grasslands (Buechner 1944, Dyksterhuis 1948, Schmidly 2002), interspersed with juniper, oak and mesquite woodlands; with juniper and oak being prevalent on steeper topography (Gehlback 1988, Baccus and Eitniear 2007). In 1847, while traveling 26 miles northwest of Fredericksburg (presumably somewhere in the approximate vicinity of present-day Doss), Roemer observed: "*Toward evening we descended from the story heights into a broad valley covered with a rich growth of grass and scattered mesquite trees, always the sure sign of fertility*" (Smeins 1980). Lightning and human caused fires helped maintain a network of live oak savannahs (Smeins 1980) and periodic grazing by native bison shaped both the structure and composition of grassland habitats. Based on current-day evidence (e.g., Fuhlendorf and Engle 2004) these grazing patterns were probably focused on areas recently burned, thus creating an interactive effect of grazing and burning. Early travelers wrote frequently about encountering burned landscapes. In 1847, Roemer recalls: "*I left Fredericksburg toward evening and found my companions camped about four miles northwest of the city. Since the grass had been burned everywhere in the vicinity of Fredericksburg, they had hurried to the place to find some for their horses*" (Smeins 1980). The next day he wrote: "*Later we came to a stony infertile plateau, which on account of the stunted oaks and exposed limestone visible in many places, did not present a very cheerful view and it seemed all the more cheerless since all the grass had been burned as far as the eye could see*"(Smeins 1980).

The arrival of a permanent European presence (about 1850) soon set in motion factors that would fundamentally change the fire/grazing interaction. Whereas bison were nomadic grazers, the domestic stock of settlers were more sedentary in nature, and, with the arrival of fencing in the later 1800's, grazing became continuous (over time and space) or nearly so over much of the Edwards Plateau. These grazing practices served to limit fine fuel production and decrease the frequency of fires, as well as their spatial magnitude. While European Settlers initially continued to burn the range (as had the indigenous peoples before them), that practice soon fell into disfavor (Smeins 1980), thus further reducing fire frequency.

Today, the influence of fire at large scales is practically non-existent, having been marginalized by reduced fine fuels, mechanized fire suppression and decreasing fire ignition with the removal of indigenous peoples (Fuhlendorf et al. 1996). Present day grazing practices often focus on maximizing forage yield and harvest resulting in homogenization of habitat at large spatial scales (Fuhlendorf and Engle 2001), reduction of nesting cover for ground nesting birds (both through reduction in habitat structure [USDA 1994] and, with heavy sustained use, compositional changes to shorter stature grasses [Fowler and Dunlap 1986]), indirect interruption of the fire cycle through consumption of fine fuels, and can result in loss of grazing intolerant plant species. Fowler and Dunlap (1986) noted that today, midgrasses are often absent or in reduced

abundance on flatter sites, and of increased abundance on adjoining steeper slopes, perhaps due to the propensity of domestic stock to concentrate grazing on the flatter terrain. It is important to note, however, that some of the apparent impacts of grazing (such as the latter phenomena) may be the products of historic use levels; those effects perhaps being sustained even under lighter stocking rates in modern times.

Alterations in the fire/grazing regime have resulted in dramatic changes to plant communities: reduced quality of grassland and savannah habitat with encroaching woody plants, succession of shrub habitats to woodlands, and conversion of deciduous woodlands to juniper dominance (Fuhlendorf and Smeins 1997); the latter often associated with high deer densities and the associated loss of palatable deciduous species such as Texas Oak (*Quercus texana*). Juniper abundance has increased markedly since European arrival, due primarily to the reduction in or absence of fire (Miller and Wigand 1994, Fuhlendorf and Smeins 1997). On the Edwards Plateau, redberry and ash juniper now form expansive woodlands in the western and northern portions of this region whereas historically these species were more limited to the southern and eastern portions of the Plateau. It is important to note that woodland plant communities have evolved as a part of the Edwards Plateau landscape and that the change suggested here is a loss of warm season grass cover and a generalized increase in woody plants, particularly ash juniper (Jessup et al. 2003). The results of this process being a conversion of grassland/savannah habitat to woody dominance and a loss of habitat diversity. Additionally, conversion to woody plants can increase soil erosion and may have negative implications to water conservation (Huang et al. 2006, Wilcox et al. 2006).

The Avian Assemblage

At least 419 avian species occur within the Edwards Plateau BCR, the vast majority of these being landbirds (Lockwood 2001). This rich avifauna results in part from the Edwards Plateau's central location in the state, providing for an influx of species from surrounding ecoregions.

In August and September 2008 a series of three technical team meetings were held to discuss the initial priorities of the Oaks and Prairies Joint Venture including identifying specific bird species within priority habitats in the Edwards Plateau (BCR 20) and the Oaks and Prairies (BCR 21). Selection of priority species was based upon several criteria starting with the listing of species on existing state (Oklahoma and Texas) and national (waterfowl, landbird, waterbird and shorebird) plan lists as well as other national priority lists (Audubon Society Watchlist, USFWS Species of Conservation Concern) (Appendix 1 & 2). Species on those lists were discussed by the technical team members for their importance in the region by examining available information related to population trends and estimates based upon Breeding Bird Survey (BBS) data (Appendix 3), perceived threats, and the possibility that management actions could reverse the negative population trend.

Although the Edwards Plateau is usually considered of minor importance to wetland dependent species (e.g., Texas Parks and Wildlife Department does not normally include the Edwards Plateau area in their annual midwinter waterfowl surveys), there are several 8 nonbreeding waterfowl species of conservation concern within the BCR (North American Waterfowl Management Plan, Plan Committee 2004) (Appendix 1). There are also 3 breeding and 3 nonbreeding waterbirds (Hunter et al. 2006) including the American Coot, which is a species of continental concern. The American Coot is considered common in the Edwards Plateau by Lockwood (2001), but little is known about the birds in the region. In addition, there are 37 shorebird species of conservation concern (Brown et. al 2001) in the larger region (Central Plains/Playa Lakes), but again little is known about the birds in the Edwards Plateau.

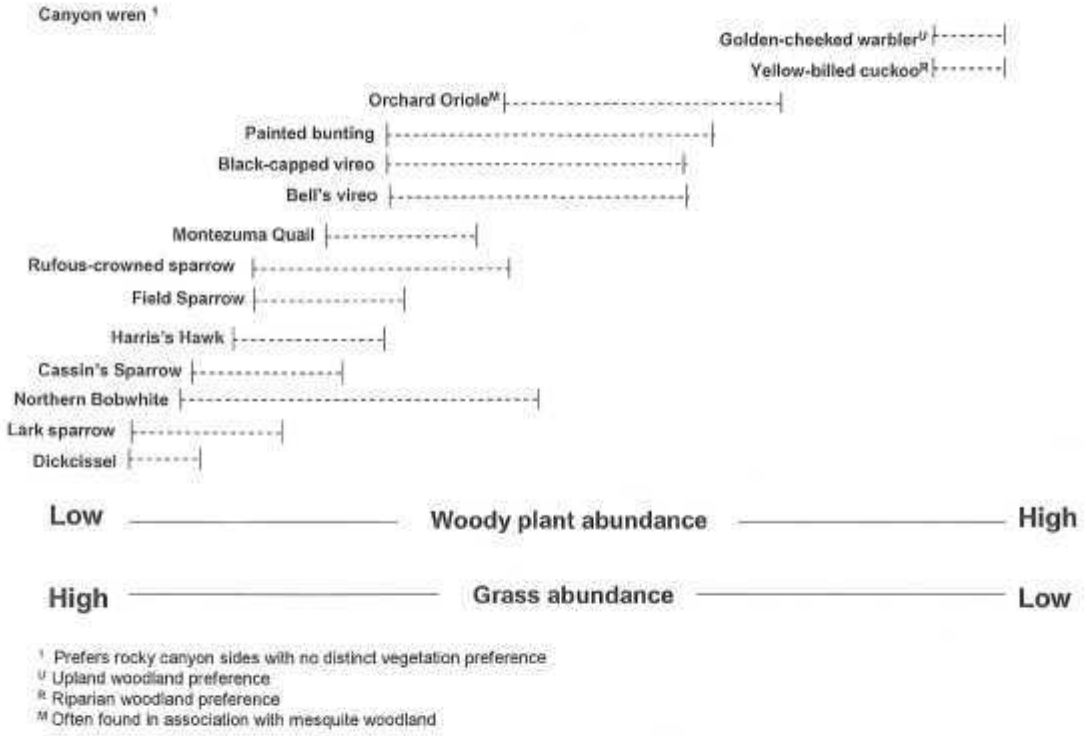


Figure 6. Distribution of landbird species of regional concern (Rocky Mountain Bird Observatory http://www.rmbo.org/pif/downloads/downloads.html) in BCR 20. Species have been arranged with respect to habitat preference and range of tolerance along a continuum of grass-dominated to woody plant-dominated plant communities.

The Partners in Flight landbird species assessment recognizes (Panjabi et al. 2005) 19 species of continental and/or regional concern, including two federally endangered species, and 6 additional regional stewardship species (Appendix 1). The Edwards Plateau region harbors the much of the known breeding habitat for the endangered Black-capped Vireo and virtually the entire known breeding range for the endangered Golden-cheeked Warbler (U.S. Fish and Wildlife Service 1992, U.S. Fish and Wildlife Service 1991). Other landbird species of regional concern include: Northern Bobwhite, Black-chinned Hummingbird, Dickcissel, Lark Sparrow, Bell's Vireo, Painted Bunting, and Rufous-crowned Sparrow. Many of the landbird species of regional concern have been arranged graphically according to habitat preference in Figure 6.

Species were then placed into general habitat types that were ranked highest, medium and lowest priority for conservation actions within each BCR (Appendix 4 & 5). All of the habitats listed were considered important for priority bird species, but the ranking allows the Joint Venture partners to decide where limited conservation resources should focus first (i.e., highest ranked habitats). As more resources become available, it is anticipated that the lower priority habitats will be become a focus of the Oaks and Prairies Joint Venture. This priority species list represents a "first cut" attempt and will undoubtedly change over time in conjunction with priorities of conservation partner organizations and future population information from the various monitoring and research programs.

Oaks and Prairies, BCR 21

The Oaks and Prairies BCR encompasses over 48 million acres (19.4 million Ha) of Texas, Oklahoma, and a small portion of Kansas (~70,425 acres or 28,500 Ha) and contains both the southernmost extent of the "True Prairie" (the Grand Prairie and the Blackland Prairies), and the westernmost extent of deciduous forest (the Cross Timbers) (Figure 7). This region contains a mix of habitats grading from prairie to forested landscapes (Figure 7). To the east, the Post Oak Savannah separates this region from the adjoining Gulf Coast Plains. Here tall grass species intermingle with a scattered overstory of mainly deciduous oaks. Moving west, the Blackland Prairie stretches from near the Red River south to San Antonio. The heavy Clay soils of this area support a variety of tall grass plant communities. The Blackland Prairie grades into the Grand Prairie (a.k.a. Fort Worth Prairie) to the west which supports similar plant communities on more shallow soils that are somewhat less productive. The East and West Cross Timbers bracket the Grand Prairie and move north into Oklahoma. The majority of the OPJV administrative area in Oklahoma is within the Cross Timbers, but includes areas of transitional prairie to the west. The Cross Timbers is a diverse mix of post oak/blackjack oak woodlands in variable stages of succession intermixed with prairie and transitional shrubland habitats. In contrast to the Mollisol soils of the adjoining prairies, the Cross Timbers has sandy soils substrates over Alfisols (Smeins 2004). The north/south banding of these sandy soils is thought to be related to their position at the edge of ancient sea beds (Hill 1887).

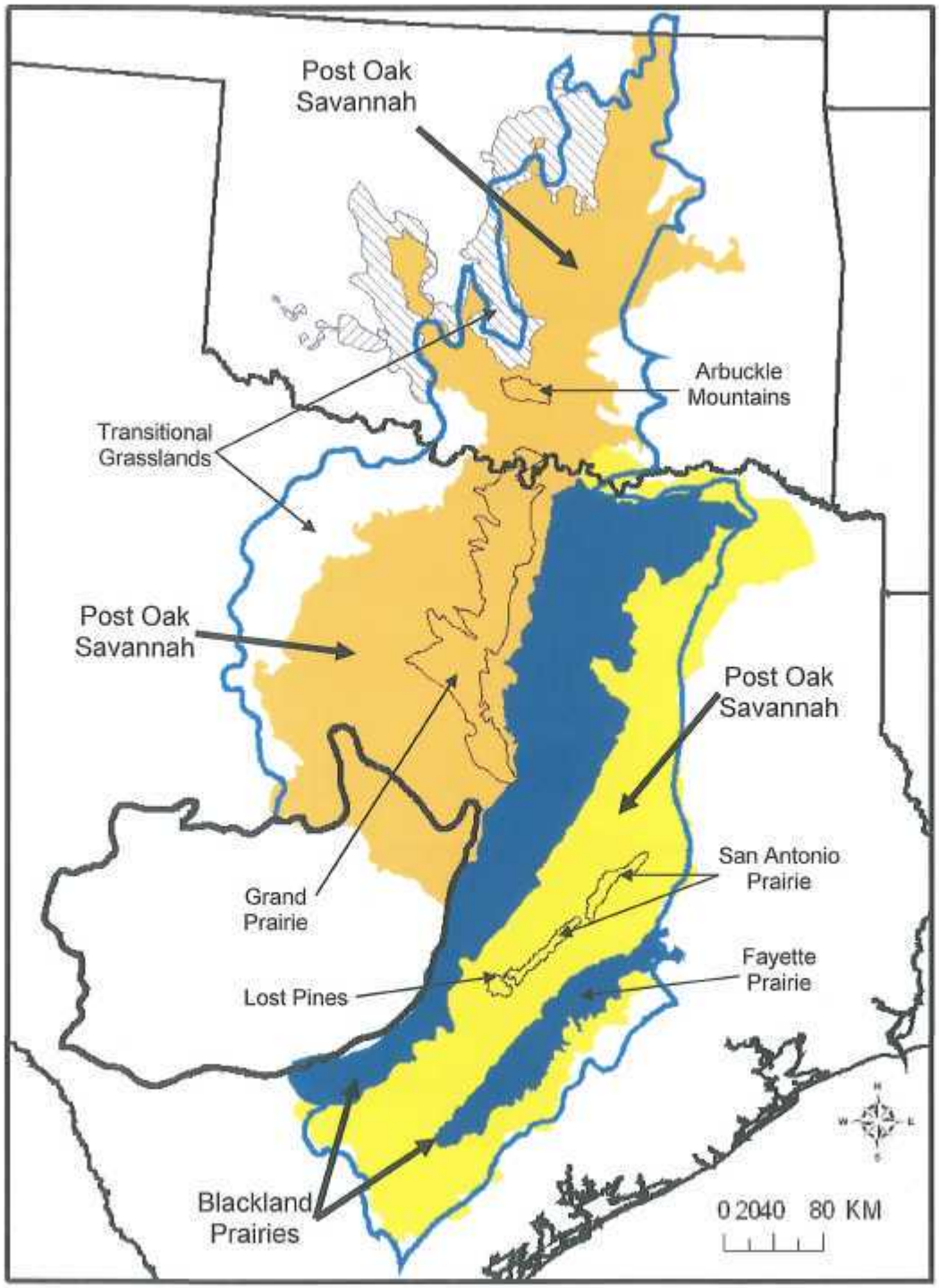


Figure 7. Oaks and Prairies sub-ecoregions.

Subregions

The Post Oak Savannah (POS) is the eastern most subregion (Figure 7) extending in a belt running from Bryan County in southeast Oklahoma, southwest to Bexar and Atascosa Counties in Texas covering approximately 13.5 million acres (5.5. million Ha). Topography is hilly to slightly rolling. Currently, part of the POS lies in the West Gulf Coast BCR of the Lower Mississippi Joint Venture in Red River, Franklin, Titus, Morris and Wood Counties in Texas (Figure 7). The POS is considered part of the oak-hickory or deciduous forest formation (Correll and Johnson 1979). Elevations range from 90 to 250m above sea level and yearly rainfall averages 90 to 115cm with rainfall peeks in May or June (Correll and Johnson 1979). Growing season averages 250 days (Silvy 2007). Soils are characterized by a clay pan substrate underlying surface layers at depths of about 1 meter. Upland soils are generally acidic with a textures ranging from sandy loams or sands (Correll and Johnson 1979) whereas Bottomland soils are acidic, ranging from sand loams to clay surface texture (Sharpless and Yelderman 1993). Sandy texture, along with claypans act to restrict moisture percolation into the soil profile and combine to make these soils very "droughty". Sandy soils tend to have increased potential for woody plant production, whereas increasing clay content (in near-surface horizons) favors grasses (Jim Yantis, personal communication 2006). The namesake plant community of this sub-ecoregion is tall and midgrasses mixed with a broken overstory of post oak and blackjack oak. Co-dominant woody plants include Bluejack Oak (*Quercus incana*) and Blackjack Oak (*Quercus marilandica)*. Important grasses are little bluestem, Indiangrass, switchgrass, silver bluestem, Texas wintergrass, brownseed paspalum, purpletop and beaked panicum (Hatch et al. 1990).

The Cross Timbers is the western most subregion (Figure 7) stretching in a northwest/southeast line from southeastern Kansas, through central Oklahoma and into Northern Texas covering over 15 million acres (6.1 million Ha). Elevations range from 100 to 400 meters and topography is rolling to hilly (McNab and Avers 1994b). Annual precipitation decreases from 900mm in the east to 625 mm in the west with a seasonal peak in spring (USDA 1981). Annual temperature ranges from 15 to 17°C with a growing season (freeze-free period) of 190 to 240 days (USDA 1981). Geologically, the ecoregion is characterized by arenaceous formations of Cretaceous rocks and permeable regolith (Hill 1887). Regional soils developed from deposits associated with an ancient (Cretaceous) inland sea (McNab and Avers 1994b); spatial variability in soil particle size results from beaches formed by either predominately sand or clay particles (Dyksterhuis 1948).

