LANDBIRD PLAN

SECTION 5

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BACKGROUND AND CONTEXT

North American grassland bird populations have been declining faster than any other avian guild over the last 40 years (Knopf 1994, Sauer et al. 2014). The Northern Great Plains contains the highest diversity of grassland bird species on the continent (Figure 1; Peterjohn and Sauer 1999), including several populations of conservation concern. Of the 189 landbird species breeding in the Prairie Potholes Bird Conservation Region (BCR 11), 16 species are estimated to have more than 20% of their continental breeding population in the region, including 9 grassland-nesting birds. Of those species, 4 mixed-grass specialists are of primary conservation concern due to their ongoing population declines (Table 1; Sauer et al. 2014): Sprague's Pipit (*Anthus spragueii*), Baird's Sparrow (*Ammodramus bairdii*), McCown's Longspur (*Rhynchophanes mccownii*) and Chestnut-collared Longspur (*Calcarius ornatus*).

Table 1. Global population estimates and trends for the 4 mixed-grass specialists of BCR 11.

Species	Global Population Estimate*	Global Population Trend*
Baird's Sparrow	2,000,000	-2.93 (-4.52, -1.31)
Sprague's Pipit	900,000	-3.51 (-4.83, -2.34)
McCown's Longspur	600,000	-6.18 (-8.90, -2.85)
Chestnut-collared Longspur	3,000,000	-4.35 (-5.30, -3.33)

*Population estimates from Partners in Flight Science Committee (2013), population trends from Sauer et al. (2014)

Although these 4 species' population declines are some of the most dramatic, several other species across the PPJV administrative area continue to decline (Table 2). The PPJV will take a proactive approach to addressing declining grassland bird populations.

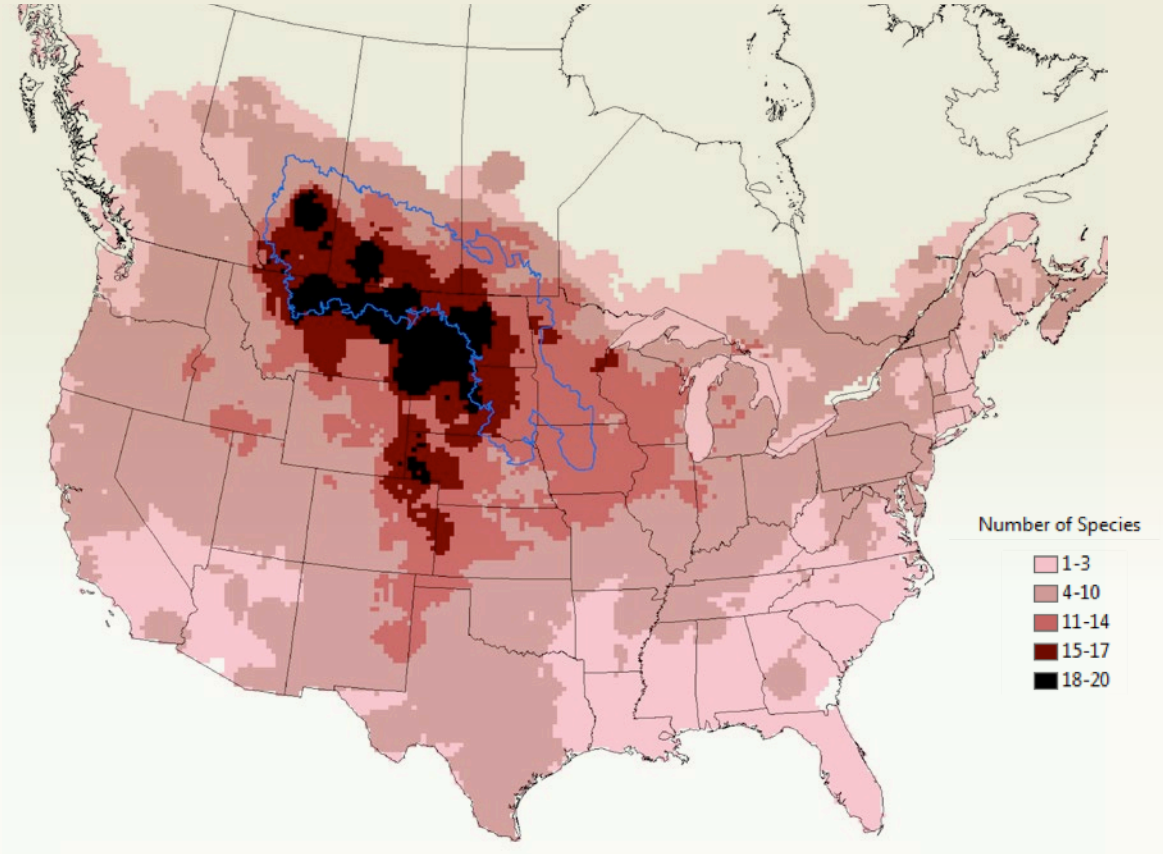

Figure 1. North American grassland bird species richness based on the Breeding Bird Survey results (Sauer et al. 2014). The BCR 11 boundary is shown in blue.

We will focus time, attention, and funding on supporting healthy populations reducing the possibility these priority birds will require the protection of the Endangered Species Act. However, it is important to recognize that 13 of the 16 PPJV priority landbird species are migratory songbirds that only use the habitat within the boundaries of the PPJV administrative area during the breeding phase of their annual cycle. These species migrate to the southern U.S., Mexico, and South America to overwinter, and it is currently unknown which demographic parameters are limiting population growth. Consequently, our work in the PPJV administrative area addresses issues during only one phase of the annual cycle. There are likely problems impacting these species populations beyond the boundaries of the PPJV. Working with partners outside of the PPJV administrative area will be necessary to ensure some level of success in grassland bird conservation.