The Cross Timbers are characterized by somewhat open stands of trees with a mid and tall grass understory intermixed with small patches of prairie (McNab and Avers 1994b). The woody plant component is dominated by post oak and blackjack oak, with lesser amounts of elm (*Ulmus* spp.), live oak, hackberry (*Celtis* spp.) and sumac (*Rhus* spp.). Other important tree species include Black Oak (*Quercus velutina*) on sandy, mesic soils; Black Hickory (*Carya texana*) in the eastern portion of the region; and

Shumard Oak (*Quercus shumardii*) and Green Ash (*Fraxinus pennsylvanica*), Native Red Mulberry (*Morus rubra*), Black Walnut (*Juglans nigra*) and Slippery Elm (*Ulmus rubra*) in floodplain habitats. Important herbaceous species include little bluestem, Indiangrass, purpletop (*Tridens flavus*), big bluestem, sunflower (*Helianthus* spp.) and western ragweed (*Ambrosia psilostachya*) and yarrow (*Achillea millefolium*) (Bezanson 2000, Dillard et al. 2005). Floodplain habitats are characterized by hardwood overstory. Dominant species include pecan (*Carya* spp.), sugarberry (*Celtis laevigata*), American elm (*Ulmus Americana*), bur oak (*Quercus macrocarpa*), roughleaf dogwood (*Cornus drummondii*) and western soapberry (*Sapindus drummondii*). In general, upland woody plants occur in highest abundance on course-textured soils and grasses on finer-textured soils. Variability in soil texture over space helps give the Cross Timbers its general character of interspersed grassland and woodland vegetation with bottomland forests occurring on alluvial soils (Ewing 1984, Engle 1997).

One of the unique attributes of the Cross Timbers is the existence of "old growth" (>300 years) stands of post oak (Figure 8). These knarled, drought-stressed, low-growing trees represent some of the oldest unharvested trees in the United States (Diggs et al. 1999). "The Cross Timbers is one of the least disturbed forest types left in the eastern United States...Millions of 200- to 400-year old post oak survive in the Cross Timbers, and red cedar (*Juniperus virginiana*) trees over 500-years old have also been found on fire-protected blufflines (Ancient Cross Timbers Consortium 2007)."

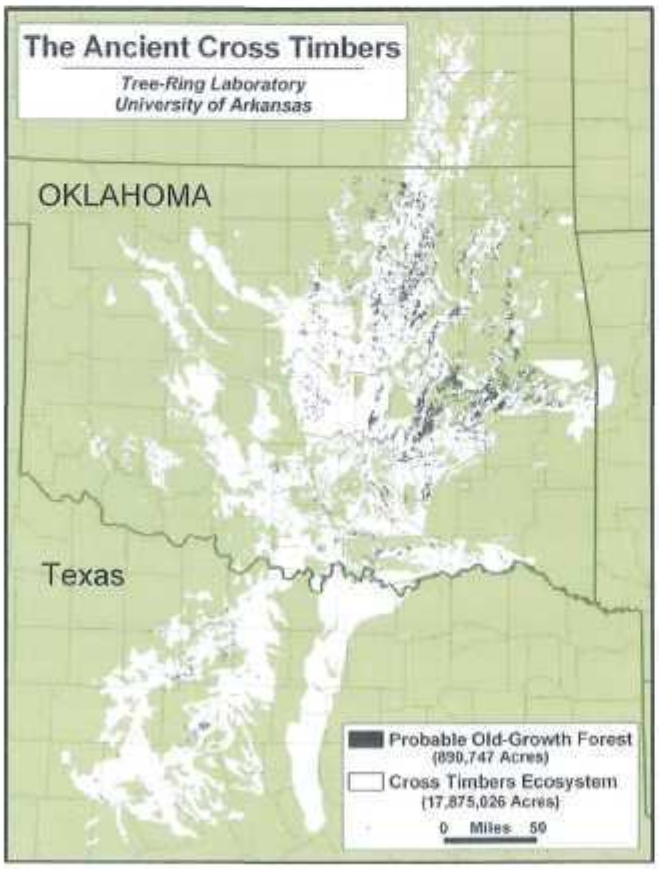


Figure 8. Spatial extent of current-day Cross Timbers region with probable locations of "old-growth" forest remnants. Adapted from Ancient Cross Timbers Consortium (2007).

The Blackland Prairies run from northeast Texas, south and west to San Antonio covering over 10.7 million acres (4.3 million Ha). The Blackland Prairies include the Blackland [10.6 million acres, 4.3 million Ha], Fayette [4.2 million acres, 1.7 million Ha], San Antonio [1.7 million acres, 0.7 million Ha] and part of the Upper Coastal Prairies (see Diamond and Smeins 1985). Of these prairies, all but the Upper Coastal are wholly or mostly contained by BCR 21. Precipitation ranges from 750 to 1,150 mm, with rains falling mainly in spring from April through May. Temperature averages 17 to 21°C. The growing season lasts 230 to 280 days (USDA 1981) and topography is rolling to flat with elevations ranging from 100 to 200m (Mcnab and Avers 1994a). The distinguishing feature of this subregion is a heavy clay soil (either Vertisols or Alfisols) overlaying various limestone features at depths great than that of the Grand Prairie (see below, Diggs et al. 1999.) These soils have a very high agronomic value and are used principally for row crop production. Vertisols are the dominant soil throughout most of the Blackland Prairies and are more productive than either Alfisols or Mollisols. Alfisols are lower in calcium carbonate (i.e. more acidic) and sand, and are the least productive of the soil orders (Diggs et al. 1999). Dominant vegetation on Vertisol soils is tallgrass prairie with little bluestem, Indiangrass, big bluestem, tall dropseed, switchgrass, sideoats grama, knotroot bristlegrass (*Setaria parviflora*), Texas cupgrass (*Eriochloa sericea*) and a variety of broadleaf species (Bezanson 2000). Vegetation of Alfisol prairies includes little bluestem, brownseed paspalum, rosettegrass, croton, sunflowers, coneflowers, goldenrods, phloxes and camphor weeds (Launchbaugh 1955, Diamond and Smeins 1985, Bezanson 2000).

The Grand Prairie subregion (Figure 7) lies between the East and West Cross Timbers in northern Texas with a small portion extending into southern Oklahoma covering over 2 million acres (854,000 Ha) . Some (e.g. Griffith et al. 2004) have considered this to be part of the Cross Timbers or as part of the Blackland Prairies (e.g. Diggs et al. 1999). However, for this document it is treated as a part of the Cross Timbers, although there is a disparity in soil properties that results in habitat types which differ from either the Blackland Prairies or the Cross Timbers. Climate for the Grand Prairie is as described above for the Cross Timbers (USDA 1981). Topography is rolling to flat with elevations ranging from 200 to 400 m (USDA 1981). Soils are predominately Mollisols underlain by limestone (Diamond and Smeins 1985). Although extremely fertile, shallow depth to bedrock limits plant rooting and soil water storage capacity, making these soils more susceptible to drought than those of the Blackland Prairies (Diggs et al. 1999). Dominant vegetation on these clayey soils includes a mixed prairie of mainly tall and midgrass species including little bluestem, big bluestem, Indiangrass, side-oats grama, tall dropseed (*Sporobolus compositus*) and hairy grama (Dyksterhuis 1946, Diamond and Smeins 1985).

The Oaks and Prairies BCR contains at least two other relatively small, but unique and significant areas. The first is the Arbuckle Uplift/Arbuckle Mountains, 750,000 acres (306,336 Ha) in Murray, Carter, Johnston, and Pontotoc Counties in the southern Oklahoma part of the Cross Timbers. This area is singled out because of its unique geology and plant community that closely mirrors the Edward's Plateau. Second is the Lost Pines in Bastrop County Texas in the Post Oak Savanna covering 56,107

acres (22,706 Ha). This area contains the westernmost edge of loblolly pine (*Pinus taeda)* range, and is home to the largest known populations of federally Endangered Houston toad (*Bufo houstonensis*) (Campbell 1995).

Historical Vegetation and Bird Habitat Change

The POS was one of the first areas in Texas to be occupied by Europeans (Weniger 1984). Historical accounts describe this region as a mixture of open or closed woodlands interspersed with prairie, savannah, and associated herbaceous species being maintained by fire (Bezanson 2000, Weniger 1984). By 1900, most of the large tracts of POS were cleared and, by the 1950's, colonized by woody plant species (Silvy 2007). Today most (75%) of the POS has been converted to pastureland (predominantly non-native forages) and overgrazing has increased the susceptibility of woodland understories to invasion by yaupon (*Ilex vomitoria*) (Silvy 2007). Additionally, reduced fire frequency, whether associated with grazing-induced fine fuel reduction or direct suppression, has led to increased woody plant dominance and conversion of savannah to a woodland state across much of this ecoregion.

Those encountering the historic Cross Timbers describe an abrupt transition from prairie to forested landscape that some dubbed the "Cast Iron Forest" due to the low-growing, dense growth form of post oak and blackjack oak (Francavigila 2000). Here too fire played a central role in maintaining both the structure of woodlands, and the existence of prairie islands, helping to maintain a shifting mosaic of plant communities across the landscape. On an 1832 excursion, Washington Irving described the Cross Timbers as: "*...forty miles in breadth and stretches over a rough country of rolling hills, covered with scattered tracts of post-oak and black-jack; with some intervening valleys, which at proper seasons, would afford good pasturage*" (Irving 1835). Parker, in 1854, described the Western Cross Timbers of Texas as: "*The timber is a short, stunted oak, not growing in a continuous forest, but interspersed with open glades, plateaus, and vistas of prairie scenery, which give a very picturesque and pleasing variety*" (in Dillard et al. 2005). Historically, fire, herbivory and spatial variation in soils interacted to create a shifting mosaic of plant community types across the landscape (Engle 1997). Use of the Cross Timbers by cattle (Castilian) and feral horses (probably Spanish) was occurring as early as 18th Century (Dyksterhuis 1948). Today, the character of the Cross Timbers has been heavily impacted by livestock grazing practices that focus on maximizing forage harvest, fire suppression, and the interactive effect of these two factors (i.e., reduced fine-fuel loads from harvest to decrease fire frequency) (Rice and Penfound 1959, Johnson and Risser 1975). The result has been "thicketization" of woodlands and savannahs, and a dramatically increased presence of woody vegetation in formally grassland sites (Stritzke and Bidwell 1989, Stahle et al. 2005); with mesquite increasing in the south and west, and eastern red cedar in the north and east. Additionally, extensive conversion of this area to cropland occurred during the 20th Century. Francaviglia (2000) estimated that by 1930, 26 million acres (10.5 million Ha) had been so converted in north central Texas, about 8 million acres (3.2 million Ha) of which were in formerly "forested" condition and likely part of the Cross Timbers.

The historical Blackland Prairies and Grand Prairie share a common land use history and have similar vegetation responses to fire and grazing. Historically, these areas were typified immense expanses of prairie, broken only by the occasional tree, or when intersecting riparian zones. In 1849, Brooke described the Blackland Prairie, Grayson County, just north of Dallas as: "*...I can sit on the porch before my door and see miles of the most beautiful prairie interwoven with groves of timber surpassing, in my idea, the beauties of the sea. Think of seeing a tract of land on a slight incline covered with flowers and rich meadow grass for 12 to 20 miles...*" (Diggs et al. 1999). Fire and grazing (Bison and other native ungulates) are mentioned frequently by early travelers through this region (see Roemer 1849). These two factors probably interacted as described above for the Edwards Plateau: herbivores focus grazing on recently burned areas and moving accordingly. By the latter 1800's, growth of the livestock industry and demand for beef had resulted in sever overstocking with associated negative impacts on vegetation (Dyksterhuis 1946). This, combined with removal of native peoples (i.e. and their associated burning activities) acted to effectively de-couple the fire/grazing interaction. Overgrazing by cattle and a lack of fire promote fundamental changes in both structure and composition of prairie communities (Dyksterhuis 1946). In the absence of disturbance, woody plant encroachment may transform the prairie into an alternate vegetative state that includes a loss of tallgrass species and their replacement with more grazing tolerant species such as Texas wintergrass or silver bluestem (Dyksterhuis 1946, Smeins and Diamond 1983, Bezanson 2000, USDA 2007). Additionally, the high agronomic value of Blackland Prairies has resulted in a near complete conversion of these habitats to either crops or non-native forage species. At present, less than 100 unplowed examples of native Blackland Prairies remain (Diamond and Smeins 1985), amounting to a habitat loss approaching 98% (Bezanson 2000). The Grand Prairie has fared somewhat better due to poorer agronomic conditions (e.g. reduced soil fertility and shallow depth to limiting layer). The dominant use today is rangeland, however, these native prairies are under serious threat from both planting of non-native species as well as the encroachment of the urban development (Diggs et al. 1999).

The Avian Assemblage

At least 471 avian species have been documented within the Oaks and Prairies region (Freeman 2003) and Partners in Flight (Panjabi 2005) recognizes 12 species of continental concern, 23 of regional concern, and 6 regional stewardship species. This suite of species includes over 25% of the global breeding populations of Painted Buntings and Scissor-tailed Flycatchers. Other landbirds of regional concern include the Eastern Meadowlark, Northern Bobwhite, Bell's vireo, Golden-cheeked Warbler, and Loggerhead Shrike.

Throughout the Oaks and Prairies, numerous riverine systems provide habitat for terrestrial avian species (e.g., Bells Vireo, Red-headed Woodpecker; ODWC 2005) in addition to shorebirds and waterfowl. While the region is not listed as an area of

Continental Significance by the North American Waterfowl Management Plan, significant waterfowl populations are associated with numerous impoundments and reservoirs scattered throughout the BCR. In some years in Texas, up to one third or more of censused over wintering waterfowl can be found within the Texas portion of BCR 21 (Texas Parks and Wildlife Department, unpublished data). There are 2 breeding priority species and 18 nonbreeding priority waterfowl species (see Appendix 2) including the Northern Pintail, which is a high priority species in the Texas Comprehensive Wildlife Conservation Strategy (2005), and is considered common by Freeman (2003). The Oaks and Prairies region is considered of lesser importance to waterbirds with 13 breeding species and 11 nonbreeding species of concern. Finally, there are 37 shorebird species of conservation concern in the greater region mostly during migration (Central Plains/Playa Lakes, Brown et al. 2001).

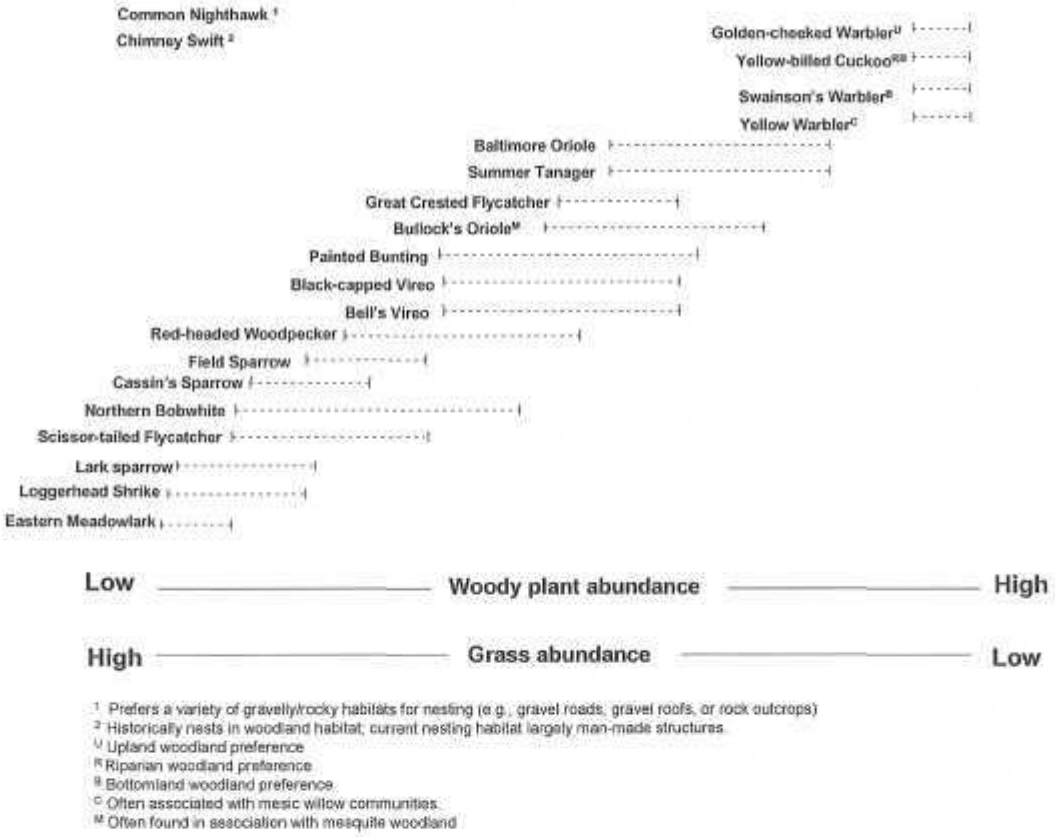


Figure 9. Distribution of landbird species of regional concern (Rocky Mountain Bird Observatory http://www.rmbo.org/pif/downloads/downloads.html) in BCR 21. Species have been arranged with respect to habitat preference and range of tolerance along a continuum of grass-dominated to woody plant-dominated plant communities.

Selection of priority landbird species for BCR 21 is as described previously. Landbird species of regional concern have been arranged graphically according to habitat preference in Figure 9. Species were placed into general habitat types that were ranked highest, medium, and lowest priority for conservation actions within the Oaks and Prairies BCR (Appendix 5). All of the habitats listed were considered important for priority bird species, but the ranking allows the Joint Venture partners to decide where limited conservation resources should focus first (i.e., highest ranked habitats including native grassland, native oak savanna, natural wetlands, and deciduous shrub/grassland). As more resources become available, it is anticipated that the medium and lowest priority habitats will be become a focus of the Oaks and Prairies Joint Venture in the Oaks and Prairies BCR.

Administrative Structure

Partners. Any individual, agency, or organization that plays a role in furthering the OPJV's mission is welcomed as a volunteer Partner Organization. The number of Partner Organizations is unlimited, but Partner Organizations are expected to continually aid in promoting and advancing the OPJV mission. A subset of these Partner Organizations are voting partners that serve as the OPJV's Management Board and provide leadership (see below).

The Management Board. The Management Board consists of representatives from 2 state (Oklahoma Department of Wildlife Conservation, and Texas Parks and Wildlife Department) and 2 federal agencies (USDA-NRCS and USFWS) with jurisdictional responsibilities within the Oaks and Prairies Joint Venture region, as well as representatives from Quail Unlimited, National Wild Turkey Federation, Audubon, Native Prairies Association of Texas, Texas Wildlife Association, and The Nature Conservancy. The Management Board is guided by a set of bylaws (Appendix 7), and can add new members at their discretion. Voting seats on the OPJV Management Board are open to conservation organizations, industry representatives, individuals, and other private groups that commit to sharing the responsibility for bird conservation throughout the Oaks and Prairies Joint Venture, and to furthering the vision and mission of the OPJV.

The management board's responsibilities include; 1.) Lead and govern the activities of the OPJV, including the technical teams, and staff, 2.) Formulate strategies to further the OPJV's mission and periodically review and update the mission as necessary, 3.) Provide oversight of organizational and programmatic planning and evaluation, 4.) Ensure legal and ethical integrity and maintain accountability for the OPJV, 5.) Promote the activities of the OPJV and enhance the OPJV's visibility among partner organizations and the broader conservation community.