We will focus time, attention, and funding on supporting healthy populations reducing the possibility these priority birds will require the protection of the Endangered Species Act.

Table 2. BCR 11 Partners in Flight Watch List species (white) and Common Birds In Steep Decline (tan). Species with <1% of the estimated global population in BCR 11 were not included in the list.

Common Name	2013 BCR 11 Population Estimate	Estimated % of Global Population in BCR 11	1966 - 2013 BCR 11 Trend	95% LCI	95% UCI
Greater Prairie-Chicken	30,000	9.10%	6.52	-21.86	38.69
Baird's Sparrow	2,000,000	90.53%	-0.59	-0.59	11.59
Sprague's Pipit	800,000	87.06%	-4.46	-4.46	10.2
Chestnut-collared Longspur	1,700,000	61.41%	0.00	0.00	0.00
McCown's Longspur	300,000	45.84%	-5.87	-5.87	83.67
Bobolink	2,800,000	34.46%	-0.55	-0.55	15.46
Black-billed Cuckoo	110,000	12.62%	-4.97	-4.97	1.19
Greater Sage-Grouse	NA	9.00%	NA	NA	NA
Red-headed Woodpecker	90,000	7.81%	-1.10	-1.10	2.06
Brewer's Blackbird	4,100,000	19.93%	-0.55	-0.55	60.14
Grasshopper Sparrow	5,000,000	16.02%	-0.37	-0.37	8.16
Common Grackle	8,700,000	14.22%	0.97	0.97	44.36
Horned Lark	16,000,000	13.54%	-3.24	-3.24	263.56
Lark Bunting	1,000,000	10.91%	5.32	5.32	178.77
Loggerhead Shrike	260,000	4.43%	-2.39	-2.39	0.69
Bank Swallow	500,000	2.70%	-2.08	-2.08	16.6
Field Sparrow	150,000	2.04%	5.06	5.06	0.65
Short-eared Owl	40,000	1.55%	-6.42	-6.42	0.20
Common Nighthawk	200,000	1.28%	0.71	0.71	0.37
Chimney Swift	100,000	1.26%	0.24	0.24	0.72

Working with partners outside of the PPJV administrative area will be necessary to ensure some level of success in grassland bird conservation.

Kevin Barnes

Factors that Limit Landbird Populations

Several likely causes have been identified for the decline of North American grassland bird populations. The temperate grasslands of the PPR are among the most threatened ecosystems on the planet (Hoekstra et al. 2004, Lark et al. 2015), and the loss and fragmentation of breeding habitat has clearly played a role in the decline of some species (Askins et al. 2007). Although grassland losses in the PPJV administrative area have exceeded 54% overall (Doherty et al. 2013, Wright and Wimberly 2013), the three grassland biomes that comprise the PPJV area reflect large differences in the amount of breeding habitat remaining in each (Figure 2). At a continental level, the tallgrass ecosystem has suffered the greatest loss of grassland area (>90%), followed by the mixed-grass and dry mixed-grass ecosystems, respectively. Some of the largest grassland tracts remaining in the continental U.S. occur in the dry mixed-grass portion of the western PPJV administrative area in Montana, where 62% of the original grasslands are intact. Yet population declines are evident for bird species throughout all three ecoregions (Table 3), suggesting that, in addition to habitat loss and fragmentation, other factors are involved in the decline of grassland bird populations. For example, many of these species have also demonstrated sensitivity to anthropogenic disturbances, such as activities associated with wind energy development and oil and gas extraction (Thompson et al. 2014, Shaffer et al. 2015). Further exacerbating grassland bird declines, the direct and indirect effects of climate change and agricultural pesticide use on bird populations have yet to be fully understood (Mineau and Whiteside 2013). Although many of the factors limiting grassland bird populations are unknown, perhaps the most obvious conservation actions for grassland birds are to protect remaining grasslands and restore lost grasslands in the PPJV administrative area.