It is expected that board members will; 1.) Maintain commitments of time, focus, and financial support necessary to achieve the OPJV mission, 2.) Consistently attend and engage fully in Management Board meetings, conference calls, and ad-hoc working groups as needed, 3.) Direct technical staff from his/her organization to fully participate

on OPJV technical committees and contribute to the development of technical documents, 4.) Possess authority to represent his/her organization in decision making on the OPJV Management Board, 5.) Serve as active partners in the OPJV's planning and implementation activities, 6.) Act as OPJV ambassadors for their organization to other public, private, and political leaders, 7.) Be alert to opportunities and threats likely to be encountered by the OPJV, 8.) Become familiar with OPJV finances, financial or resource needs, and 9.) Understand the policies and procedures of the OPJV.

The Joint Venture Coordinator. The OPJV Coordinator provides leadership and coordinates operation of the OPJV. The Coordinator is accountable to the OPJV Management Board and has primary responsibility for furthering the OPJV mission, vision, and implementation plan; programmatic, organizational, and financial management; and maintaining communication among partner organizations. Responsibilities include Organizational Leadership, Board Administration and Support, Program Administration, Development and Financial Management, Internal Communications, External Communications/ Public Relations, and Human Resource Management.

Technical Teams. Technical Teams serve as the technical forum for coordination and communication among OPJV partners in matters pertaining to implementing Adaptive Conservation (Plan-Do-Learn; biological planning, conservation design conservation delivery, and monitoring and research). Technical Teams will ensure that the conservation actions of OPJV partners support the progressive refinement of OPJV conservation goals and objectives.

Responsibilities of the OPJV Technical Teams include; 1.) Develop, refine, and integrate OPJV priority species and habitat objectives that contribute to range-wide bird conservation plan population objectives for all priority bird species (waterbird, shorebird, waterfowl, landbird, and Norhtern Bobwhite plans), 2.) Consider the role of OPJV in integrating Comprehensive State Wildlife Plans, 3.) Implement an adaptive conservation (Plan-Do-Learn) approach for bird conservation that includes habitat monitoring to evaluate impacts of JV partner conservation actions, 4.) Provide technical support for Biological Planning including the development of population-habitat models and decision support tools, and the identification of basic research needs where not enough information is available to build initial models, 5.) Identify conservation actions and targeted research of the conservation actions to test assumptions built into the OPJV biological foundation, and coordinate the implementation of research projects, 6.) Provide technical support for Conservation Design by developing GIS tools and maps to identify strategic, biologically-based locations for conservation actions 7.) Represent the OPJV in communication and outreach to the public on the technical and scientific issues, and 8.) Organize such ad hoc or standing sub-committees or working groups as necessary (e.g., focus areas, communications and outreach).

Examples of Ties to existing conservation efforts

Texas Comprehensive Wildlife Conservation Strategy (TPWD 2005)

BCR 20 – Edwards Plateau. Currently, BCR 20 includes about 2/3 of the Edwards Plateau (EP) region included in the Texas Comprehensive Wildlife Conservation Strategy. The EP is listed as a Tier 2 Region and contains 102 priority avian species, a large number of these species being migrant landbirds. Within the EP, species of primary importance include the Black-capped Vireo and the Golden-cheeked Warbler. The majority of the known breeding habitat for these two federally listed species occurs within BCR 20. The OPJV will work to design and implement high priority actions consistent with restoration and maintenance of shrubland, savanna, woodland and riparian habitats.

BCR 21 – Oaks and Prairies. All of the Blackland Prairie, a Tier 1 Region, is located within BCR 21. This Region includes 105 priority avian species, the majority of which are landbirds. Less than 10% of Blackland Prairie habitat remains in its native state and conservation actions within this region are given high priority. The OPJV will engage in high priority conservation actions consistent with designing and implementing grassland habitat restoration initiatives.

The southern portions of the East and West Cross Timbers are located within BCR 21. This area is a Tier 2 Region containing 106 priority avian species (predominantly landbirds). The OPJV will work to control of expanding juniper populations, protect and restore native grassland habitat, and restore the understory species in savanna and woodland habitats.

The Post Oak Savannah (POS) is completely contained within BCR 21 and is listed as a Tier 3 Region. The high diversity of habitat types present within this region is reflected in the 108 priority avian species; a group that includes grassland and forested landbirds, waterbirds, shorebirds, waterfowl and raptors. Northern bobwhite (a priority species) populations within the POS have plummeted in recent years with local extirpations becoming increasingly common. The OPJV will work to restore grassland (including conversion from non-native to native grasses) and maintain the structural diversity within savanna and woodland habitat types.

Oklahoma Comprehensive Wildlife Conservation Strategy (ODWC 2005)

BCR 21 – Oaks and Prairies. The northern portion of the Cross Timbers is located in Central Oklahoma within BCR 21. The Cross Timbers represents the largest single ecosystem type in the state of Oklahoma (Oklahoma Department of Wildlife Conservation 2005). This region in Oklahoma contains 53 priority avian species and is separated into 12 conservation landscapes or habitat types. The high priority habitat types include habitats associated with rivers and streams, Oak and Hickory Bottomland Hardwood Forest and woodland, tallgrass prairie, and Sandstone Canyonlands with

Post Oak and Blackjack Oak Shrubland. The OPJV will work to design and implement high priority actions consistent with actions identified in the Oklahoma Wildlife Conservation Strategy including the control of expanding juniper populations, restoration of native grassland and wetland habitat, restoration of understory species in woodland habitat, and the protection of existing old growth forest.

Northern Bobwhite Conservation Initiative (NBCI)

Conservation of Northern Bobwhite habitat in both BCR 20 and 21 is in direct support of the NBCI objectives to increase Northern Bobwhite habitat through conservation efforts aimed at improving habitat for all grassland, shurbland, and savanna species specifically or landscape functionality in general. The preceding also ties OPJV activities to both the Texas Quail Conservation Initiative (TQTSC 2003) and those efforts of Audubon Texas on behalf of Northern Bobwhites.

Working with other partners

The OPJV will work to incorporate focus areas identified by partner organizations into future planning efforts. For example, conservation focus areas of the OPJV will include many of those habitats contained within The Nature Conservancy Conservation Portfolios (TNC 2004), including most of the Terrestrial habitats and many of the aquatic habitats. Also, the OPJV and Texas Parks and Wildlife Department are directly and indirectly supporting efforts to map and protect native prairie patches by the Native Prairies Association of Texas and other native plant conservation organizations.

Conservation time scale

One of the most critical aspects of the conservation process is to define the time-scale appropriate to the associated activities. To illustrate this point, consider the inherent differences in near-term and long-term threats to avian habitat within the context of the Edwards Plateau. In the short-term paradigm (e.g., the next 5 to 10 years), improving the condition of existing habitat resources can result in quantifiable benefits to habitat for priority species. However, long-term (e.g., 50 to 100 years) development and population trends suggest that the ultimate threat to habitat integrity is land use change from rural to urban resulting in less or more fragmented usable habitat space. In the long-term conservation paradigm, short-term gains in habitat quality may ultimately be negated by conversion of the habitat to urban use, suggesting that long-term efforts be focused on those conservation tools that mitigate land conversion, like establishing more large mostly protected areas through easements or acquisition and connecting protected areas with appropriate corridors. In reality both the short and long-term planning can play a role in effective avian habitat conservation, but the dichotomy of tools needed to address these differing frameworks underscores the need for specifically defining the temporal horizon of planning activities. With respect to this document, both frameworks will be incorporated; the short-term planning horizon will be 5 to 10 years and long-term 50 to 100 years.

Next Steps

The primary charge of JVs is to implement national/international scale bird conservation plans. One way to tackle this conservation problem is to start with the population objectives set forth in the national plans (e.g., Rich et al. 2004), determine the average within-BCR density of the species, and calculate the number of bird habitat acres needed to realize the plan objective. This becomes the quantitative objective for the number of habitat acres needed to realize, for example, a 50% increase in populations of Painted Buntings within BCR 21. A good example for this procedure using Northern Bobwhite can be found in Texas Quail Conservation Initiative (Texas Quail Technical Support Committee 2003). However, this process requires an extensive monitoring network and a detailed understanding of the relationship between habitat change and population dynamics of priority species.

For most priority landbirds within the OPJV boundaries, the necessary population and habitat information is less than adequate or totally non-existent. The initial priority habitats will be linked directly to the "closest" habitat component available in region-wide coverage of vegetation community descriptions (e.g., National Landuse/Landcover Data [NLCD], LANDFIRE). One of the ultimate goals of the JV will be to develop a biological foundation that is capable of making data-based predictions of the quantitative response of priority species to management induced habitat changes. Once this information is in place, it will constitute the knowledge base necessary to formulate specific, quantitative goals that are representative of the amount and type of habitat the BCR is capable of producing. If these goals conflict with the expectations of national/international plans, then, in most cases, revision of national/international goals will be the next logical step given that these goals are based largely on the number of birds present at a given point in the historical past (e.g. Rich et al. 2004) and may not reflect the present conservation potential of the BCR.

From our discussions among the Technical Team and Management Board members and other partners in the Oaks and Prairies Joint Venture region, our first objective will be to address the habitat needs of grassland birds, the nation's fastest declining birds (North American Bird Conservation Initiative, U.S. Committee 2009). For initial planning purposes, our definition of "grasslands" could include native grass fields, native savannas, native grass/shrub mosaics, as well as non-native and potential grasslands in agricultural landscapes like improved pastures and rangelands, croplands, and plowed fields. The grassland bird technical teams will work in both BCRs to refine our definitions of priority habitats (Appendix 4 and 5) as a part of the Biological Planning process of the Plan-Do-Learn (Adaptive Management) cycle.

Adaptive management, or Strategic Habitat Conservation, is planning intensive, but the Joint Venture will need to be flexible enough to switch focus from planning to on-the-ground action. We expect the first few years will be dominated by planning activities including Biological Planning and Conservation Design (Planning Phase). As plans for birds of management concern develop, the proportion of Joint Venture resources allocated to the planning phase will decrease as the proportion of time devoted to

conservation delivery, research, and monitoring increases (Action Phase). We anticipate every 5-10 years the implementation plan will be revisited and updated to stay relevant with changes in ecological, social, political, and economic conditions. This update will start a new planning phase followed by another action phase, while incorporating lessons learned from the previous cycle. Both the planning and action phases can happen at the same time for several different species or species guilds, but the amount of resources allocated to each will vary. For example, as the planning phase for grassland birds slows, landscape level biological planning and conservation design for bird populations in other habitat types, like bottomland hardwood forests, sand bars, and riparian corridors, could begin.

Figure 10. The Oaks and Prairies Joint Venture will follow a continual cycle of overlapping planning and action phases on a 5-10 year cycle. In this manner, the OPJV can maintain an emphasis of on-the-ground action while staying relevant as ecological, social, political, and economic conditions change.

The following is an outline of the steps the Oaks and Prairies Joint Venture expects to take to achieve our mission. These steps represent our understanding of the Plan-Do-Learn cycle today, and may be altered as we confront the realities of implementing an adaptive management cycle. This outline does not represent a step-by-step process. It is more like a checklist because many of the items in the outline can and will be done simultaneously.

Planning Phase

I. Identify species and habitats of concern
   a. Identify all species of concern in the OPJV

i. Endangered and Threatened species
ii. National bird conservation plans and lists
iii. Species listed in state conservation plans
iv. Other species identified by the technical teams
    1. Local concern
        a. High responsibility for population within the OPJV, but no indication of national declining population trend
        b. Unknown population status or trend
            i. Small populations on the periphery of the species range
            ii. Poorly monitored species
    2. Economic concern
        a. Provide hunting opportunities
        b. Provide tourism and recreation opportunities
        c. Provide educational opportunities
        d. Cause negative impacts
            i. To other species
            ii. To economic activities (i.e., agriculture)
            iii. Considered nuisance species

b. Identify and prioritize major habitat types (i.e., Native Grassland, Oak Savanna, Riparian Habitat...) and **priority species** (two out of the three following situations)
    i. Significant declining population trend
    ii. High responsibility in the OPJV
        1. Greater than 5% of the world population for landbirds
        2. Listed as highest priority in other national plans
    iii. Less than adequate information available for the species

II. Select initial ***management focal species*** or ***guilds*** from the priority bird list within high priority habitat types and identify information gaps

a. Choose species that use sub-habitat types that overlap several other priority species habitat use (e.g., for major the habitat type "Native Grassland" → interior of large grassland patch, edge of grassland, small shrub motts or clumps within large grassland, bare ground in grassland setting)
    i. Habitat needs can represent needs for other priority species
    ii. Population trend is similar to other priority species
    iii. Species expected to respond to management similar to other priority species
b. Choose species that have known basic life history information available for modeling (birds per habitat area and relationships between vital rates and habitat)
    i. Population size estimate
    ii. Population trends
    iii. Vital rates in different habitats within or near the OPJV region are known to allow species-habitat modeling
    iv. Weather effects on survival and productivity (for climate change evaluation)
    v. Relatively easy to monitor
        1. Abundant enough to provide adequate sample size
        2. Expected to be able to detect a response to possible management actions
    vi. Partners interested
c. Identify and prioritize ***research needed to fill information gaps*** for high priority species that lack adequate life history information to be included in the initial management focal species or guilds (Basic research assessment)

III. Biological Planning

a. Establish baseline and target population objectives using national conservation plans (step down) and local biological knowledge (roll up)
b. Identify population limiting factors

c. Identify a limited set of management options to mitigate major limiting factors and achieve population objectives
d. Create and test models describing species-habitat and population responses to management options using existing knowledge
e. Create decision support tools to integrate species-habitat relationships
f. Identify information gaps and key assumptions in the models that will need to be tested with further research

IV. Conservation design
a. Map existing protected and focal areas
b. Map existing habitats
c. Formulate habitat objectives
d. Assess the implications of alternative scenarios under climate change, where possible.
e. Identify program priority areas using biological planning products (science) and socioeconomic inputs (opportunities).

Action Phase

V. Provide on-the-ground conservation support activities.
a. Use products from conservation design to encourage the focus of partner conservation and research activities in priority areas.
i. Identify and pursue adequate funding for both land management and research
ii. Identify potential sites for land management activities
1. Consider public lands and other protected lands as core areas for management and research
2. Consider existing partner focus areas as core areas for management and research
iii. Identify potential research partners from the academic community
iv. Ensure communication among local public land managers, private landowners, researchers, and other partners
v. Ensure the study design addresses the assumptions and information gaps identified in the biological planning
vi. Ensure research to test assumptions and fill information gaps is being integrated with the on-the-ground management
b. Ensure monitoring to evaluate population response to land management is conducted.
i. Identify and pursue adequate funding
ii. Account for area of land impacted by management
iii. Account for population level changes or changes in vital rates (e.g., nesting success or survival) due to management actions

Repeat the process

VI. Repeat planning until ***sustainable populations* (at prescribed population objective levels) *exist for all priority bird species in the Edwards Plateau and Oaks and Prairies BCRs in Oklahoma and Texas (OPJV mission)***
a. Identify a new set of management focal species
i. Update priority species, if needed, incorporating new information about population trends or estimates
ii. Incorporate species that did not have enough information available to be included as initial management focal species in the first round of planning, if the identified information needs have been addressed (in section II.c.)
b. Return to biological planning (section III.) incorporating lessons learned from research in the action phase (section V.)

Summary

The mission of the Oaks and Prairies Joint Venture is to *plan for and facilitate bird habitat conservation, research, and outreach in an effort to ensure sustainable populations of priority bird species in the Edwards Plateau and Oaks and Prairies BCRs in Oklahoma and Texas.* Increased cooperation among Joint Venture partners will be necessary to achieve this large and complex mission. Cooperation is built through trust, and trust is built through communication of a shared vision. The partners in the Oaks and Prairies Joint Venture are committed to accomplishing our mission, and to building the infrastructure and tools to accomplish our mission. The Plan-Do-Learn cycle will form the basis of efforts to address conservation at the landscape level to bring together partners with diverse knowledge, skills and abilities to address biological planning, conservation design, conservation delivery, research and monitoring, evaluation, and communication, education, outreach, and marketing. Each partner will bring their own goals and, as the Oaks and Prairies Joint Venture partnership develops and consensus builds, the goals of the individual partners will become the goals of the Joint Venture. As the goals of the Joint venture are articulated and further developed, and partners start accomplishing more together, the goals of the Joint Venture will feed into the goals of the individual partners making the partners more interconnected and efficient.

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Appendix 1: Species of conservation concern in the Edwards Plateau Bird Conservation Region (20). The list includes species in the Texas Comprehensive Wildlife Conservation Strategy (TPWD 2005), Texas state Endangered Species (Campbell 1995), national bird conservation plans (landbird [Rich et al. 2004], waterfowl [North American Waterfowl Management Plan Committee 2004], waterbird [Kuslan et al. 2002], and shorebird [Brown et al. 2001]), National Audubon Society's Watchlist (2007) and the US Fish and Wildlife Service's species of conservation concern (USFWS 2008).

		Texas		PIF Landbird									
Species	TX state wildlife plan*	Endangered	Threatened	Continental Concern	Regional Concern	Regional Stewardship	Breeding Waterfowl	Nonbreeding Waterfowl	Breeding Waterbird	Nonbreeding Waterbird	Shorebird[$]	Audubon Red List	Audubon Yellow List
Wood Duck								X					
Gadwall								X					
American Wigeon								X					
Northern Pintail	H							X					
Green-winged Teal								X					
Canvasback	L							X					
Redhead	M							X					
Lesser Scaup	M												
Bufflehead								X					
Scaled Quail	L			X									X
Northern Bobwhite	H				X								
Montezuma Quail	M			X	X								X
Horned Grebe	L												
Eared Grebe	L												
American White Pelican	L									X			
Neotropic Cormorant									X				
American Bittern										H			
Least Bittern	L												
Great Blue Heron									X				
Snowy Egret	L												
Green Heron									X				
Yellow-crowned Night-Heron	L												
Wood Stork										H			
Mississippi Kite	L												
Golden Eagle	H												

Appendix 1: (Cont., Edwards Plateau Bird Conservation Region)

Species	TX SWP	TX-E	TX-T	PIF-CC	PIF-RC	PIF-RS	BWF	NBWF	BWB	NBWB	SB	ARL	AYL
Bald Eagle #	M		X										
Northern Harrier	H												
Harris's Hawk	M				X								
Red-shouldered Hawk	L												
Swainson's Hawk	M												X
Zone-tailed Hawk	L												
Golden Eagle	L												
(Arctic) ***Peregrine Falcon***	L		X										
King Rail	H												
Virginia Rail	L									X			
Sora										X			
American Coot										H			
Black-bellied Plover											m		
American Golden-Plover	L										M		
Snowy Plover	H										B,M		
Semi-palmated Plover											M		
Piping Plover			X								B,m	X	
Killdeer											B,M,W		
Mountain Plover	H										B,M,w	X	
Black-necked Stilt	L										B,M		
American Avocet	M										b,M,w		
Solitary Sandpiper	L										m		
Greater Yellowlegs	L										M		
Lesser Yellowlegs	L										M		
Willet											B,M,w		
Spotted Sandpiper											B,M,w		
Eskimo Curlew											M		
Whimbrel											M		
Upland Sandpiper	L										B,M		
Long-billed Curlew	H										B,M		X
Hudsonian Godwit	L										M		X
Marbled Godwit	L										m		
Ruddy Turnstone											m		
Red Knot	M												X
Sanderling											m		
Semipalmated Sandpiper											M		X
Western Sandpiper	L										M		X
Least Sandpiper											M,W		
White-rumped Sandpiper											M		
Baird's Sandpiper											M		
Pectoral Sandpiper											M		

Appendix 1: (Cont., Edwards Plateau Bird Conservation Region)

Species	TX SWP	TX-E	TX-T	PIF-CC	PIF-RC	PIF-RS	BWF	NBWF	BWB	NBWB	SB	ARL	AYL
Dunlin											m		
Stilt Sandpiper	L										M		
Buff-breasted Sandpiper	H										M		
Short-billed Dowitcher	M										m		
Long-billed Dowitcher											M,W		
Wilson's Snipe	L										b,M,W		
American Woodcock											B,W		
Wilson's Phalarope	L										B,M		
Red Necked Phalarope											m		
Forster's Tern	L												
Mourning Dove	L												
Yellow-billed Cuckoo	L				X								
Elf Owl	M												
Common Nighthawk	L												
Chuck-will's-widow	M												
Chimney Swift	L												
Black-chinned Hummingbird						X							
Green Kingfisher	L												
Red-headed Woodpecker	M												X
Golden-fronted Woodpecker	L												
Ladder-backed Woodpecker	L												
Hairy Woodpecker	M												
Pileated Woodpecker	L												
Eastern Wood-Pewee	L												
Acadian Flycatcher	L												
Great Crested Flycatcher	L												
Eastern Kingbird	L												
Scissor-tailed Flycatcher	L												
Loggerhead Shrike	M												
Bell's Vireo	L			X	X	X						X	
Black-capped Vireo	H	X		X	X	X						X	
Gray Vireo	L			X									X
Yellow-throated Vireo	L												
Warbling Vireo	L												
Black-crested Titmouse	L					X							
Cactus Wren	L												
Canyon Wren	L				X								
Bewick's Wren						X							
Wood Thrush	L												X
Crissal Thrasher	L												

Appendix 1: (Cont., Edwards Plateau Bird Conservation Region)

Species	TX SWP	TX-E	TX-T	PIF-CC	PIF-RC	PIF-RS	BWF	NBWF	BWB	NBWB	SB	ARL	AYL
Brown Thrasher	L												
Curve-billed Thrasher	L												
Yellow Warbler					X								
Golden-cheeked Warbler	H	X		X	X	X						X	
Yellow-throated Warbler	L												
Prothonotary Warbler	M												X
Worm-eating Warbler	H												
Louisiana Waterthrush	H												
Kentucky Warbler	H												X
Common Yellowthroat					X								
Hooded Warbler	L												
Cassin's Sparrow	M				X								
Harris's Sparrow													
Rufous-crowned Sparrow	L				X								
Brewer's Sparrow	L												
Field Sparrow	L				X								
Lark Sparrow	L				X								
Black-throated Sparrow	L												
Grasshopper Sparrow	L												
Baird's sparrow	M												
Le Conte's Sparrow	M												X
McCown's Longspur	L												
Chestnut-collard Longspur													
Pyrrhuloxia	L												
Varied Bunting	L												X
Painted Bunting	M			X	X								X
Dickcissel	L			X	X								
Eastern Meadowlark	H												
Western Meadowlark	L												
Orchard Oriole	M				X								
Hooded Oriole	M												
Totals 135	100	2	3	8	17	6	0	8	3	3	37	5	16
	H=15												
	M=21												
	L=64												

*For the Texas Comprehensive Wildlife Conservation Strategy H= high priority, M = Medium, and L = low.

$Shorebirds are for the Central Plains/Playa Lakes region. Upper case = high priority, B = Breeding, M = Migration, W = Wintering

#Species in ***bold Italics*** represent US Fish and Wildlife Service's species of conservation concern (USFWS 2008).

Appendix 2: Species of conservation concern in the Oaks and Prairies Bird Conservation Region. The list includes species in the Oklahoma and Texas Comprehensive Wildlife Conservation Strategies (ODWC 2005, TPWD 2005) , Texas and Oklahoma state Endangered Species lists (Campbell 1995, ODWC 2008) , national bird conservation plans (landbird [Rich et al. 2004], waterfowl [North American Waterfowl Management Plan Committee 2004], waterbird [Kuslan et al. 2002], and shorebird [Brown et al. 2001]), National Audubon Society's Watchlist (2007) and the US Fish and Wildlife Service's species of conservation concern (USFWS 2008).

			Texas		Oklahoma			PIF Landbird									
Species	OK state wildlife plan	TX state wildlife plan*	Endangered	Threatened	Endangered	Threatened	Species of Special Concern	Continental Concern	Regional Concern	Regional Stewardship	Breeding Waterfowl	Nonbreeding Waterfowl	Breeding Waterbird	Nonbreeding Waterbird	Shorebird	Audubon Red List	Audubon Yellow List
Greater White-fronted Goose												X					
Snow Goose (Lesser)												X					
Canada Goose												X					
Trumpeter Swan	X																X
Wood Duck											X	X					
Gadwall												X					
American Wigeon												X					
Mallard												X					
Mottled Duck											X	X				X	
Blue-winged Teal												X					
Northern Shoveler												X					
Northern Pintail	X	H										X					
Green-winged Teal												X					
Canvasback	X	L										X					
Redhead		M										X					
Ring-necked Duck												X					
Lesser Scaup	X	M										X					
Bufflehead												X					
Common Goldeneye												X					
Greater Prairie-Chicken	X							X	X							X	
Scaled Quail		L															X
Northern Bobwhite	X	H							X								
Least Grebe													X				
Horned Grebe		L															
Eared Grebe		L															

Appendix 2: (Cont., Oaks and Prairies BCR)

Species	OK SWP	TX SWP	TX-E	TX-Th	OK-E	OK-Th	OK-SC	PIF-CC	PIF-RC	PIF-RS	BWF	NBWF	BWB	NBWB	SB	ARL	AYL
American White Pelican		L												X			
American Bittern		L												H			
Least Bittern		L											X				
Great Blue Heron													X				
Great Egret													X				
Snowy Egret	X	L											X				
Little Blue Heron #	X	H											H				
Tricolored Heron		L															
Green Heron													X				
Yellow-crowned Night-Heron		L															
White Ibis													X				
White-faced Ibis		M		X													
Roseate Spoonbill		L															
Wood Stork		M												H			
Swallow-tailed Kite		M						X	X								X
White-tailed Kite		L															
Mississippi Kite		L															
Golden Eagle		H															
Bald Eagle	X	M		X													
Northern Harrier		H															
Red-shouldered Hawk		L															
Swainson's Hawk	X	M					X	X									X
Ferruginous Hawk	X						X										
American Kestrel (Southeastern)		H															
Merlin		L															
(Arctic) ***Peregrine Falcon***	X	L	X	X			X										
Prairie Falcon	X																
Black Rail	X													H		X	
Yellow Rail	X	M												H		X	
King Rail	X	H											H				X
Virginia Rail		L												X			
Sora														X			
Purple Gallinule		L											H				
Common Moorhen													X				
American Coot														H			
Sandhill Crane	X																
Whooping Crane	X		X		X									X		X	

Appendix 2: (Cont., Oaks and Prairies BCR)

Species	OK SWP	TX SWP	TX-E	TX-Th	OK-E	OK-Th	OK-SC	PIF-CC	PIF-RC	PIF-RS	BWF	NBWF	BWB	NBWB	SB	ARL	AYL
Black-bellied Plover															m		
American Golden-Plover	X	L													M		X
Snowy Plover	X	H					X								B,M		X
Semi-palmated Plover															M		
Piping Plover	X	L		X		X									B,m	X	
Killdeer															B,M,W		
Mountain Plover		H					X								B,M,w	X	
Black-necked Stilt		L													B,M		
American Avocet		M													b,M,w		
Solitary Sandpiper	X	L													m		
Greater Yellowlegs		L													M		
Lesser Yellowlegs		L													M		
Willet															B,M,w		
Spotted Sandpiper															B,M,w		
Eskimo Curlew															M		
Whimbrel		L													M		
Upland Sandpiper	X	L													B,M		
Long-billed Curlew	X	H					X								B,M		
Hudsonian Godwit	X	L													M		X
Marbled Godwit		L													m		X
Ruddy Turnstone															m		
Red Knot		M															X
Sanderling															m		
Semipalmated Sandpiper															M		X
Western Sandpiper	X	L													M		
Least Sandpiper															M,W		
White-rumped Sandpiper															M		
Baird's Sandpiper	X														M		
Pectoral Sandpiper															M		
Dunlin															m		
Stilt Sandpiper		L													M		
Buff-breasted Sandpiper	X	H													M		
Short-billed Dowitcher		M													m		
Long-billed Dowitcher															M,W		
Wilson's Snipe		L													b,M,W		
American Woodcock	X	L													B,W		
Wilson's Phalarope	X	L													B,M		
Red Necked Phalarope															m		
Franklin's Gull														H			
Least Tern	X	L											H			X	
Interior Least Tern	X	H	X										H			X	
Common Tern														X			
Forster's Tern		L															
Mourning Dove		L															

Appendix 2: (Cont., Oaks and Prairies BCR)

Species	OK SWP	TX SWP	TX-E	TX-Th	OK-E	OK-Th	OK-SC	PIF-CC	PIF-RC	PIF-RS	BWF	NBWF	BWB	NBWB	SB	ARL	AYL
Inca Dove										X							
Yellow-billed Cuckoo		L							X								
Barn Owl	X						X										
Burrowing Owl	X	H					X										
Short-eared Owl	X	M															X
Common Nighthawk		L							X								
Chuck-will's-widow		M															
Chimney Swift		L							X								
Red-headed Woodpecker	X	M						X	X								X
Golden-fronted Woodpecker		L															
Ladder-backed Woodpecker		L															
Hairy Woodpecker		M															
Pileated Woodpecker		L															
Eastern Wood-Pewee		L															
Acadian Flycatcher		L															
Great Crested Flycatcher		L							X								
Eastern Kingbird		L															
Scissor-tailed Flycatcher		L							X								
Loggerhead Shrike	X	M					X		X								
Bell's Vireo	X	L					X	X	X							X	
Black-capped Vireo	X		X					X	X							X	
Yellow-throated Vireo		L															
Warbling Vireo		L															
Horned Lark		M															
Purple Martin										X							
Carolina Chickadee										X							
Black-crested Titmouse		L															
Canyon Wren		L															
Bewick's Wren		M															
Sedge Wren		L															
Wood Thrush	X	L															X
Brown Thrasher		L															
Sprague's Pipit	X	H															
Blue-winged Warbler		L															X
Golden-winged Warbler		H														X	
Yellow Warbler									X								
Golden-cheeked Warbler			X					X	X							X	
Yellow-throated Warbler		L															
Prairie Warbler	X	M															X
Cerulean Warbler		H															X

Appendix 2: (Cont., Oaks and Prairies BCR)

Species	OK SWP	TX SWP	TX-E	TX-Th	OK-E	OK-Th	OK-SC	PIF-CC	PIF-RC	PIF-RS	BWF	NBWF	BWB	NBWB	SB	ARL	AYL
Prothonotary Warbler	X	M						X									X
Worm-eating Warbler		H															
Swainson's Warbler		H						X	X								X
Louisiana Waterthrush	X	H															
Kentucky Warbler	X	H						X									X
Hooded Warbler	X	L															
Summer Tanager									X								
Cassin's Sparrow		M							X								
Bachman's Sparrow							X									X	
Rufous-crowned Sparrow		L															
Field Sparrow		L							X								
Lark Sparrow		L							X								
Black-throated Sparrow		L															
Grasshopper Sparrow		L															
Baird's sparrow		M															
Henslow's Sparrow	X	L														X	
Le Conte's Sparrow	X	M															X
Nelson's Sharp-tailed Sparrow	X																X
Harris's Sparrow	X	L															
McCown's Longspur		L															
Smith's Longspur	X	M															X
Chestnut-collared Longspur	X																X
Painted Bunting	X	M						X	X	X							X
Dickcissel		L						X		X							
Eastern Meadowlark		H							X	X							
Western Meadowlark		L															
Rusty Blackbird	X																
Orchard Oriole		M															
Bullock's Oriole									X								
Baltimore Oriole									X								
151	54	115	5	4	1	1	11	12	23	6	2	18	7	5	37	15	25
		H=21															
		M=26															
		L=68															

*For the Texas Comprehensive Wildlife Conservation Strategy H= high priority, M = Medium, L = low, L = low and the species is not on any other lists.

$Shorebirds are for the Central Plains/Playa Lakes region. Upper case = high priority, B = Breeding, M = Migration, W = Wintering

#Species in ***bold Italics*** represent US Fish and Wildlife Service's species of conservation concern (USFWS 2008).

Appendix 3. Landbird species identified in the Partners in Flight process as Continental or Regional concern and Stewardship species in the Oaks and Prairies Bird Conservation Region (BCR 21) and the Edwards Plateau BCR (20) of the Oaks and Prairies Joint venture. Species in Bold are showing significant population declines as measured by the BBS in at least one of the BCRs.

			Oaks and Prairies JV			Breeding Bird Survey Results: Oaks and Prairies BCR (21)		Breeding Bird Survey Results: Edwards Plateau BCR (20)		Oaks and Prairies BCR (21)		Edwards Plateau BCR (20)		Conservation Priority * see below for codes				
Species	Responsibility	Declining Population (Significant)	Estimated Population	% of Global pop.	BCR	trend	p	trend	p	Population Estimate	% of Global pop.	Population Estimate	% of Global pop.	CC	RC	CS	RS	Act.
Golden-cheeked Warbler	High	**Declining**	21,000	100.0		-	-	-	-	?	0.0	?	100.0	O/E	O/E	E	E	CR
Black-capped Vireo	High	**Declining**	6,269	45.2		-	-	-	-	2,495	26.4	3,515	18.8	O/E	O/E	E	E	CR
Bell's Vireo	High	**Declining**	330,000	19.3	Both	-13.8	0.00	0.2	NS	30,000	2.0	300,000	17.3	O/E	O/E		E	MA
Rufous-crowned Sparrow	High	**Declining**	230,000	11.8	Both	-8.5	NS	-3.6	0.00	30,000	1.4	200,000	10.4		E		E	MA
Lark Sparrow	High	**Declining**	1,170,000	11.8	Both	-4.5	0.00	-4.2	0.00	630,000	6.4	540,000	5.4		O/E		E	MA
Northern Bobwhite	High	**Declining**	820,000	8.8	Both	-3.1	0.00	-3.0	0.00	660,000	7.1	160,000	1.7		O/E		O	MA
Eastern Meadowlark	High	**Declining**	930,000	9.2	Both	-2.5	0.01	-1.4	NS	860,000	8.5	70,000	0.7		O		O	MA
Common Nighthawk	High	**Declining**	910,000	8.5	Both	-2.3	0.08	-1.4	NS	800,000	7.5	110,000	1.0		O		O	MA
Yellow-billed Cuckoo	High	**Declining**	1,270,000	13.6	Both	-2.2	0.00	-1.2	NS	970,000	10.6	300,000	3.0		O/E		O	MA
Ladder-backed Woodpecker	High	**Declining**	180,000	8.3	Both	-1.7	NS	-4.0	0.00	80,000	3.7	100,000	4.6					
Scissor-tailed Flycatcher	High	**Declining**	2,500,000	32.3	Both	-1.6	0.00	0.4	NS	2,200,000	28.3	300,000	4.0		O		O	MA
Northern Mockingbird	High	**Declining**	5,500,000	12.2	Both	-1.4	0.00	-0.9	NS	4,200,000	9.3	1,300,000	2.9					
Field Sparrow	High	Declining	730,000	8.4	Both	-3.3	NS	-1.5	NS	430,000	5.2	300,000	3.2		O/E			MA
Common Ground-Dove	High		210,000	9.1	Both	-1.6	NS	11.5	NS	180,000	7.9	30,000	1.2					
Golden-fronted Woodpecker	High		170,000	9.9	Both	-0.7	NS	2.3	NS	100,000	6.0	70,000	3.9					
Painted Bunting	High	Declining	1,700,000	39.0	Both	-0.5	NS	-1.1	NS	1,200,000	27.4	500,000	11.6	O/E	O/E		O/E	MA
Carolina Chickadee	High		2,400,000	13.5	Both	-0.3	NS	1.2	NS	2,200,000	12.2	200,000	1.3				O	PR
Bewick's Wren	High		1,300,000	21.0	Both	-0.2	NS	0.1	NS	500,000	8.0	800,000	13.0				E	PR
Dickcissel	High	Declining	1,970,000	8.8	Both	-0.1	NS	-1.7	NS	1,900,000	8.5	70,000	0.3	O/E	E	O	O	PR
Black-chinned Hummingbird	High		390,000	21.1	Both	0.2	NS	0.4	NS	190,000	9.9	200,000	11.2				E	PR
Chuck-will's-widow	High		1,500,000	9.9	Both	0.3	NS	2.9	NS	1,000,000	6.5	500,000	3.4					
Greater Roadrunner	High		100,000	8.5	Both	0.5	NS	1.0	NS	70,000	6.2	30,000	2.3		O		O	MA
Black-crested Titmouse	High		590,000	58.3	Both	1.0	0.04	0.6	NS	90,000	8.5	500,000	49.8			E	E	PR
Northern Cardinal	High		11,100,000	10.6	Both	1.2	0.00	0.5	NS	8,900,000	8.5	2,200,000	2.1					
Inca Dove	High		250,000	12.9	Both	5.8	NS	3.4	NS	180,000	9.3	70,000	3.6				O	PR