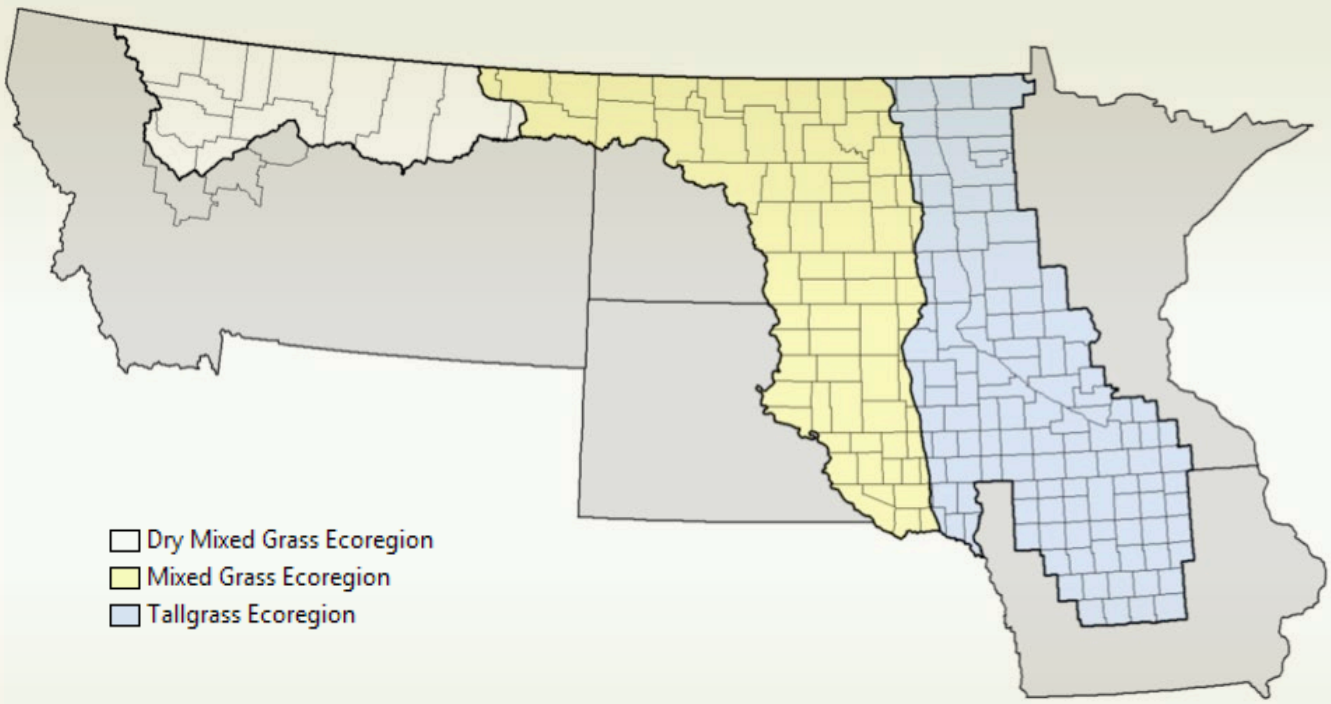

Figure 2. Grassland ecoregions of the PPJV administrative area based on Wright and Bailey (1982). Remaining grasslands based on 2011 landcover: Dry Mixed Grass Ecoregion (62% remaining), Mixed Grass Ecoregion (38%), Tallgrass Ecoregion (15%)

Biological Models

When the PPJV was founded in 1989, it adopted a biological model-based approach to decision support for conservation programs. Selected models are based on research that demonstrates a strong linkage between habitat characteristics and demographics. The models are updated as new population monitoring and habitat information becomes available, demonstrating the iterative, adaptive approach to conservation that is the foundation of the PPJV. Several conceptual and data-driven empirical models have been developed for grassland birds in the PPJV administrative area (Table 3). These models assess the biological value of the PPJV landscape to priority grassland bird species and provide decision support tools guiding strategic habitat conservation actions through spatial prioritization.

Table 3. Priority landbird species models used to guide conservation in the PPJV. Model type, geographic extent and model source are listed for each species. * RW = Breeding Range Wide, including Canada, MG = Mixed-grass ecoregion, TG = Tallgrass ecoregion, DMG= Dry mixed-grass ecoregion (see Figure 2)

Source	Species	Geographic Extent*	Model Type
Lispey et al. 2015	Baird's Sparrow	RW	Occurrence
	Chestnut-collared Longspur	RW	Occurrence
	McCown's Longspur	RW	Occurrence
	Sprague's Pipit	RW	Occurrence
Drum et al. 2015	Baird's Sparrow	MG	Abundance
	Bobolink	MG,TG	Abundance
	Chestnut-collared Longspur	MG	Abundance
	Clay-colored Sparrow	MG,TG	Abundance
	Dickcissel	TG	Abundance
	Grasshopper Sparrow	MG,TG	Abundance
	Horned Lark	MG,TG	Abundance
	Le Conte's Sparrow	MG,TG	Abundance
	Savannah Sparrow	MG,TG	Abundance
	Sedge Wren	MG,TG	Abundance
	Sprague's Pipit	MG	Occurrence
	Western Meadowlark	MG,TG	Occurrence
Niemuth et al. 2017	Bobolink	DMG, MG	Occurrence
	Eastern Meadowlark	DMG, MG	Occurrence
	Lark Bunting	DMG, MG	Occurrence
	Grasshopper Sparrow	DMG, MG	Occurrence
	Savannah Sparrow	DMG, MG	Occurrence
	Sprague's Pipit	DMG, MG	Occurrence

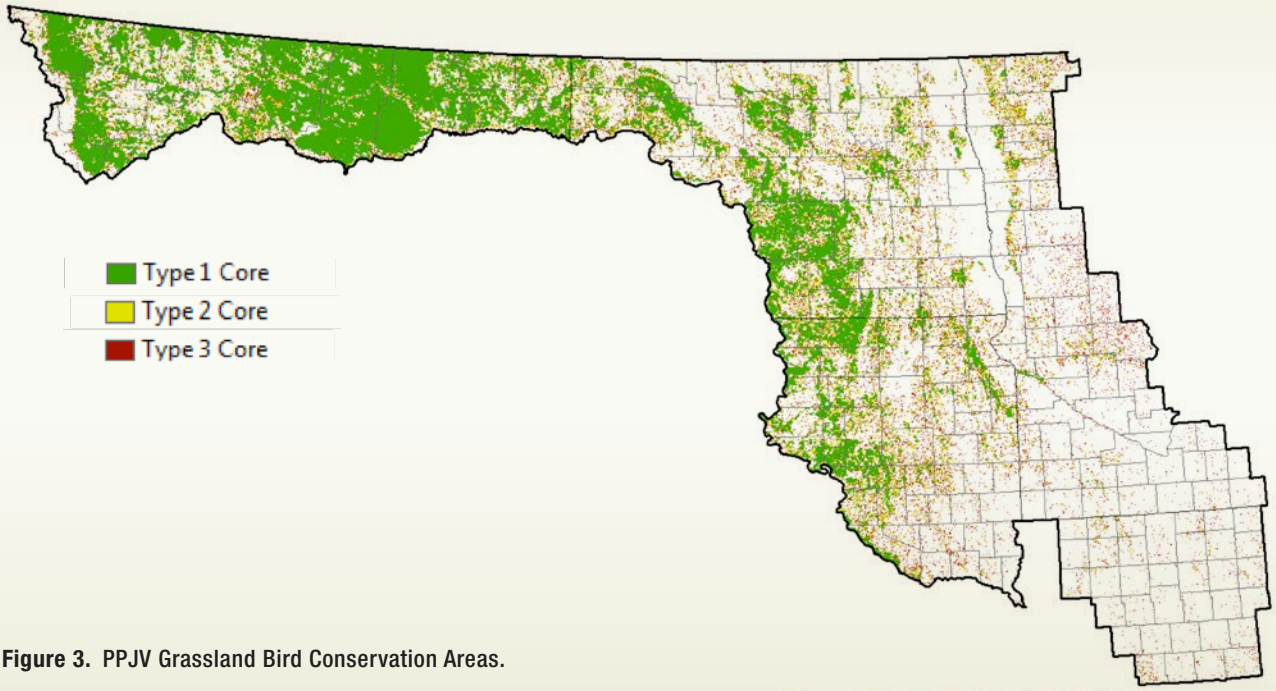

Figure 3. PPJV Grassland Bird Conservation Areas.