Common Poorwill	High		300,000	10.9	Both	5.9	NS	-6.6	NS	200,000	7.5	100,000	3.4			
Wild Turkey	High		130,000	9.2	Both	7.5	0.01	2.2	0.43	70,000	4.9	60,000	4.3			
Loggerhead Shrike	Medium	**Declining**	209,000	5.1	Both	-5.2	0.00	0.9	NS	190,000	4.6	19,000	0.5	O		IM
Mourning Dove	Medium	**Declining**	5,700,000	4.3	Both	-1.1	0.01	-2.0	0.01	4,400,000	3.3	1,300,000	1.0			
Chimney Swift	Medium	**Declining**	550,000	3.7	Both	-2.9	0.00	-2.5	0.04	500,000	3.3	50,000	0.4	O		MA
Brown-headed Cowbird	Medium	**Declining**	1,700,000	3.1	Both	-2.8	0.00	-1.3	NS	1,300,000	2.3	400,000	0.8			
Purple Martin	Medium		870,000	7.7	Both	0.4	NS	2.6	0.06	800,000	7.0	70,000	0.7		O	PR
Eastern Screech-Owl	Medium		56,000	7.3	Both					40,000	5.2	16,000	2.1			
Barred Owl	Medium		41,300	7.3	Both					40,000	7.1	1,300	0.2			
Eastern Bluebird	Medium		720,000	7.0	Both					660,000	6.4	60,000	0.6			
Long-billed Thrasher	Medium		31,600	6.9	Both					30,000	6.5	1,600	0.4			
Red-shouldered Hawk	Medium		49,000	6.1	Both					40,000	5.0	9,000	1.1			
White-eyed Vireo	Medium		940,000	5.5	Both					800,000	4.6	140,000	0.9			
Ruby-throated Hummingbird	Medium		380,000	5.3	21					380,000	5.3	-	0.0			
Tufted Titmouse	Medium		614,000	5.2	Both					610,000	5.2	4,000	0.0			
Turkey Vulture	Medium		230,000	5.1	Both					140,000	3.1	90,000	2.0			
Lesser Goldfinch	Medium		157,000	5.0	Both					7,000	0.2	150,000	4.8			
Blue-gray Gnatcatcher	Medium		2,500,000	4.5	Both					1,900,000	3.4	600,000	1.1			
Mississippi Kite	Medium		8,000	4.3	21					8,000	4.3	-	0.0			
Cliff Swallow	Medium		3,400,000	4.1	Both					3,000,000	3.7	400,000	0.4			
Carolina Wren	Medium		710,000	4.1	Both					600,000	3.4	110,000	0.7			
Summer Tanager	Medium		158,000	4.0	Both	-2.2	NS	1.0	NS	48,000	1.2	110,000	2.8	O		MA
Red-bellied Woodpecker	Medium		424,000	4.0	Both					420,000	4.0	4,000	0.0			
Canyon Wren	Medium		20,400	3.8	Both	-1.5	NS	-7.0	NS	400	0.1	20,000	3.7	E		MA
Cave Swallow	Medium		260,000	3.6	Both					160,000	2.2	100,000	1.4			
Eastern Phoebe	Medium		530,000	3.3	Both					370,000	2.3	160,000	1.0			
Vermilion Flycatcher	Medium		61,500	3.3	Both					1,500	0.1	60,000	3.2			
American Crow	Medium		991,000	3.2	Both					980,000	3.2	11,000	0.0			
Cooper's Hawk	Medium		18,000	3.2	Both					11,000	2.0	7,000	1.2			
Downy Woodpecker	Medium		401,400	3.0	Both					400,000	3.0	1,400	0.0			
Ash-throated Flycatcher	Medium		250,000	3.0	Both					50,000	0.5	200,000	2.5			
Great Crested Flycatcher	Medium		214,000	2.9	Both	-1.9	NS	1.8	NS	200,000	2.7	14,000	0.2	O		MA
Blue Grosbeak	Medium		220,000	2.9	Both					120,000	1.6	100,000	1.3			
Olive Sparrow	Medium		57,000	2.8	Both					40,000	2.0	17,000	0.8			
Great-tailed Grackle	Medium		830,000	2.7	Both					800,000	2.6	30,000	0.1			
Canyon Towhee	Medium		168,000	2.6	Both					8,000	0.1	160,000	2.5			
Red-tailed Hawk	Medium		59,000	2.6	Both					50,000	2.2	9,000	0.4			

Common Grackle	Medium		2,180,000	2.2	Both					2,100,000	2.1	80,000	0.1			
Western Scrub-Jay	Medium		70,000	2.2	20					-	0.0	70,000	2.2			
Louisiana Waterthrush	Medium		6,000	2.2	21					6,000	2.2	-	0.0			
Blue Jay	Medium		450,000	2.0	Both					430,000	1.9	20,000	0.1			
Scott's Oriole	Low		30,000	1.9	20					-	0.0	30,000	1.9			
Verdin	Low		160,000	1.8	Both					60,000	0.6	100,000	1.2			
Cassin's Sparrow	Low		320,000	1.7	Both	-0.8	NS	-3.6	NS	190,000	1.0	130,000	0.7		O/E	MA
Eastern Wood-Pewee	Low		101,000	1.7	Both					61,000	1.0	40,000	0.7			
Curve-billed Thrasher	Low		35,000	1.6	Both					30,000	1.4	5,000	0.2			
Broad-winged Hawk	Low		24,000	1.6	Both					20,000	1.4	4,000	0.2			
Great Horned Owl	Low		80,000	1.5	Both					50,000	1.0	30,000	0.5			
Orchard Oriole	Low	**Declining**	61,000	1.4	Both	-10.6	0.00	-6.8	0.00	11,000	0.3	50,000	1.1		E	MA
Yellow-breasted Chat	Low	**Declining**	170,000	1.4	Both	-13.8	0.01	6.1	0.06	10,000	0.1	160,000	1.3			
Cactus Wren	Low	**Declining**	120,000	1.4	Both	-4.9	0.04	-0.1	NS	60,000	0.7	60,000	0.7			
Grasshopper Sparrow	Low		210,000	1.4	Both					170,000	1.1	40,000	0.3			
Indigo Bunting	Low		371,000	1.3	Both					360,000	1.3	11,000	0.0			
Northern Rough-winged Swallow	Low		182,000	1.2	Both					170,000	1.1	12,000	0.1			
White-breasted Nuthatch	Low		120,000	1.2	21					120,000	1.2	-	0.0			
Yellow-throated Vireo	Low		17,000	1.2	Both					5,000	0.4	12,000	0.8			
Swainson's Hawk	Low		5,200	1.1	Both	1.3	NS	-6.0	NS	5,000	1.1	200	0.0	O		PR
Swainson's Warbler	Low		900	1.1	21	58.2	NS			900	1.1	-	0.0	O	O	MA
Belted Kingfisher	Low	**Declining**	23,000	1.1	Both	-1.9	NS	-6.8	0.01	19,000	0.9	4,000	0.2			
Bullock's Oriole	Low	**Declining**	41,000	1.0	Both	-6.1	0.00	-3.8	NS	30,000	0.7	11,000	0.3		O	MA
Pyrrhuloxia	Low		70,000	1.0	Both					30,000	0.4	40,000	0.6			
Bronzed Cowbird	Low		50,000	1.0	Both					40,000	0.8	10,000	0.2			
Bushtit	Low		44,000	1.0	Both					4,000	0.1	40,000	0.9			
Yellow-throated Warbler	Low		15,000	1.0	Both					1,000	0.1	14,000	0.9			
Barn Swallow	Low		1,720,000	0.9	Both					1,600,000	0.8	120,000	0.1			
Western Kingbird	Low		170,000	0.9	Both					150,000	0.8	20,000	0.1			
Crested Caracara	Low		18,800	0.9	Both					18,000	0.9	800	0.0			
Eastern Kingbird	Low		110,900	0.8	Both					110,000	0.8	900	0.0			
Red-winged Blackbird	Low	**Declining**	1,460,000	0.7	Both	-3.0	0.01	-2.8	0.00	1,400,000	0.7	60,000	0.0			
House Finch	Low		146,000	0.7	Both					16,000	0.1	130,000	0.6			
Brown Thrasher	Low	**Declining**	44,000	0.6	21	-1.8	0.04	41.4	NS	44,000	0.6	-	0.0			
Brown-crested Flycatcher	Low		51,200	0.6	Both					50,000	0.6	1,200	0.0			
Northern Parula	Low		41,400	0.6	Both					40,000	0.6	1,400	0.0			
White-tailed Kite	Low		300	0.6	21					300	0.6	-	0.0			

Prothonotary Warbler	Low		9,000	0.5	21	2.7	NS			9,000	0.5	-	0.0	O		PR
Red-headed Woodpecker	Low	**Declining**	12,000	0.5	21	-10.5	0.00			12,000	0.5	-	0.0	O	O	MA
Acadian Flycatcher	Low		25,000	0.5	Both					19,000	0.4	6,000	0.1			
Couch's Kingbird	Low		9,000	0.5	21					9,000	0.5	-	0.0			
Harris's Hawk	Low		1,400	0.4	Both	?		?		600	0.2	800	0.2		E	MA
Kentucky Warbler	Low		4,000	0.4	21	0.2	NS			4,000	0.4	-	0.0	O		MA
Black-throated Sparrow	Low	**Declining**	94,000	0.4	Both	-8.8	0.02	-10.6	0.00	4,000	0.0	90,000	0.4			
White-winged Dove	Low		80,000	0.4	Both					40,000	0.2	40,000	0.2			
Black Vulture	Low		70,000	0.4	Both					60,000	0.3	10,000	0.1			
Pileated Woodpecker	Low		4,000	0.4	21					4,000	0.4	-	0.0			
Whip-poor-will	Low		5,000	0.3	21					5,000	0.3	-	0.0			
Scaled Quail	Low		2,300	0.2	Both	?		?		300	0.0	2,000	0.2	E		PR
Gray Vireo	Low		800	0.2	20			?		-	0.0	800	0.2	E		PR
Baltimore Oriole	Low		13,000	0.2	21	-2.3	NS			13,000	0.2	-	0.0		O	MA
Varied Bunting	Low		1,600	0.2	20					-	0.0	1,600	0.2			
Chipping Sparrow	Low		190,000	0.2	Both					20,000	0.0	170,000	0.2			
Black-and-white Warbler	Low		26,000	0.2	Both					18,000	0.1	8,000	0.1			
Pine Warbler	Low		18,000	0.2	21					18,000	0.2	-	0.0			
Lesser Nighthawk	Low		16,000	0.2	Both					14,000	0.2	2,000	0.0			
Hairy Woodpecker	Low		16,000	0.2	21					16,000	0.2	-	0.0			
Barn Owl	Low		11,000	0.2	21					11,000	0.2	-	0.0			
Chihuahuan Raven	Low		1,840	0.2	Both					40	0.0	1,800	0.2			
Sharp-shinned Hawk	Low		1,600	0.2	Both					800	0.1	800	0.1			
Hooded Oriole	Low		1,300	0.2	Both					200	0.0	1,100	0.2			
Northern Flicker	Low	**Declining**	14,000	0.1	21	-13.4	0.00			14,000	0.1	-	0.0			
House Sparrow	Low	**Declining**	1,790,000	0.1	Both	-3.6	0.00	-4.5	0.00	1,600,000	0.1	190,000	0.0			
European Starling	Low		1,630,000	0.1	Both					1,600,000	0.1	30,000	0.0			
American Robin	Low		400,000	0.1	21					400,000	0.1	-	0.0			
Red-eyed Vireo	Low		160,000	0.1	Both					120,000	0.1	40,000	0.0			
American Goldfinch	Low		27,200	0.1	Both					27,000	0.1	200	0.0			
Gray Catbird	Low		5,500	0.1	Both					5,000	0.1	500	0.0			
American Kestrel	Low		4,000	0.1	21					4,000	0.1	-	0.0			
Groove-billed Ani	Low		3,000	0.1	21					3,000	0.1	-	0.0			
Green Jay	Low		2,000	0.1	21					2,000	0.1	-	0.0			
Plumbeous Vireo	Low		1,400	0.1	21					1,400	0.1	-	0.0			
Northern Harrier	Low		960	0.1	Both					900	0.1	60	0.0			
Fish Crow	Low		900	0.1	21					900	0.1	-	0.0			

Prairie Warbler	Low	700	0.1	21		700	0.1	-	0.0			
Greater Prairie Chicken	Low		0.0							O	O	CR
Swallow-tailed Kite	Low		0.0							O	O	CR
Montezuma quail	Low	1,500	0.0							E	E	IM
Yellow Warbler	Low	1,400	0.0	21	-26.0 NS	1,400	0.0	-	0.0		O/E	CR
Common Yellowthroat	Low	13,000	0.0	21	2.3 NS	13,000	0.0	-	0.0		E	CR
Rock Pigeon	Low	416,000	0.0	Both		400,000	0.0	16,000	0.0			
Horned Lark	Low	54,000	0.0	Both		50,000	0.0	4,000	0.0			
Western Meadowlark	Low	14,190	0.0	Both		14,000	0.0	190	0.0			
Bank Swallow	Low	12,000	0.0	21		12,000	0.0	-	0.0			
House Wren	Low	5,000	0.0	21		5,000	0.0	-	0.0			
Rock Wren	Low	2,400	0.0	Both		700	0.0	1,700	0.0			
Common Raven	Low	1,700	0.0	20		-	0.0	1,700	0.0			
Common Pauraque	Low	1,600	0.0	21		1,600	0.0	-	0.0			
Warbling Vireo	Low	1,600	0.0	21		1,600	0.0	-	0.0			
Hooded Warbler	Low	1,100	0.0	21		1,100	0.0	-	0.0			
Black-tailed Gnatcatcher	Low	1,000	0.0	20		-	0.0	1,000	0.0			
Cassin's Kingbird	Low	700	0.0	21		700	0.0	-	0.0			
Scarlet Tanager	Low	500	0.0	21		500	0.0	-	0.0			
Brown-headed Nuthatch	Low	300	0.0	21		300	0.0	-	0.0			
Eastern Towhee	Low	300	0.0	21		300	0.0	-	0.0			
Wood Thrush	Low	300	0.0	21		300	0.0	-	0.0			
Zone-tailed Hawk	Low	300	0.0	20		-	0.0	300	0.0			
Eurasian Collared-Dove	Low	160	0.0	21		160	0.0	-	0.0			
Burrowing Owl	Low	130	0.0	21		130	0.0	-	0.0			
Osprey	Low	130	0.0	21		130	0.0	-	0.0			
White-tailed Hawk	Low	110	0.0	21		110	0.0	-	0.0			

***Act:** Action code indicating the type of conservation action most needed for improving or maintaining current population status of each species. CR= Critical Recovery; IM=Immediate Management; MA= Management Attention; PR= Planning and Responsibility. For more information on Action Codes, please see the Partners in Flight Handbook on Species Assessment, version 2005.

CC: Continental Concern species (O= Oaks and Prairies BCR, E=Edwards Plateau BCR, O/E= Both BCRs, blank=no). Species must meet all of the following criteria in order to rank as Continental Concern within a given BCR:

Listed on Watch List in PIF North American Landbird Plan (Rich et al. 2004)
Occur regularly in significant numbers in the BCR, i.e. RD > 1

Future conditions are not enhanced by human activities, i.e. Threat score > 1

RC: Regional Concern species (O= Oaks and Prairies BCR, E=Edwards Plateau BCR, O/E= Both BCRs, blank=no). Species must meet all of the following criteria in the season(s) for which it is listed in order to rank as Regional Concern species within a given BCR:

Regional Combined Score > 13
High Regional Threats (> 3) or Moderate Regional Threat (3) combined with significant population decline (PT > 3)
Occurs regularly in significant numbers in the BCR, i.e. RD > 1

CS: Continental Stewardship Species (O= Oaks and Prairies BCR, E=Edwards Plateau BCR, O/E= Both BCRs, blank=no). Continental Stewardship Species are those that have a high proportion of their global population or range within one of the seven 'Avifaunal Biomes' identified by Rich et al. (2004). In order for Continental Stewardship Species to merit attention within a given BCR, they must meet all of the following criteria:

Listed as a Stewardship Species in PIF North American Plan (Rich et al. 2004)
High importance of the BCR to the species; i.e., Pct_POP ≥ 25% OR (RD=5 and Pct_POP ≥ 5%)
Future conditions are not enhanced by human activities, i.e. Threat Score > 1

RS: Regional Stewardship species (O= Oaks and Prairies BCR, E=Edwards Plateau BCR, O/E= Both BCRs, blank=no). Species must meet all criteria in the season(s) for which it is listed in order to rank as Regional Stewardship species within a given BCR:

Regional Combined Score > 13
High importance of the BCR to the species; Pct_POP ≥ 25% OR (RD = 5 and Pct_POP ≥ 5%)
Future conditions are not enhanced by human activities, i.e. Threat Score > 1

Citations

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Appendix 4: Edwards Plateau BCR priority bird species by habitat and a summary of Partners in Flight (PIF) ranking including estimated percent of the world population, PIF priority score (0-25), Continetial Concern (CC), Regional Concern (RC), Continential Stewadship (CS), Regional Stewardship (RS) and PIF Action codes (Panjabi et al. 2005).