CONCEPTUAL MODELS

Grassland Bird Conservation Areas (GBCAs) are priority areas for grassland protection and enhancement that provide suitable habitat for many priority grassland bird species in the U.S. PPR. GBCAs identify adequate habitat based on the sensitivity of specific grassland birds to patch size and landscape structure. A conceptual model for GBCAs was first described by Sample and Mossman (1997) and recommended for the U.S. PPR by Partners in Flight (Fitzgerald et al. 1998, 1999). All GBCAs consist of a grassland core with a surrounding 1-mile wide matrix. Core areas are at least 95% grassland, at least 50 m from woody vegetation, and may contain up to 30% wetland habitat. GBCAs have been defined at 3 levels (i.e., types) to address the needs of grassland breeding birds with different area requirements (Figure 3). Types are classified by minimum size, width, percentage of grassland in the landscape, and compatible wetland class (e.g., temporary wetlands are considered compatible for all GBCA types because they are typically dry for much of the nesting season). Species-specific empirical grassland bird models provide similar predictions to GBCAs about the distribution of area-sensitive grassland bird species that require large, contiguous blocks of grassland in grassland-rich landscapes (Niemuth et al. 2005, Johnson et al. 2010).

The 3 types are:

- Type 1 – at least 640 acres of grassland at least 1 mile wide. Matrix and core are at least 40% grassland.
- Type 2 – at least 160 acres of grassland at least ½ mile wide. Matrix and core are at least 30% grassland.
- Type 3 – at least 55 acres of grassland at least ¼ mile wide. Matrix and core are at least 20% grassland.

Type 3 GBCAs are combined with empirical breeding duck models (a.k.a. Thunderstorm Map, see Waterfowl section) to identify areas across the PPJV landscape that are priority areas for both bird groups. Although limited funds are available for grassland bird habitat conservation, this decision support tool provides an integrated approach that allows funding for breeding waterfowl to be leveraged to benefit breeding grassland birds.

EMPIRICAL MODELS

Species-specific empirical models relating grassland birds to their habitats at landscape scales were developed for birds in the PPJV administrative areausing data from various sources (Table 3). The models cover different geographic extents and inform conservation for different species. First, Niemuth et al. (2005, 2008, and 2017) used stop-level BBS observations to build species-habitat relationship

Grassland Bird Conservation Areas (GBCAs) are priority areas for grassland protection and enhancement that provide suitable habitat for many priority grassland bird species in the U.S.

Scott Somershoe

models (Figure 4). These same methods have been repeated with updated BBS and landcover data to develop decision support tools for the PPJV areas of Montana, North Dakota and South Dakota. The model development process is planned for the entire PPJV area, including Minnesota and Iowa using updated landcover and BBS data.

Second, Quamen (2007) developed grassland bird models in the Minnesota and Iowa PPJV regions using data from 100-meter fixed-radius point counts collected during May and June of 2003, 2004, and 2005 (Figure 5). Drum et al. (2015*a*) developed additional grassland bird models using Quamen's (2007) point count data to estimate breeding pair abundance for several grassland passerine species further west into the mixed-grass ecoregion of the Dakotas and northeast Montana (Figure 6). The ecoregions were analyzed separately due to differences in land use, landcover, climate, and breeding range for the modeled species.

Third, Lipsey et al. (2015) developed a breeding range distribution model for Sprague's Pipit in cooperation with the University of Montana and Canadian and U.S. partners. They used point count data from 2007-2012 collected by several sources in an integrated analysis across the entire breeding range. The modeling effort was the first successful attempt at building an international model for a non-game species by Canadian and U.S. partners in the PPR.

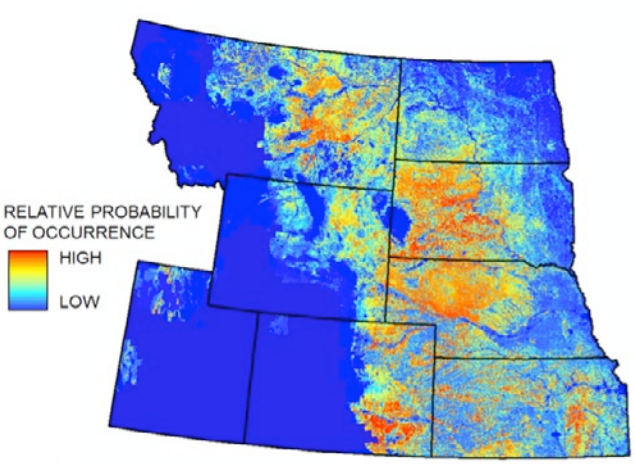

Figure 4. A spatial model of Grasshopper Sparrow occurrence in USFWS Region 6 provides a foundation for evaluating populations, assessing threats, and guiding conservation in the PPJV administrative area relative to a broader landscape (Niemuth et al. 2017)

Similar techniques were used to create breeding range-wide distribution models for Baird's Sparrow (*Ammodramus bairdii*), McCown's Longspur (*Rhynchophanes mccownii*) and Chestnut-collared Longspur (*Calcarius ornatus*) (Figure 7, M. Sather, unpublished data). All models were validated using independent datasets.

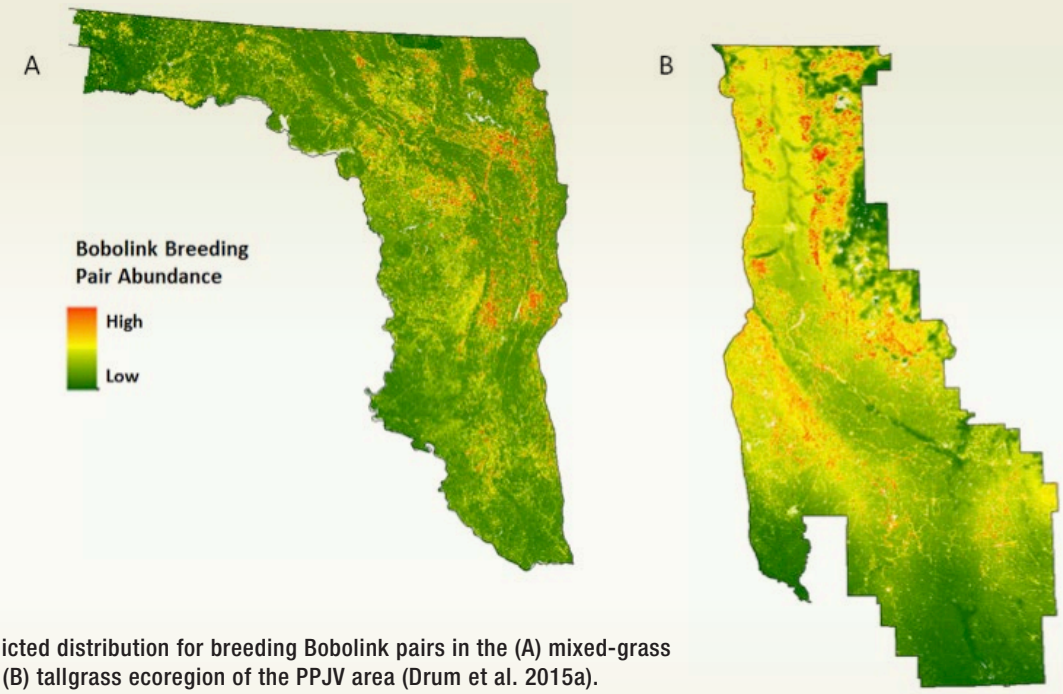

Figure 6. Predicted distribution for breeding Bobolink pairs in the (A) mixed-grass ecoregion and (B) tallgrass ecoregion of the PPJV area (Drum et al. 2015a).

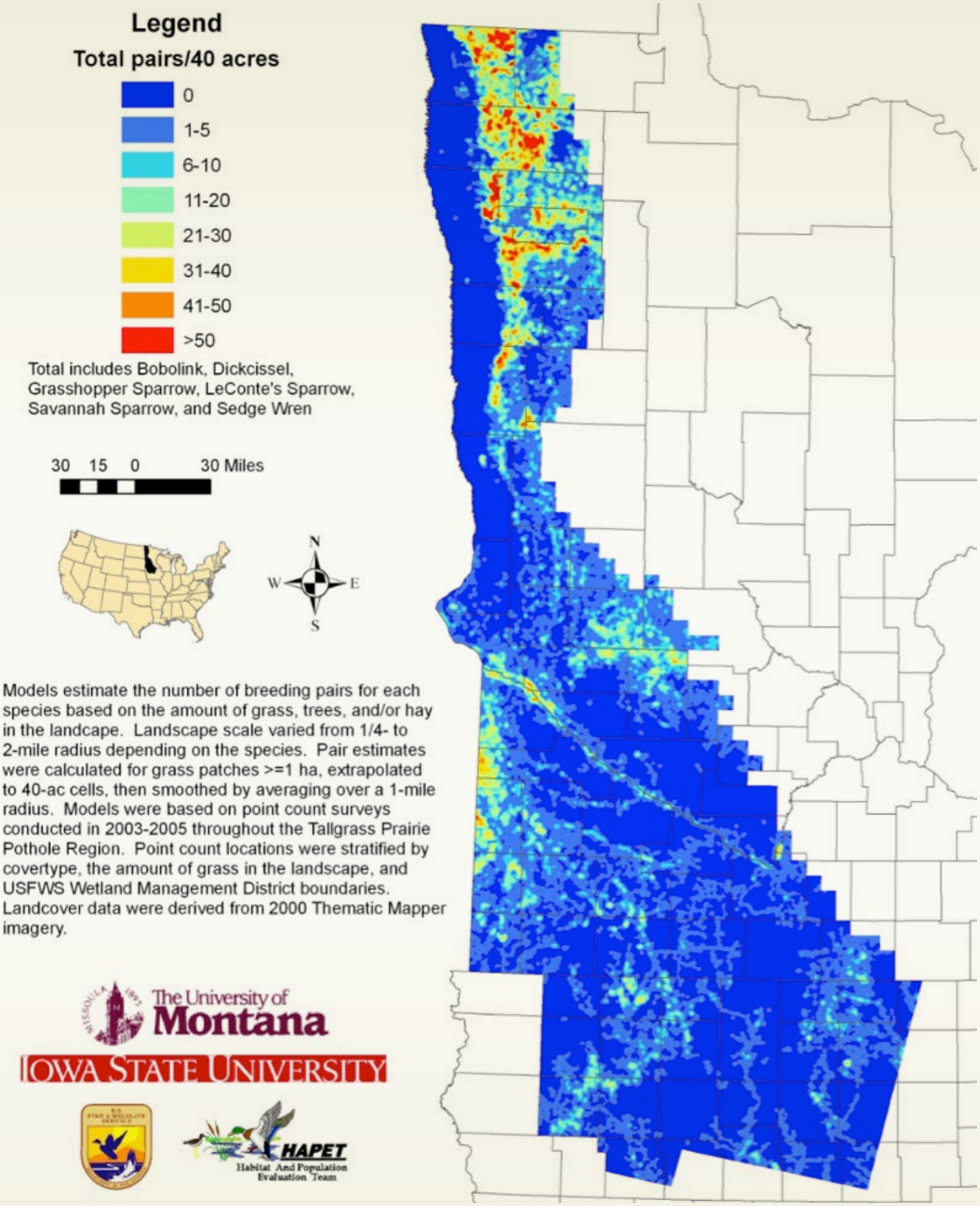

Figure 5. Predicted number of grassland nesting bird pairs in the Prairie Pothole Region of Minnesota and Iowa (Quamen 2007).