Habitat or Species	Breeding	Wintering	% of Pop	PIF Score	CC	RC	CS	RS	PIF Action*
HIGHEST PRIORITY HABITATS									
Ashe Juniper – Oak Woodland (Closed canopy)									
Golden-cheeked Warbler	x		100	25	Y	Y	Y	Y	Critical Recovery
Black-crested Titmouse	x	x	50	17	-	-	Y	Y	Planning and Responsibility
Ladder-backed Woodpecker	x	x	5	17	-	-	-	-	-
Savanna Mosaic									
Painted Bunting	x		12	21	Y	Y	-	Y	Immediate Management
Rufous-crowned Sparrow	x	x	10	19	-	Y	-	Y	Management Attention
Ladder-backed Woodpecker	x	x	5	17	-	-	-	-	-
Lark Sparrow	x	x	5	16	-	Y	-	Y	Management Attention
Wild Turkey	x	x	4	17	-	-	-	-	-
Scissor-tailed Flycatcher	x		4	15	-	-	-	-	-
Golden-fronted Woodpecker	x	x	4	13	-	-	-	-	-
Field Sparrow	x	x	3	17	-	Y	-	-	Management Attention
Northern Bobwhite	x	x	2	17	-	Y	-	-	Management Attention
Montezuma Quail	x	x	0	18	Y	Y	-	-	Immediate Management
Harris's Hawk	x	x	0	14	-	Y	-	-	Management Attention
Grassland/Shrubland Mosaic (disturbance dependent in the east, generally no large trees)									
Black-capped Vireo	x		42	25	Y	Y	Y	Y	Critical Recovery
Bell's Vireo	x		17	18	Y	Y	-	Y	Management Attention
Bewick's Wren	x	x	13	15	-	-	-	Y	Planning and Responsibility
Painted Bunting	x		12	21	Y	Y	-	Y	Immediate Management
Rufus-crowned Sparrow	x	x	10	19	-	Y	-	Y	Management Attention
Field Sparrow	x	x	3	17	-	Y	-	-	Management Attention
Common Poorwill	x	x	3	15	-	-	-	-	-
Northern Bobwhite	x	x	2	17	-	Y	-	-	Management Attention
Cassin's Sparrow	x	x	1	15	-	Y	-	-	Management Attention
Scaled Quail	x	x	0	14	Y	-	-	-	Planning and Responsibility
Loggerhead Shrike	x	x	0	13	-	-	-	-	-

Appendix 4 (Continued): Edwards Plateau Priority Bird Species by habitat

Habitat or Species	Breeding	Wintering	% of Pop	PIF Score	CC*	RC	CS	RS	PIF Action
MEDIUM PRIORITY HABITATS									
Riparian Woodland, Canyons, and Other Wetlands									
Black-chinned Hummingbird	x		11	16	-	-	-	Y	Planning and Responsibility
Wild Turkey	x	x	4	17	-	-	-	-	-
Green Heron	x			-	-	-	-	-	-
Canyon Wren	x		4	17	-	Y	-	-	Management Attention
Yellow-billed Cuckoo	x		3	15	-	Y	-	-	Management Attention
Yellow-throated Warbler	x		1	15	-	-	-	-	-
Red-shouldered hawk	x	x	1	13	-	-	-	-	-
Orchard Oriole	x		1	17	-	Y	-	-	Management Attention
Louisiana Waterthrush	x		0	14	-	-	-	-	-
Green Kingfisher	x	x	0	10	-	-	-	-	-
American Woodcock		x		WINTER					
Grassland									
Northern Bobwhite	x	x	2	17	-	Y	-	-	Management Attention
Eastern Meadowlark	x	x	1	13	-	-	-	-	-
Grasshopper Sparrow	x	x	0	11	-	-	-	-	-
Dickcissel	x		0	14	Y	Y	-	-	Management Attention
Northern Harrier		x		WINTER					
Chestnut-collared Longspurs		x		WINTER					
LOWEST PRIORITY HABITATS									
Pasture, Agricultural									
Mountain Plover		x		WINTER					
Residential and Suburban									
Bewick's Wren	x	x	13	15	-	-	-	Y	Planning and Responsibility
Black-chinned Hummingbird	x		11	16	-	-	-	Y	Planning and Responsibility
Inca Dove	x	x	4	14	-	-	-	-	-
Chimney Swift	x		0	13	-	-	-	-	-

*PIF Action: Partners in Flight Action code indicating the type of conservation action most needed for improving or maintaining current population status.

Appendix 5: Oaks and Prairies BCR priority bird species by habitat and a summary of Partners in Flight (PIF) ranking information including estimated percent of the world population, PIF priority score (0-25), Continetial Concern (CC), Regional Concern (RC), Continential Stewadship (CS), Regional Stewardship (RS) and PIF Action codes (Panjabi et al. 2005).

Priority Habitat Types	Species	Breeding	Wintering	% of Pop.	PIF Score	CC	RC	CS	RS	PIF Action*
HIGHEST PRIORITY										
Native grasslands										
	Attwater's Greater Prairie-Chicken#	x	x	100	20	Y	Y	-	-	Critical Recovery
	(Interior) Greater Prairie-Chicken#	x	x	?	20	Y	Y	-	-	Critical Recovery
	Eastern Meadowlark	x	x	8	16	-	Y	-	Y	Management Attention
	Dickcissel	x		8	15	Y	-	Y	Y	Planning and Responsibility
	Northern Bobwhite	x	x	7	17	-	Y	-	Y	Management Attention
	Swainson's Hawk		x	1	13	Y	-	-	-	Planning and Responsibility
	Grasshopper Sparrow	x	x	1	13	-	-	-	-	-
	Burrowing Owl		x			-	-	-	-	-
	Killdeer	x	x			-	-	-	-	-
	Upland Sandpiper	(x)				-	-	-	-	-
	Northern Harrier	?	x			-	-	-	-	-
	Short-eared Owl		x			-	-	-	-	-
	Sedge Wren	x	x			-	-	-	-	-
	Sprague's Pipit		x			-	-	-	-	-
	Henslow's Sparrow	(x)	x			-	-	-	-	-
	Le Conte's Sparrow		x			-	-	-	-	-
	Smith's Longspur		x			-	-	-	-	-
	McCown's Longspur		x			-	-	-	-	-
Native oak savanna (5-30% tree canopy cover with grass/forb understory)										
	Scissor-tailed Flycatcher	x		28	18	-	Y	-	Y	Management Attention
	Painted Bunting	x		27	20	Y	Y	-	Y	Management Attention
	Black-chinned Hummingbird	x		10	12	-	-	-	-	-

Bewick's Wren	x	x	8	13	-	-	-	-	-
Northern Bobwhite	x	x	7	17	-	Y	-	Y	Management Attention
Chuck-will's-widow	x		6	14	-	-	-	-	-
Eastern Bluebird	x	x	6	11	-	-	-	-	-
Loggerhead Shrike	x	x	5	16	-	Y	-	-	Immediate Management
Field Sparrow	x	x	5	16	-	Y	-	-	Management Attention
Mississippi Kite	x		4	14	-	-	-	-	-
Great Crested Flycatcher	x		3	15	-	Y	-	-	Management Attention
Bell's Vireo	x		2	17	Y	Y	-	-	Immediate Management
Red-headed Woodpecker	x	x	0	15	Y	Y	-	-	Management Attention
Orchard Oriole	x		0	14	-	-	-	-	-
Bachman's Sparrow	x	x			-	-	-	-	-
Harris's Sparrow		x			-	-	-	-	-
Wintering Sparrows and allies		x			-	-	-	-	-

Bottomland hardwood forests, sand bars, and riparian corridors

Carolina Chickadee	x	x	12	16	-	-	-	Y	Planning and Responsibility
Yellow-billed Cuckoo	x		11	15	-	Y	-	Y	Management Attention
Chuck-will's-widow	x		6	14	-	-	-	-	-
Wild Turkey	x	x	5	12	-	-	-	-	-
Red-shouldered Hawk	x	x	5	13	-	-	-	-	-
Mississippi Kite	x		4	14	-	-	-	-	-
Great Crested Flycatcher	x		3	15	-	Y	-	-	Management Attention
Blue-gray Gnatcatcher	x	(X)	3	10	-	-	-	-	-
Bell's Vireo	x		2	17	Y	Y	-	-	Immediate Management
Louisiana Waterthrush	x		2	15	-	-	-	-	-
Swainson's Warbler	x		1	17	Y	Y	-	-	Management Attention
Summer Tanager	x		1	15	-	Y	-	-	Management Attention
Swallow-tailed Kite	x		0	19	Y	Y	-	-	Critical Recovery
Red-headed Woodpecker	x		0	15	Y	Y	-	-	Management Attention
Prothonotary Warbler	x		0	14	Y	-	-	-	Planning and Responsibility

Kentucky Warbler	x		0	14	Y	-	-	-	Planning and Responsibility
Wood Thrush	x		0	11	-	-	-	-	-
Pileated Woodpecker	x	x	0	10	-	-	-	-	-
Bald Eagle	x	x	0	13	-	-	-	-	-
American Woodcock	x	x			-	-	-	-	-
Worm-eating Warbler	x				-	-	-	-	-
Rusty Blackbird		x			-	-	-	-	-
(Interior) Least Tern	x				-	-	-	-	-
Wood Duck	x	x			-	-	-	-	-
Little Blue Heron	x				-	-	-	-	-
Green Heron	x				-	-	-	-	-
Wintering Waterfowl		x			-	-	-	-	-
Migratory Shorebirds					-	-	-	-	-
Natural wetlands and associated freshwater marshes and bogs									
Little Blue Heron	x				-	-	-	-	-
Green Heron	x				-	-	-	-	-
Least Bittern	x				-	-	-	-	-
Wood Stork		x			-	-	-	-	-
King Rail		x			-	-	-	-	-
Killdeer	x				-	-	-	-	-
(Interior) Least Tern	x	x			-	-	-	-	-
Marsh Wren		x	0	-	-	-	-	-	-
Rusty Blackbird		x			-	-	-	-	-
Wintering Waterfowl		x			-	-	-	-	-
Migratory Shorebirds					-	-	-	-	-
Deciduous shrub/grasslands, including early successional shrub-scrub habitat									
Scissor-tailed Flycatcher	x		28	18	-	Y	-	Y	Management Attention
Painted Bunting	x		27	20	Y	Y	-	Y	Management Attention
Dickcissel	x		8	15	Y	-	Y	Y	Planning and Responsibility

Bewick's Wren (Eastern)	x		8	13	-	-	-	-	-
Lark Sparrow	x	x	6	15	-	Y	-	-	Management Attention
Loggerhead Shrike	x	x	5	16	-	Y	-	-	Immediate Management
Mississippi Kite	x		4	14	-	-	-	-	-
Bell's Vireo	x		2	17	Y	Y	-	-	Immediate Management
Black-capped Vireo	x		1	22	Y	Y	-	-	Critical Recovery
Cassin's Sparrow	x		1	14	-	Y	-	-	Management Attention
Grasshopper Sparrow	x	x	1	13	-	-	-	-	-
American Kestrel		x			-	-	-	-	-
Bachman's Sparrow	x	x			-	-	-	-	-
Clay-colored Sparrow (migration)					-	-	-	-	-
Harris's Sparrow		x			-	-	-	-	-

MEDIUM PRIORITY

Native pine-oak (including the Lost Pines Area in Bastrop) woodlands(30-70% canopy cover)

Scissor-tailed Flycatcher	x		28	18	-	Y	-	Y	Management Attention
Yellow-billed Cuckoo	x		11	15	-	Y	-	Y	Management Attention
Northern Bobwhite	x	x	7	17	-	Y	-	Y	Management Attention
Lark Sparrow	x	x	6	15	-	Y	-	-	Management Attention
Loggerhead Shrike	x	x	5	16	-	Y	-	-	Immediate Management
Great Crested Flycatcher	x		3	15	-	Y	-	-	Management Attention
Red-headed Woodpecker	x	x	0	15	Y	Y	-	-	Management Attention

Upland deciduous forest

Painted Bunting	x		27	20	Y	Y	-	Y	Management Attention
Carolina Chickadee	x	x	12	16	-	-	-	Y	Planning and Responsibility
Yellow-billed Cuckoo	x		11	15	-	Y	-	Y	Management Attention
Golden-fronted Woodpecker	x	x	6	14	-	-	-	-	-
Chuck-will's-Widow	x		6	14	-	-	-	-	-
Eastern Screech-Owl	x	x	5	14	-	-	-	-	-
Wild Turkey	x	x	5	12	-	-	-	-	-

Red-bellied Woodpecker	x	x	4	13	-	-	-	-	-
Mississippi Kite	x		4	14	-	-	-	-	-
Broad-winged Hawk	x		1	13	-	-	-	-	-
Summer Tanager	x		1	15	-	Y	-	-	Management Attention

Old-growth Ashe-Juniper

Golden-cheeked Warbler	x		0	20	Y	Y	-	-	Critical Recovery

LOWEST PRIORITY

South Texas Thornscrub Ecotone at southern tip of region

Curve-billed Thrasher	x	x	1	13	-	-	-	-	-
Cactus Wren	x	x	1	12	-	-	-	-	-
Harris's Hawk	x	x	0	13	-	-	-	-	-

Agricultural croplands, plowed fields and pastures, including airports.

Agricultural Croplands, Plowed Fields/Pastures/Airports									
Painted Bunting	x		27	20	Y	Y	-	Y	Management Attention
Dickcissel	x		8	15	Y	-	Y	Y	Planning and Responsibility
Burrowing Owl		x	0	12	-	-	-	-	-
Sprague's Pipit		x			-	-	-	-	-
Smith's Longspur		x			-	-	-	-	-
McCown's Longspur		x			-	-	-	-	-
Chestnut-collared Longspur		x			-	-	-	-	-
American Golden-Plover (migration)					-	-	-	-	-
Mountain Plover		x			-	-	-	-	-
Killdeer	x	x			-	-	-	-	-
Upland Sandpiper (migration)					-	-	-	-	-
Migratory Shorebirds					-	-	-	-	-

Hedgerows and Fence Rows									
Scissor-tailed Flycatcher	x		28	18	-	Y	-	Y	Management Attention
Painted Bunting	x		27	20	Y	Y	-	Y	Management Attention
Yellow-billed Cuckoo	x		11	15	-	Y	-	Y	Management Attention
Eastern Bewick's Wren	x	x	8	13	-	-	-	-	-
Bell's Vireo	x		2	17	Y	Y	-	-	Immediate Management
Harris's Sparrow		x			-	-	-	-	-
Clay-colored Sparrow (migration)					-	-	-	-	-
Urban habitat for native wildlife									
Carolina Chickadee	x	x	12	16	-	-	-	Y	Planning and Responsibility
Inca Dove	x	x	9	14	-	-	-	Y	Planning and Responsibility
Northern Mockingbird	x	x	9	13	-	-	-	-	-
Bewick's Wren	x	x	8	13	-	-	-	-	-
Common Nighthawk	x		7	15	-	Y	-	Y	Management Attention
Purple Martin	x		7	14	-	-	-	Y	Planning and Responsibility
Chimney Swift	x		3	15	-	Y	-	-	Management Attention
Interior Least Tern	x				-	-	-	-	-

*PIF Action: Partners in Flight Action code indicating the type of conservation action most needed for improving or maintaining current population status.
#

Appendix 6: Land and water summary for the oaks and Prairies Joint Venture.

Protected lands in the OPJV groupd by ecoregion

Location name	Controlling Authority	Size (acres)	Size (Ha)
Blackland Prairies			
Baker Sanctuary	Travis Audubon Society	690	279
Caddo National Grasslands	USFS	17,785	7,197
Cedar Hill State Park	Army Corps of Engineers/TPWD	1,826	739
Dallas Nature Center, and Escarpment Preserve	Dallas County	296	120
Cedar Mountain Preserve	Dallas County	110	45
Cedar River Preserve	Dallas County	604	244
Cleburne State Park	TPWD	528	214
Clymer Meadow Preserve	TNC	823	333
Connemara Meadow Preserve	Connemara Conservancy	72	29
Cottonwood Creek Preserve	Dallas County	220	89
Cooper lake State Park	TPWD	3,026	1,225
County Line Prairie Preserve	TNC	40	16
Drews Prairie	Native Prairies Association of TX	4	2
Eisenhower State Park	TPWD	423	171
Elm Fork Preserve	Dallas County	44	18
Ennis Kachina Prairie	City of Ennis	30	12
Fish Creek Preserve	Dallas County	47	19
Fort Parker State Park	TPWD	1,459	590
Gambill Goose Refuge	City of Paris	600	243
Goat Island Preserve	Dallas County	294	119
Granger State WMA	Army Corps of Engineers/TPWD	10,888	4,406
Grapevine Springs Park Preserve	Dallas County	17	7
Great Trinity Forest Park	City of Dallas	210	85
Indiangrass Wildlife Sanctuary	City of Austin	200	81
Joppa Preserve	Dallas County	294	119
Lake Whitney State Park	TPWD	1,281	518
Lee F. Jackson Spring Creek Forest Preserve	Dallas Couty	83	34
L.B. Houston Park	City of Dallas	476	193
Lehmann Prairie	Native Prairies Association of TX	11	4
Leonhardt Prairie Preserve	TNC	40	16
Lester Lorch Park	Dallas County	87	35
Lyndon B. Johnson National Grasslands	USFS	20,250	8,195
Mathews Prairie Preserve	TNC	100	40
McCommas Bluff Preserve	Dallas County	111	45
McKinney Falls State Park	TPWD	630	255
Monument Hill/Kreische Brewery State Historical Par	TPWD	40	16
Mountain Creek Preserve	Dallas County	55	22
Muddy Creek Preserve	Dallas County	206	83
Nelson L. Wieting Prairie	Native Prairies Association of TX	17	7
North Mesquite Creek Preserve	Dallas County	22	9
Oak Cliff Preserve	Texas Land Conservancy	111	45
Palmetto-Alligator Slough Preserve	Dallas County	267	108
Parkhill Prairie	Collin County	436	176

Palmetto-Alligator Slough Preserve	Dallas County	282	114
Peters Prairie	Native Prairies Association of TX	4	2
Post Oak Preserve	Dallas County	335	136
Purtis Creek State Park	TPWD	1,582	640
Ray Roberts Lake	TPWD	41,303	16,715
Risel Prairie	Native Prairies Association of TX	5	2
River Bend Preserve	Dallas County	252	102
Rochester Park	City of Dallas	985	399
Rosehill Prairie	City of Garland	70	28
Rowlett Creek Preserve	Dallas County	97	39
Spring Creek Forest Preserve	Dallas County	116	47
Tenmile Creek Preserve	Dallas County	57	23
Tridens Prairie Preserve	TNC	97	39
Trinity Island Preserve	Dallas County Audubon Society	40	16
Trinity River Greenbelt Preserve	Dallas County	530	214
Trinity River/Mountain Creek Preserve	Dallas County	52	21
Veda Farrington Preserve	Texas Land Conservancy	320	129
White Rock Creek Park/Greenbelt	City of Dallas	770	312
Windmill Hill Preserve	Dallas County	75	30
Woodland Basin Nature Area	City of Rowlett	300	121
Tawakoni WMA	TPWD	2,335	945
TOTAL		**95,885**	38,803

Cross Timbers

Aquilla State WMA	TPWD	6,100	2,469
Arcadia Lake	ACOE, City of Edmond & ODWC	5,060	2,048
Arrowhead State Park	Ok. Dept. of Tourism and Rec./ACOE	2,200	890
Birch Reservoir	ACOE	2,700	1,093
Blue River Public Fishing and Hunting Area	ODWC	3,300	1,335
Boggy Depot State Park	Ok. Dept. of Tourism and Rec.	630	255
Bonham State Park	TPWD	261	106
Chickasaw National Recreation Area	National Park Service	9,889	4,002
Cleburne State Park	TPWD	528	214
Copan WMA	ACOE & ODWC	7,500	3,035
Cross Timbers Research Natural Area	USFS	380	154
Deep Fork National Wildlife Refuge	USFWS	9,000	3,642
Deep Fork NWR	USFWS	9,000	3,642
Deep Fork WMA	ODWC	11,900	4,816
Dinosaur Valley State Park	TPWD	1,274	516
Draper Lake	City of Oklahoma City	2,800	1,133
Eagle Mountain Lake	City of Fort Worth	401	162
Eisenhower State Recreation Area	TPWD	457	185
Eufaula Lake and WMA	ACOE & ODWC	48,000	19,425
Fort Cobb WMA	ACOE & ODWC	3,500	1,416
Fort Worth Nature Center/Refuge	City of Fort Worth	3,412	1,381
Fountainhead State Park	ACOE & ODTR	2,800	1,133
Hagerman National Wildlife Refuge	USFWS	11,320	4,581
Heard Wildlife Sanctuary	City of McKinney	274	111
Heyburn Lake and WMA	ACOE & ODWC	7,200	2,914
Hickory Creek WMA	ODWC	7,300	2,954
Hulah Lake and WMA	ACOE & ODWC	20,600	8,337