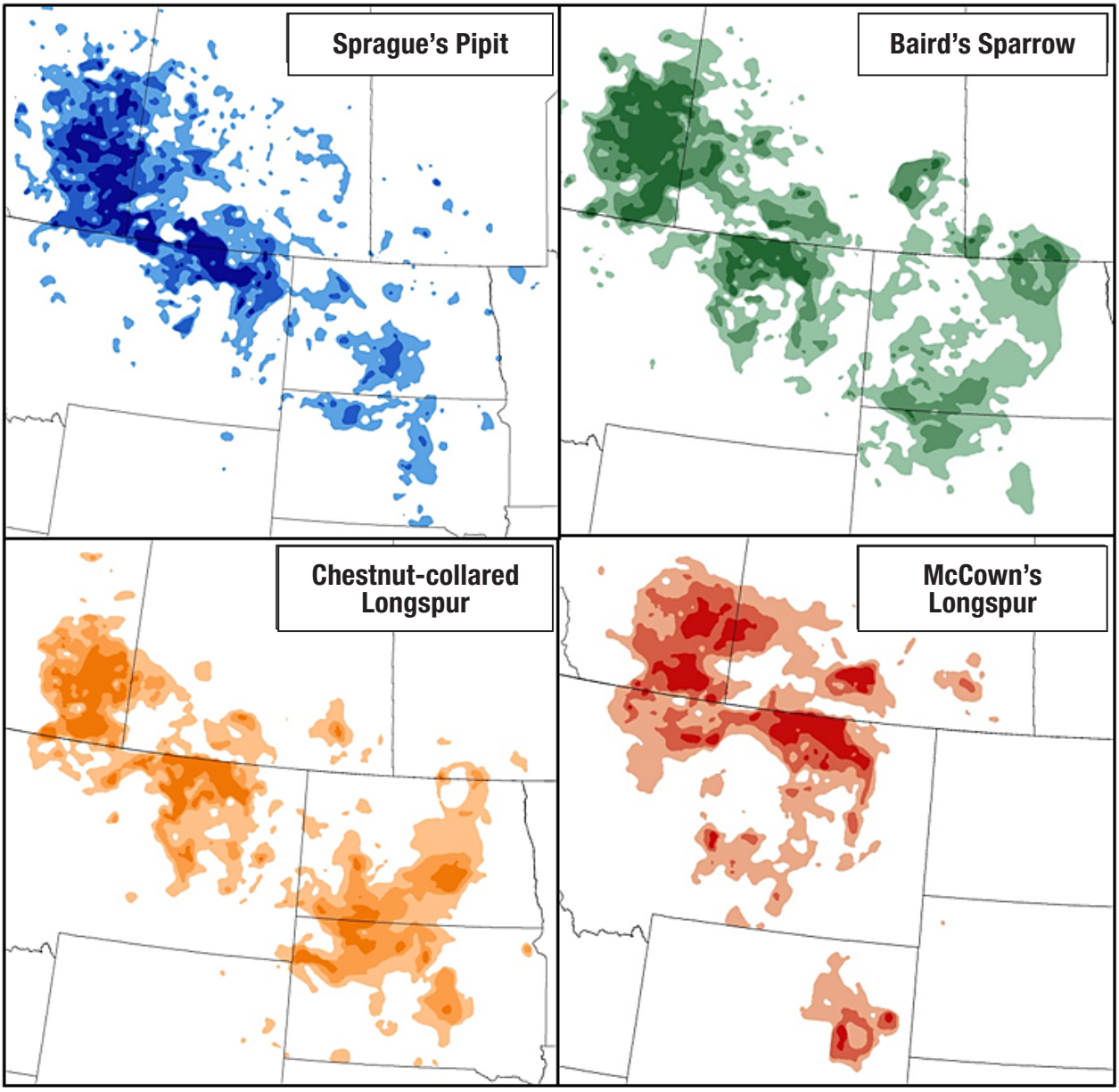

Figure 7. Predicted breeding population cores for 4 grassland songbirds of concern. Deeper colors show greater density of predicted occurrence. Deepest colors represent 25% population core, middle shade represents 50% population core, lightest shade represents 75% population core (Lipsey et al. 2015, M. Sather, unpublished data).

In addition to the biological models described above, individual partners and local planning efforts may include other models to identify conservation priorities. For example, Montana PPJV partners conducted an analysis in 2012 to guide conservation actions in the western Joint Venture area. They integrated models developed by the Montana Natural Heritage Program for priority grassland bird species with models developed for other priority species, such as the USFWS Thunderstorm Map for breeding waterfowl.

Finally, models that link socioeconomic considerations to biological outcomes will be important tools for grassland bird conservation in the PPJV administrative area. Drum et al. (2015*b*) suggested successful grassland bird conservation will depend upon linkages with ecosystem services on working agricultural lands and grassland-based marketing campaigns to engage the public. The authors recommended development of spatial models that link landowner decisions with biological outcomes as tools for informing conservation policy decisions.

POPULATION AND HABITAT TRENDS

The North American Breeding Bird Survey (BBS) is a cooperative effort between the USGS Patuxent Wildlife Research Center and Environment Canada's Canadian Wildlife Service to monitor the status and trends of North American bird populations. The annual, continent-wide survey is the primary source of information regarding populations of many North American bird species and is the only landbird monitoring program that covers the entire PPJV administrative area (Figure 8). In 2015, PPJV partners worked with USGS to expand the BBS in Montana where the core U.S. breeding ranges for several priority grassland landbirds are located. Before the expansion, Montana contained relatively few BBS routes compared to the other PPJV states. Data from the expanded survey will strengthen the JV's understanding of landbird population trends across the landscape. Additionally, models developed with BBS data (e.g., Niemuth et al. 2007, Niemuth et al. 2008, Niemuth et al. 2017, Lipsey et al. 2015) are used to predict the results of landscape level changes in the relationship of breeding landbirds to habitat quality and quantity. The BBS offers the considerable advantage of being conducted across most of North America, enabling comparisons of the PPJV administrative area with other regions and providing samples from outside the JV boundaries to increase sample size and ecological inference for spatial models.

Partners in Flight and the North American Bird Conservation Initiative

The 2004 Partners in Flight (PIF) North American Landbird Conservation Plan (NALCP; Rich et al. 2004) was the first attempt to establish continental landbird population estimates and objectives, and identified priority species of continental importance. The NALCP was revised in 2016 to reassess the vulnerability of 448 species of North American landbirds and recommend high priority landbird conservation actions. The 2016 NALCP also provided guidance on developing population objectives for priority species and highlighted an approach used by the Bobolink Working Group to specify trend-based population objectives for each BCR (see Population and Habitat Goals section below).

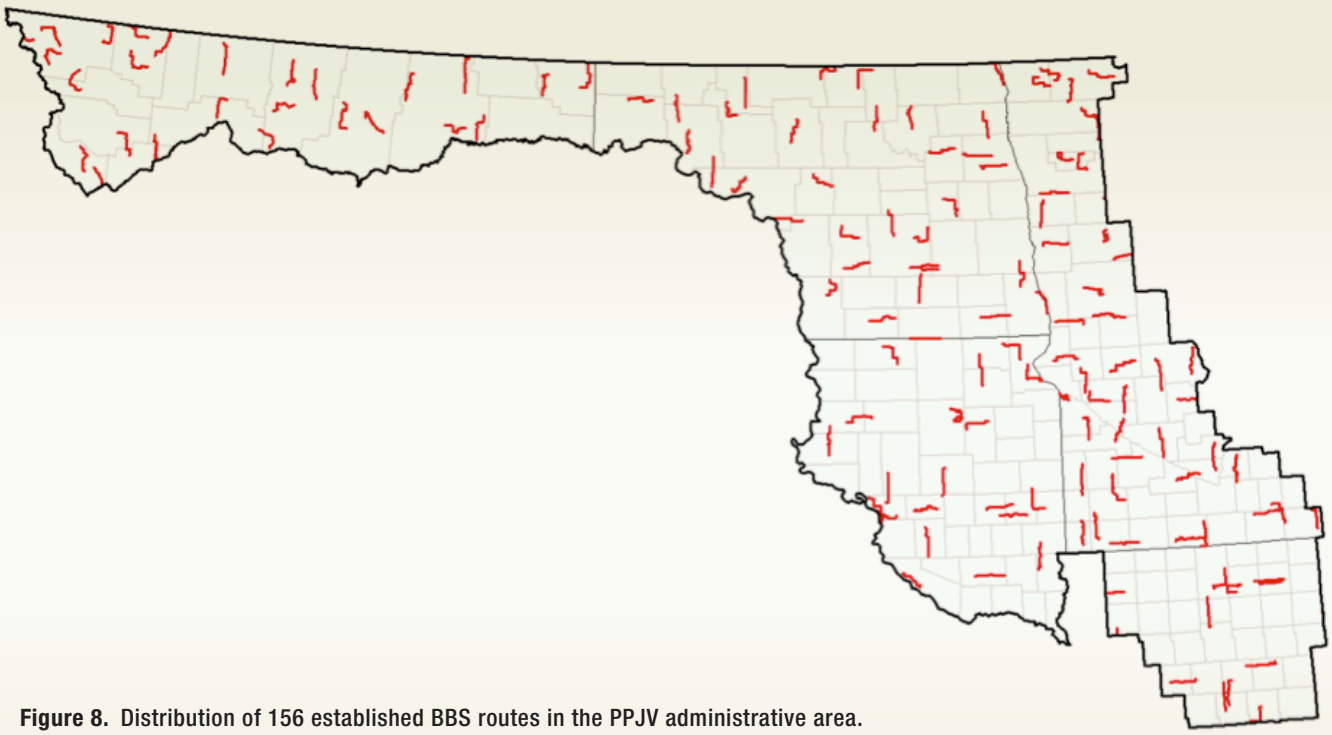

Figure 8. Distribution of 156 established BBS routes in the PPJV administrative area.

Since 2009, the U.S. North American Bird Conservation Initiative (NABCI) Committee has produced 7 State of the Birds (SOB) reports, some of which focus on key issues, such as climate change and private lands conservation. The U.S. NABCI Committee comprises government agencies, private organizations, and bird initiatives (including the NALCP) and helps partners across the continent meet their common bird conservation objectives.


Marissa Ahlering

The 2016 SOB report (NABCI 2016), the sixth report in the series, included those birds of highest conservation concern occurring in the U.S. and its territories. The report contained a list of priority species of conservation concern known as the PIF Watch List. The 2016 Watch List included many of the species listed under the Endangered Species Act, additional species that required immediate conservation attention, and others on or near the brink of being threatened that warranted continued vigilance. The Watch List is updated every 5 to 10 years based on improved methods of evaluation, additional data, and changes in the status of populations. As part of the species assessment process, PIF also identified 24 common birds in steep decline in the 2016 NALCP. These are birds still too numerous or widely distributed to warrant Watch List status that are experiencing troubling long-term declines. The birds included in the list have lost more than half their global populations over the past 4 decades. Of the 33 common bird species in steep decline, 18 occur in BCR 11 (Table 2).