Keystone Ancient Forest Preserve	City of Sand Springs	1,900	769
Keystone WMA	ACOE & ODWC	16,500	6,677
Lake Benbrook	Army Corps of Engineers	1,578	639
Lake Brownwood State Park	TPWD	538	218
Lake Burtschi	ODWC	180	73
Lake Keystone	ODWC	714	289
Lake Mineral Wells State Park/Trailway	TPWD	2,843	1,151
Lake Murray State Park & Lodge	Ok. Dept. of Tourism and Rec.	12,496	5,057
Lake Texoma State Park	Ok. Dept. of Tourism and Rec./ACOE	1,882	762
Lake Thunderbird State Park	Bureau of Reclamation & ODTR	1,874	758
Lake Whitney State Park	TPWD	955	386
Lexington WMA	ODWC	9,000	3,642
Love Valley WMA	ODWC	7,700	3,116
McAlester Army Ammunition Plant	Department of Defense	45,000	18,211
McGillivay-Muse WMA	TPWD	1,972	798
Meridian State Recreational Area	TPWD	502	203
Miller Springs Nature Center Mother Neff State Park	TPWD	260	105
Okmulgee State Park	Ok. Dept. of Tourism and Rec.	1,075	435
Okmulgee WMA	ODWC	9,000	3,642
Osage Hills State Park	Ok. Dept. of Tourism and Rec.	1,199	485
Osage WMA	ODWC	9,500	3,845
Oxley Nature Center	City of Tulsa	800	324
Pontotoc Ridge Preserve	TNC	2,900	1,174
Pontotoc Ridge Preserve	TNC	2,000	809
Possum Kingdom State Park	TPWD	1,728	699
Ray Roberts Lake State Park and WMA	TPWD	21,020	8,506
Simpson Prairie	Native Prairies Association of TX	50	20
Skiatook WMA	ACOE & ODWC	5,000	2,023
Sportsmans Lake	City of Seminole	1,754	710
Tallgrass Prairie Preserve	TNC	39,000	15,783
Tandy Hills/Stratford Parks	City of Fort Worth	105	42
Tishomingo NWR and Washita River WMA	ACOE, USFWS & ODWC	29,700	12,019
Turkey Mountain City Park	City of Tulsa	150	61
Turner Falls Park	The City of Davis	1,500	607
Vivian Malone Preserve	Texas Land Conservancy	145	59
Wah-Sha-She State Park	Ok. Dept. of Tourism and Rec.	266	108
Walnut Creek State Park	Ok. Dept. of Tourism and Rec.	1,429	578
Wichita Mountains Wildlife Refuge	USFWS	59,020	23,885
Wichita Mountains Wildlife Refuge	USFWS	59,000	23,876
TOTAL		**530,021**	**214,492**

Post Oak Savannah

Bastrop State Park	TPWD	4,506	1,824
Big Lake Bottom WMA	TPWD	2,870	1,161
Buescher State Park	TPWD	1,017	412
Cedar Creek Islands State WMA	TPWD	159	64
Cooper Lake State Park and WMA	TPWD	14,160	5,730
Fairfield Lake State Park	TPWD	1,460	591
Fort Boggy State Park	TPWD	1,847	747
Fort Parker State Park	TPWD	1,503	608

Gus Engling WMA	TPWD	10,958	4,435
Keechi Creek State WMA	TPWD	1,590	643
Lake Bastrop State Park	TPWD	773	313
Lake Somerville State Park/Trailway	TPWD	6,290	2,545
Lake Tawakoni State Park and WMA	TPWD	1,963	794
Lick Creek Park	City of College Station	515	208
M. O. Neasloney State WMA	TPWD	99	40
MicKinney Roughs Preserve	Lower Colorado River Authority	1,550	627
Palmetto State Park	TPWD	267	108
Pat Mayse WMA	TPWD	8,925	3,612
Purtis Creek State Park	TPWD	867	351
Richland Creek State WMA	TPWD	13,796	5,583
Somerville State WMA	TPWD	3,110	1,259
Tanglewood Prairie	Native Prairies Association of TX	31	13
TOTAL		**78,256**	**31,669**

Edwards Plateau

Balcones Canyonlands NWR	USFWS	32,354	13,093
Barton Creek Habitat Preserve	TNC	463	187
Blanco State Park	TPWD	105	42
Brightleaf SNA	Austin Community Foundation	200	81
Camp Bullis	DOD	11,369	4,601
Colorado Bend SP	TPWD	1,896	767
Devils River SNA	TPWD	8,032	3,250
Devil's Sinkhole SNA	TPWD	1,860	753
Dolan Falls Ranch Preserve	TNC	2,430	983
Elizabeth P. Hill Preserve	TNC	322	130
Enchanted Rock SP	TPWD	1,643	665
Ft. Hood Military Reservation	US Department of Defense	88,557	35,838
Ft. McKavett SHP	TPWD	33	13
Garner SP	TPWD	291	118
Government Canyon SNA	TPWD	285	115
Guadalupe River SP	TPWD	787	318
Hamilton Pool Nature Preserve	Travis County	232	94
Hill Country SNA	TPWD	2,073	839
Honey Creek SNA	TPWD	916	371
Inks Lake SP	TPWD	528	214
James River Bat Cave Preserve	TNC	3	1
Kerr WMA	TPWD	2,637	1,067
Kerrville-Schriener Park	City of Kerrville	517	209
Kickapoo Cavern SP	TPWD	2,578	1,043
Longhorn Cavern SP	TPWD	259	105
Lost Maples SP	TPWD	880	356
Love Creek Preserve	TNC	581	235
Lower Colorado River Authority	LCRA	7,162	2,898
Lyndon B. Johnson NHP	US National Park Service	674	273
Lyndon B. Johnson SHP	TPWD	27	11
Mason Mountain WMA	TPWD	2,373	960
Milton Reimers Ranch Park	Travis County	2,427	982
Old Tunnel WMA	TPWD	6	2
Pedernales Falls SP	TPWD	2,099	849

Ruth P. Lehmann Preserve	TNC	66	27
South Llano River SP	TPWD	269	109
Walter Buck WMA	TPWD	1,098	444
Wild Basin Wilderness Preserve	Travis County	227	92
TOTAL		**145,905**	**59,046**

Overall total	850,067	344,009
Approximate area of OPJV	62,766,978	25,400,855
Percent Protected	**1.35%**	**1.35%**

KEY

ACOE	Army Corps of Engineers
ODTR	Oklahoma Department of Tourism and Recreation
ODWC	Oklahoma Department of Wildlife Conservation
TNC	The Nature Conservancy
TPWD	Texas Parks and Wildlife Department
USFS	US Forest Service
USFWS	US Fish and Wildlife Service

Area of man-made lakes in the Oaks and Prairies Joint Venture Region gouped by ecoregion.

Name	State	Surface area (Acres)	Surface Area (Ha)	Controlling Authority
Blackland Prairies				
Alvarado Park Lake	TX	473	191	City of Alvarado
Aquilla Lake	TX	3,020	1,222	US Army Corps of Engineers
Arlington	TX	1,939	785	City of Arlington
Athens	TX	1,799	728	Athens Municipal Water Authority
Bachman	TX	132	53	City of Dallas Parks and Recreation Department
Bardwell	TX	3,138	1,270	US Army Corps of Engineers
Belton	TX	12,385	5,012	US Army Corps of Engineers
Benbrook	TX	3,635	1,471	US Army Corps of Engineers
Big Creek	TX	520	210	Delta County Clerk
Bonham City	TX	1,020	413	City of Bonham
Bonham State Park	TX	65	26	Texas Parks and Wildlife Department
Braunig Lake	TX	1,350	546	City Public Service Board of San Antonio
Calavaras Lake	TX	3,624	1,467	City Public Service Board of San Antonio
Cedar Creek	TX	32,623	13,202	Tarrant Regional Water District
Coffee Mill	TX	650	263	US Forest Service
Cooper	TX	19,305	7,812	US Army Corps of Engineers
Crook	TX	1,060	429	City of Paris
Cypress Springs	TX	3,461	1,401	Franklin County Water District
Davy Crockett	TX	355	144	US Forest Service
Eagle Mountain	TX	8,738	3,536	Tarrant Regional Water District
Fairfield	TX	2,159	874	TXU
Fort Parker State Park	TX	725	293	Texas Parks and Wildlife Department
Granger Lake	TX	4,009	1,622	US Army Corps of Engineers
Grapevine	TX	6,684	2,705	US Army Corps of Engineers
Halbert	TX	603	244	City of Corsicana
Joe Pool	TX	6,469	2,618	US Army Corps of Engineers
Lady Bird	TX	468	189	City of Austin
Lake Georgetown	TX	1,297	525	US Army Corps of Engineers
Lavon	TX	21,400	8,660	US Army Corps of Engineers
Lewisville	TX	29,592	11,975	US Army Corps of Engineers
Limestone	TX	12,553	5,080	Brazos River Authority
Marine Creek	TX	250	101	Tarrant Regional Water District
Mexia	TX	1,048	424	Bistone Municipal Water District
Mill Creek	TX	237	96	City of Canton
Mineral Wells	TX	440	178	Texas Parks and Wildlife Department
Moss	TX	1,140	461	City of Gainesville
Mountain Creek	TX	2,493	1,009	TXU
Navarro Mills	TX	5,070	2,052	US Army Corps of Engineers
Palestine	TX	25,560	10,344	Upper Neches River Authority
Pat Cleburne	TX	1,558	630	City of Cleburne
Pat Mayse	TX	5,940	2,404	US Army Corps of Engineers
Purtis Creek State Park	TX	349	141	Texas Parks and Wildlife Department
Ray Hubbard	TX	21,671	8,770	City of Dallas
Ray Roberts	TX	25,600	10,360	US Army Corps of Engineers
Richland Chambers	TX	41,356	16,736	Tarrant County Water Control
Stillhouse Hollow	TX	6,429	2,602	US Army Corps of Engineers
Sulphur Springs	TX	1,340	542	City of Sulphur Springs
Tawakoni	TX	37,879	15,329	Sabine River Authority of Texas
Texoma	TX	74,686	30,224	US Army Corps of Engineers
Tradinghouse Creek	TX	2,010	813	TXU
Waco	TX	7,194	2,911	US Army Corps of Engineers

Walter E. Long Lake	TX	1,269	514	City of Austin
Waxahachie	TX	656	265	City of Waxahachie
White Rock	TX	1,088	440	City of Dallas
Whitney	TX	23,500	9,510	US Army Corps of Engineers
Wood (I-5)	TX	229	93	Guadalupe-Blanco River Authority
Worth	TX	3,489	1,412	City of Fort Worth
Subtotal		**477,732**	**193,331**	

Cross Timbers

Acadia Lake	OK	1,820	737	Army Corps of Engineers
Arbuckle Lake	OK	2,350	951	Bureau of Reclamation reservoir
Ardmore City Lake	OK	142	57	City of Ardmore
Atoka Lake	OK	5,700	2,307	City of Oklahoma City
Bellcow Lake	OK	1,000	405	City of Chandler
Birch Lake	OK	1,137	460	Army Corps of Engineers
Boomer Lake	OK	260	105	City of Stillwater
Carter Lake	OK	108	44	City of Madill
Clear Creek Lake	OK	722	292	City of Duncan
Fuqua Lake	OK	1,500	607	City of Duncan
Guthrie Lake	OK	274	111	City of Guthrie
Heyburn Lake	OK	880	356	Army Corps of Engineers
Hulah Lake	OK	3,570	1,445	Army Corps of Engineers
Kaw Lake	OK	17,000	6,880	Army Corps of Engineers
Keystone Lake	OK	23,610	9,555	Army Corps of Engineers
Konawa Reservoir	OK	1,350	546	Okalhoma gas and electric company
Lake Jean Neustadt	OK	462	187	City of Ardmore
Lake Murray	OK	5,700	2,307	State of Oklahoma
Lake R.C. Longmire	OK	935	378	City of Pauls Valley
Lake Stanley Draper	OK	2,900	1,174	City of Oklahoma City
Lake Texoma	OK	93,000	37,636	Army Corps of Engineers
Lake Thunderbird	OK	6,070	2,456	Bureau of Reclamation reservoir
Liberty Lake	OK	167	68	City of Guthrie
Mountain Lake	OK	210	85	City of Ardmore
Okmulgee Lake	OK	668	270	City of Okmulgee
Pauls Valley Lake	OK	750	304	City of Pauls Valley
Rock Creek Reservoir	OK	248	100	City of Ardmore
Shawnee Twin Lakes	OK	2,436	986	City of Shawnee
Skiatook Lake	OK	10,190	4,124	Army Corps of Engineers
Sooner Lake	OK	5,400	2,185	Okalhoma gas and electric company
Sportsman Lake	OK	345	140	City of Seminole
Wes Watkins Reservoir	OK	1,142	462	Pottawatomie Development Authority
Wewoka Lake	OK	371	150	City of Wewoka
Bridgeport	TX	11,945	4,834	Tarrant Regional Water District
Granbury	TX	8,310	3,363	Brazos River Authority
Hubbard Creek Reservior	TX	14,922	6,039	West Central Texas Municipal Water District
Lake Amon G. Carter	TX	1,540	623	City of Bowie
Lake Brownwood	TX	6,490	2,626	Brown County Water Control and Irrigation District No.
Lake Cisco	TX	1,050	425	City of Cisco
Lake Daniel	TX	950	384	City of Breckenridge
Lake Graham	TX	2,444	989	City of Graham
Leon Reservior	TX	726	294	Eastland County Water Supply District
Lost Creek resivoir	TX	385	156	City of Jacksboro
Nocona	TX	1,323	535	North Montague County Water Supply District
Palo Pinto Reservior	TX	2,399	971	Palo Pinto Co Municipal Water District No. 1
Weatherford	TX	1,158	469	City of Weatherford
Subtotal		**246,059**	**99,576**	

Post Oak

Bastrop	TX	906	367	Lower Colorado River Authority
Bryan	TX	829	335	Bryan Texas Utilities
Fayette County	TX	2,400	971	Lower Colorado River Authority
Gibbons Creek	TX	2,770	1,121	Texas Municipal Power Agency
Gonzales (H-4)	TX	696	282	Guadalupe-Blanco River Authority
McQueeney	TX	396	160	Guadalupe-Blanco River Authority
Placid	TX	198	80	Guadalupe-Blanco River Authority
Somerville	TX	11,456	4,636	US Army Corps of Engineers
Subtotal		**19,651**	**7,952**	

Edwards Plateau

Brady Creek	TX	2,020	817	City of Brady
Canyon Lake	TX	8,308	3,362	US Army Corps of Engineers
Inks Lake	TX	831	336	Lower Colorado River Authority
Lake Austin	TX	1,599	647	Lower Colorado River Authority
Lake Buchanan	TX	22,211	8,988	Lower Colorado River Authority
Lake Lyndon B. Johnson	TX	6,449	2,610	Lower Colorado River Authority
Lake Marble Falls	TX	611	247	Lower Colorado River Authority
Lake Travis	TX	18,622	7,536	Lower Colorado River Authority
Proctor	TX	4,537	1,836	US Army Corps of Engineers
Medina Lake	TX	5,426	2,196	Bexar/Medina/Atascosa County Agricultural District
Subtotal		**70,614**	**28,576**	

TOTAL		**814,056**	**329,436**
OPJV		62,766,978	25,400,855
% of OPJV submerge		**1.30%**	**1.30%**

Citations...

Texas Lakes TPWD website (http://www.tpwd.state.tx.us/fishboat/fish/recreational/lakes/)
Oklahoma Lake information from OutdoorsOK website

Summary of 2002 USDA Agricultural Census and 2007 US population census **by county** in Texas and Oklahoma. Counties are grouped by ecoregions within the Oaks and Prairies Joint Venture (OPJV). Some counties overlap multiple ecoregions, but were assigned to one ecoregion to avoid duplication. All land areas are listed in acres. CRP/WRP= USDA's Conservation Reserve Program/Wetland Reserve Program acres. ETGP = the counties in the Eastern Tallgrass Prairie that will eventually be included in the Oaks and Prairies Joint Venture. BCR = Bird Conservation Region.

	Land area	Cropland	Pasture	CRP/WRP	Population (2007)	% Cropland	% Pasture	% CRP/WRP	People/ 100 acre
Edwards Plateau	21,318,395	2,540,494	16,038,400	126,055	794,067	11.9	75.2	0.6	3.7
Blackland	15,329,497	5,360,861	8,101,701	98,393	7,624,407	35.0	52.9	0.6	49.7
Post Oak	14,083,970	3,831,889	8,846,532	62,280	944,973	27.2	62.8	0.4	6.7
Cross Timbers in TX	15,172,364	3,698,268	10,032,679	88,874	3,168,923	24.4	66.1	0.6	20.9
Cross Timbers in OK	13,903,068	4,251,745	7,532,913	87,442	2,361,489	30.6	54.2	0.6	17.0
ETGP OK	4,022,161	1,005,937	2,394,344	10,709	332,528	25.0	59.5	0.3	8.3
Other OK	25,440,057	9,235,068	11,901,546	1,001,822	883,736	36.3	46.8	3.9	3.5
Other TX	102,227,550	23,576,805	57,643,693	2,913,549	11,411,573	23.1	56.4	2.9	11.2
BCR 20	21,318,395	2,540,494	16,038,400	126,055	794,067	11.9	75.2	0.6	3.7
BCR 21	58,488,899	17,142,763	34,513,825	336,989	14,099,792	29.3	59.0	0.6	24.1
Oklahoma	43,946,916	14,843,357	22,421,487	1,103,520	3,617,316	33.8	51.0	2.5	8.2
Texas	167,550,149	38,657,710	100,543,193	3,302,766	23,904,380	23.1	60.0	2.0	14.3
TX and OK	211,497,065	53,501,067	122,964,680	4,406,286	27,521,696	25.3	58.1	2.1	13.0
OPJV	83,829,455	20,689,194	52,946,569	473,753	15,226,387	24.7	63.2	0.6	18.2
% in OPJV	39.6	38.7	43.1	10.8	55.3				

Appendix 7: Bylaws for the Oaks and Prairies Joint Venture management Board.

Bylaws of the Oaks and Prairies Joint Venture Management Board

Article I.

Name: The name of the organization shall be the "Oaks and Prairies Joint Venture Management Board."

Article II.

Purpose: The Oaks and Prairies Joint Venture Management Board provides general oversight and guidance for the Oaks and Prairies Joint Venture, a coordinated effort among partners to implement national and continental bird conservation initiatives in the Oaks and Prairies Bird Conservation Region (BCR) (21) and the Edwards Plateau BCR (20). The Management Board determines priorities for all aspects of joint venture activities, maintains the commitment and support necessary to achieve the goals and objectives of the joint venture, and determines policy.

Article III

Board Membership: Voting Membership on the Management Board shall consist of one representative from each of the following agencies, conservation organizations, or groups:

Oklahoma Department of Wildlife Conservation
Texas Parks and Wildlife Department
US Fish and Wildlife Service
USDA-Natural Resources Conservation Service
Audubon
The Nature Conservancy
Quail Unlimited
National Wild Turkey Federation
Texas Wildlife Association
Native Prairies Association of Texas

Member organizations may be added or deleted over time at the discretion of the Management Board.

Member organizations needing to replace a representative must notify the Chair and Coordinator in writing.

Article IV

Management Board Officers: Only voting members of the Management Board may serve as officers. The officers shall be a Chair and a Vice-Chair. The Management Board will elect the officers to serve two-year terms. Elections shall take place during a Fall/Winter Management Board meeting. The Chair will organize and conduct the business meetings of the Management Board, appoint members to standing and ad-hoc committees, and review and approve expenditures incurred. A Vice-Chair shall preside in the absence of the Chair. The officers and other Management Board members will be assisted by the Joint Venture Coordinator. The Coordinator shall record or make arrangements for proper recording of Management Board minutes, shall maintain the membership rolls, serve as custodian of Management Board records, collect meeting registration fees, maintain a checking account for disbursement of petty cash, and distribute information relating to joint venture accomplishments.

Article V

Meetings and Attendance: Two regular meetings will be held annually (Spring and Fall/Winter) and shall be of sufficient length to ensure time for full discussion of relevant issues. Additional meetings may be called at the discretion of the Management Board Chair.

Every Management Board member is expected to attend every meeting, or to send an alternate or to submit a proxy to the Joint Venture Coordinator for participation in any decisions or votes (i.e., official business) that may take place at a meeting. Board membership will be reviewed for any organization that is absent from two consecutive regular meetings.

Management Board meetings shall be open to alternates, staff, or other invitee of Management Board members, members of standing committees, and any other interested party.

Article VI

Decision Making: In situations in which consensus is not achieved and the Management Board Chair determines that a decision is required, a motion will pass by a simple majority vote of Board members in attendance, provided a quorum is present. The Management Board Chair and the Vice-Chair may participate in all votes. Decisions/votes may also be conducted via teleconference or e-mail.

Article VII

Quorum: There will be no official business completed by the Management Board via a meeting, teleconference or e-mail without the participation of at least half plus one Board members including those represented by alternates or proxies.

Article VIII

Fees: Registration fees for attendance at Management Board meetings are as follows:

$50 Management Board members or their alternate or proxy.
$15 Other attendees

Registration fees may be waived or altered for individual meetings at the discretion of the Management Board Chair.

Article IX

Committees – Standing and Ad hoc: Standing Committees of the Oaks and Prairies Joint Venture include:

Oaks and Prairies BCR Technical Team
Edward's Plateau BCR Technical Team

Specific activities, responsibilities, structure, membership, and relationships to the Management Board, Oaks and Prairies Joint Venture staff, and other Oaks and Prairies Joint Venture committees are defined for each Standing Committee by the Coordinator or Chair and are subject to review and approval by the Management Board.

The Technical Teams serve the Management Board by providing expertise on birds and habitats in the Bird Conservation Region.

Ad hoc/working committees are constituted by the Management Board Chair, and their charges are determined with the assistance of the Management Board. The tenure of these committees is determined by the Management Board Chair.

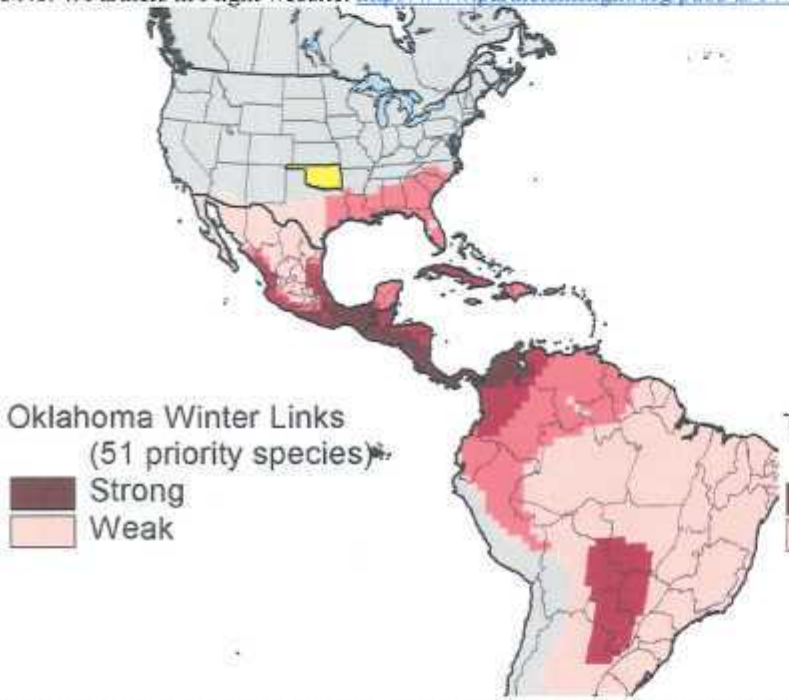
Article X

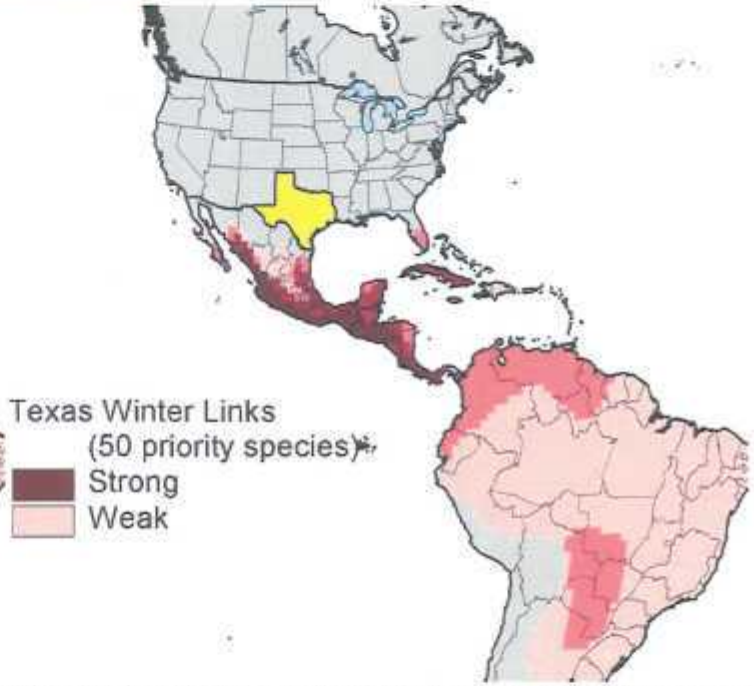
Amendments: Amendments to the Bylaws shall be in accordance with Articles VI and VII.

Approved by the OPJV Management Board on 10-9-08.

Appendix 8: Linkage maps for birds breeding or wintering in Oklahoma or Texas showing areas of concentration.

Blancher, P.J., B. Jacobs, A. Couturier, C.J. Beardmore, R. Dettmers, E.H. Dunn, W. Easton, E.E. Iñigo-Elias, T.D. Rich, K.V. Rosenberg and J.M. Ruth. 2006. Making Connections for Bird Conservation: Linking States, Provinces & Territories to Important Wintering and Breeding Grounds. Partners in Flight Technical Series No. 4. Partners in Flight website: http://www.partnersinflight.org/pubs/ts/04-Connections.





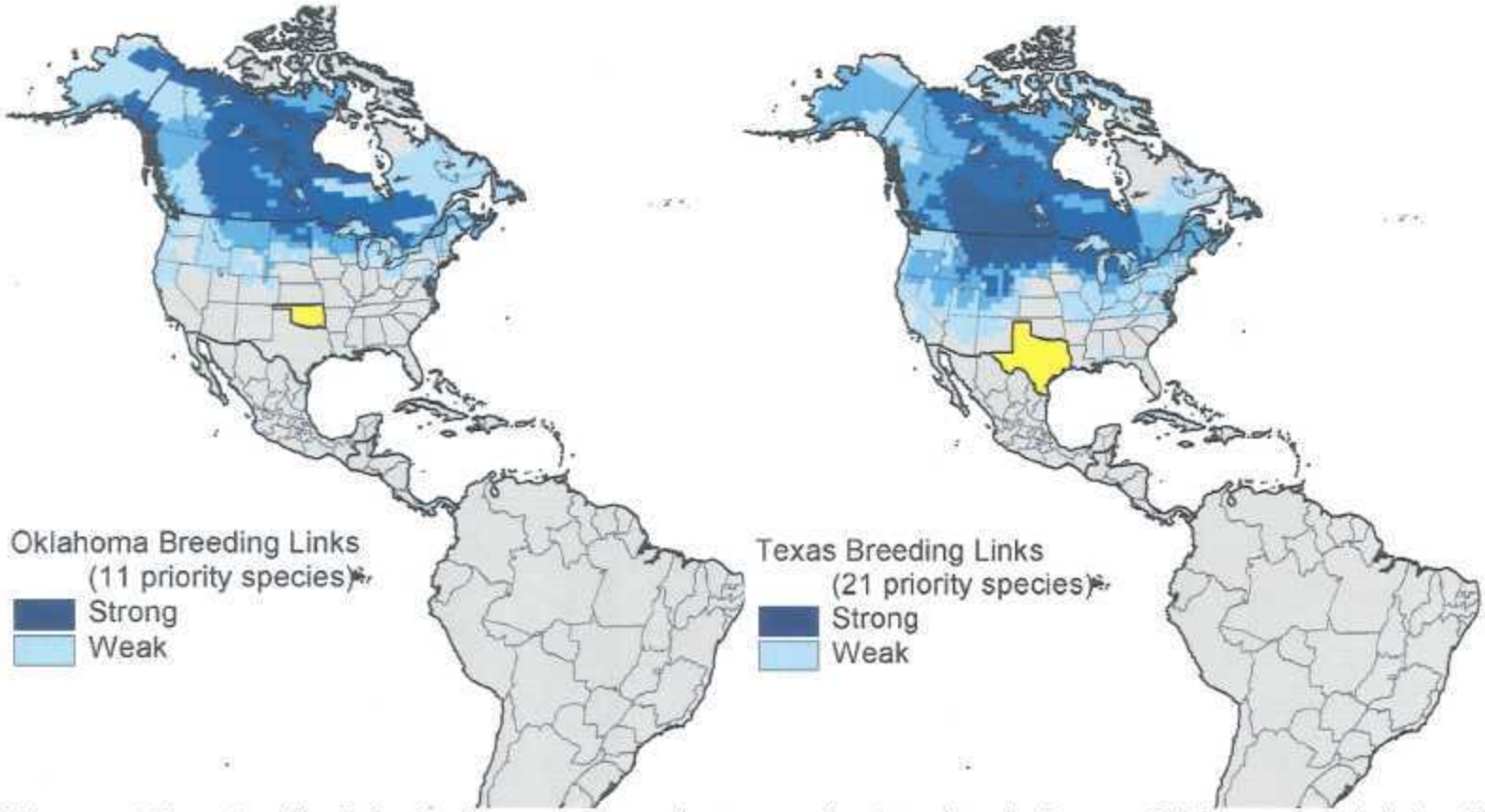
Oklahoma and Texas winter links showing areas where migratory species that breed in Texas or Oklahoma spend the winter season.

Priority Species[1]	Latin Name	OK	TX
Swallow-tailed Kite	*Elanoides forficatus*		0.01
Mississippi Kite	*Ictinia mississippiensis*	8.42	2.34
Swainson's Hawk	*Buteo swainsoni*	0.49	0.80
King Rail	*Rallus elegans*	0.78	
Upland Sandpiper	*Bartramia longicauda*	0.51	
Black-billed Cuckoo	*Coccyzus erythropthalmus*	0.03	
Yellow-billed Cuckoo	*Coccyzus americanus*	2.60	1.20

Priority Species[1]	Latin Name	OK	TX
Brown Thrasher	*Toxostoma rufum*	0.21	
Colima Warbler	*Vermivora crissalis*		0.07
Golden-cheeked Warbler	*Dendroica chrysoparia*		6.24
Yellow-throated Warbler	*Dendroica dominica*	0.41	
Pine Warbler	*Dendroica pinus*	0.10	0.24
Prairie Warbler	*Dendroica discolor*	0.19	0.06
Cerulean Warbler	*Dendroica cerulea*	0.02	

Elf Owl	*Micrathene whitneyi*		0.82
Burrowing Owl	*Athene cunicularia*	0.15	
Common Nighthawk	*Chordeiles minor*	0.94	1.77
Common Poorwill	*Phalaenoptilus nuttallii*		1.33
Chuck-will's-widow	*Caprimulgus carolinensis*	2.95	0.59
Whip-poor-will	*Caprimulgus vociferus*	0.60	
Chimney Swift	*Chaetura pelagica*	0.37	0.43
Lucifer Hummingbird	*Calothorax lucifer*		0.08
Black-chinned Hummingbird	*Archilochus alexandri*		2.11
Northern Beardless-Tyrannulet	*Camptostoma imberbe*		0.02
Eastern Wood-Pewee	*Contopus virens*	0.94	0.22
Acadian Flycatcher	*Empidonax virescens*	0.20	0.29
Say's Phoebe	*Sayornis saya*	0.04	
Great Crested Flycatcher	*Myiarchus crinitus*	1.16	0.23
Cassin's Kingbird	*Tyrannus vociferans*		0.62
Western Kingbird	*Tyrannus verticalis*	0.45	0.87
Eastern Kingbird	*Tyrannus tyrannus*	0.63	
Scissor-tailed Flycatcher	*Tyrannus forficatus*	3.55	4.48
Rose-throated Becard	*Pachyramphus aglaiae*		0.00
Loggerhead Shrike	*Lanius ludovicianus*	0.05	0.01
White-eyed Vireo	*Vireo griseus*	0.31	0.25
Bell's Vireo	*Vireo bellii*	1.37	2.36
Black-capped Vireo	*Vireo atricapilla*	0.49	4.65
Yellow-throated Vireo	*Vireo flavifrons*	0.19	0.31
Yellow-green Vireo	*Vireo flavoviridis*		0.00
Cave Swallow	*Petrochelidon fulva*		1.83
Bewick's Wren	*Thryomanes bewickii*		1.00
Wood Thrush	*Hylocichla mustelina*	0.05	0.06

Black-and-white Warbler	*Mniotilta varia*	0.14	
Prothonotary Warbler	*Protonotaria citrea*	0.32	
Worm-eating Warbler	*Helmitheros vermivorum*	0.05	0.06
Swainson's Warbler	*Limnothlypis swainsonii*		2.36
Ovenbird	*Seiurus aurocapilla*	0.01	
Louisiana Waterthrush	*Seiurus motacilla*	1.07	0.10
Kentucky Warbler	*Oporornis formosus*	0.53	0.35
Hooded Warbler	*Wilsonia citrina*	0.04	0.93
Yellow-breasted Chat	*Icteria virens*	0.37	
Summer Tanager	*Piranga rubra*	0.96	0.74
Scarlet Tanager	*Piranga olivacea*	0.15	
Cassin's Sparrow	*Aimophila cassinii*	0.23	
Field Sparrow	*Spizella pusilla*	1.13	
Lark Sparrow	*Chondestes grammacus*	1.67	0.19
Grasshopper Sparrow	*Ammodramus savannarum*	0.89	
Henslow's Sparrow	*Ammodramus henslowii*	6.05	
Seaside Sparrow	*Ammodramus maritimus*		2.11
Varied Bunting	*Passerina versicolor*		0.18
Painted Bunting	*Passerina ciris*	3.12	3.81
Dickcissel	*Spiza americana*	3.41	0.85
Eastern Meadowlark	*Sturnella magna*	1.75	0.39
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	0.00	
Boat-tailed Grackle	*Quiscalus major*		0.06
Orchard Oriole	*Icterus spurius*	0.23	0.28
Hooded Oriole	*Icterus cucullatus*		0.33
Bullock's Oriole	*Icterus bullockii*	0.20	0.77
Baltimore Oriole	*Icterus galbula*	0.48	0.01
Scott's Oriole	*Icterus parisorum*		1.18



Oklahoma and Texas breeding links showing areas where migratory species that winter in Texas or Oklahoma spend their breeding season.

Priority wintering species in TX and OK.

Priority Species[1]	Latin Name		OK	TX
Bald Eagle	*Haliaeetus leucocephalus*		0.48	0.51
Yellow Rail	*Coturnicops noveboracensis*			1.01
Sandhill Crane	*Grus canadensis*			2.04
Whooping Crane	*Grus americana*			2.51
Long-eared Owl	*Asio otus*		0.25	
Short-eared Owl	*Asio flammeus*		0.20	0.24
Sprague's Pipit	*Anthus spragueii*			1.58
American Tree Sparrow	*Spizella arborea*		0.49	0.18
Brewer's Sparrow	*Spizella breweri*			0.42
Vesper Sparrow	*Pooecetes gramineus*			0.85
Sage Sparrow	*Amphispiza belli*			0.36
Baird's Sparrow	*Ammodramus bairdii*			0.76
Henslow's Sparrow	*Ammodramus henslowii*			0.81
Le Conte's Sparrow	*Ammodramus leconteii*		1.19	1.11
Nelson's Sharp-tailed Sparrow	*Ammodramus nelsoni*			0.61
Harris's Sparrow	*Zonotrichia querula*		2.67	1.92
McCown's Longspur	*Calcarius mccownii*		0.23	2.79
Smith's Longspur	*Calcarius pictus*		3.05	0.91
Chestnut-collared Longspur	*Calcarius ornatus*		1.37	1.47
Rusty Blackbird	*Euphagus carolinus*		0.68	0.45
Purple Finch	*Carpodacus purpureus*		0.38	0.35
Cassin's Finch	*Carpodacus cassinii*			0.13