Landscape Change

Changes in the extent and spatial distribution of landcover in the U.S. PPR are important because a continual, long-term decline of the remaining grasslands and wetland habitat (Anteau 2011, Hill et al. 2014, Lark et al. 2015) can exacerbate region-wide declines for populations of most grassland bird species (Peterjohn and Sauer 1999, Herkert et al. 2003, Niemuth et al. 2007). Additionally, habitat losses negatively impact many other ecosystem services, such as carbon sequestration (Fargione et al. 2009) and may result in a long-term functional loss of resilience to climate change (Johnson et al. 2010). Ongoing habitat losses may further increase risk for future losses of wetland and grassland on unprotected lands (Wright and Wimberly 2013), and may constrain practical options for future ecological restoration efforts (Dahl 2014).

The conversion of grassland and wetland habitat to row crop agriculture throughout the PPJV geography has been well documented (Oslund et al. 2010, Doherty et al. 2013, Dahl 2014, Lark et al. 2015). Land use and vegetative cover are changing constantly throughout the PPR. However, the availability of comprehensive landcover data is limited to periodic snapshots in time (for instance, National Landcover Data is typically published every five years and HAPET landcover products have been developed at similar time intervals) due to the cost and effort required to attain, process, and validate remotely sensed imagery. Thus, snapshots of landcover change, and their subsequent biological outcomes, are periodic and inherently retrospective, and may contain substantial errors.

BIOLOGICAL FOUNDATION

The current state of knowledge for PPR landbird breeding population dynamics and ecology is generally limited compared to waterfowl. The bird conservation community's understanding of factors influencing grassland bird population dynamics is generally poor across the entire life cycle (i.e., breeding, migration, wintering). However, the current high level of conservation concern expressed by PPJV partners and researchers warrants investing additional resources to begin filling those data gaps. To understand what part of the annual cycle conservation efforts should be focused on, full life cycle models that can elucidate limiting factors for priority landbird species are needed. Working with conservation partners, the PPJV will support research to understand grassland bird life history requirements, factors limiting population growth, and habitat conditions necessary for a growing population trajectory. To that end, we will establish a PPJV Grassland Bird Technical subcommittee to address long-term declining trends in grassland populations in a strategic and action-oriented manner. Furthermore, PPJV partners will work externally with other joint ventures across the ranges of these priority grassland bird species.

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PRIORITY SPECIES

The 2016 NALCP relies on the PIF Watch List to identify priority landbird species of continental importance. These species will inform the landbird conservation design efforts in the PPJV, although individual partners and local planning efforts may include other landbird species in project design. For example, those species identified in the NAWCA grant criteria as wetland-dependent and those species identified by regional or state planning efforts as conservation priorities can be different from NALCP species of concern (see individual State Tactical Plans).

The PPJV has selected as priority species those landbirds that are highly reliant on the region (>20% of the global population) and/or declining, or identified as priorities for partners (Table 4). Although Black-billed Cuckoo and Red-headed Woodpecker are included in the BCR 11 Yellow Watch List, these eastern temperate forest birds are not primary priority species for the PPJV, as their presence in much of the PPJV administrative area is likely a result of post-settlement fire suppression and tree planting. However, these species may be included in regional or local planning efforts as needed. For example, the Iowa PPJV State Tactical Plan identifies, as priorities for restoration, native oak savannah habitats, which are used by Red-headed Woodpeckers.

Thirteen grassland bird priority species were selected by associated grassland ecosystem in the PPJV administrative area (Table 4). The PPJV area encompasses approximately 118 million acres with approximately 51, 46, and 21 million acres in tallgrass, mixed-grass, and dry mixed-grass ecoregions, respectively. Landcover data from 2011 indicates the tallgrass ecoregion has 15%, the mixed grass ecoregion 38%, and the dry mixed-grass ecoregion 62% of their original grasslands remaining. In addition to the biological basis for the geographic distinction, partner communities and conservation paradigms differ from east (primarily habitat restoration) to west (primarily habitat protection). Drum et al. (2015*a*) developed models for priority species in the tallgrass and mixed-grass ecoregions. Models following methods by Niemuth et al. (2008) were developed for priority species in the mixed-grass and dry mixed-grass ecoregions. Finally, range-wide models were developed following methods by Lipsey et al. (2015) for priority species in the mixed-grass and dry mixed-grass ecoregions, including Canadian regions.

Table 4. PPJV priority species based on population abundance, population trend, and partner priorities. The ecoregions are dry mixed-grass (DMG), mixed-grass (MG), and tallgrass (TG).

Ecoregion	Priority species	Percent Population in BCR11	Population Trend (1966-2013)	Population Trend CI (1966-2013)	Population Trend (2003-2013)	Population Trend CI (2003-2013)	2013 BCR 11 Population Estimate	2016 Continental Pop'n Change Objective (30 year)	2004 BCR 11 Objective (30 year)
MG, DMG	Baird's Sparrow	90.5%	-3.14	(-4.78, -1.59)	-0.59	(-5.27, 4.44)	2,000,000	incr. 5% to 15%	4,000,000
MG, DMG	Sprague's Pipit	87.1%	-3.46	(-4.78, -2.23)	-4.46	(-7.99, -1.43)	800,000	incr. 5% to 15%	1,600,000
MG, DMG	Chestnut-collared Longspur	61.4%	-4.6	(-5.71, -3.39)	-3.89	(-5.74, -1.86)	1,700,000	incr. 5% to 15%	1,700,000
MG, DMG	McCown's Longspur	45.8%	-7.53	(-10.68, -3.46)	-5.87	(-10.76, 2.54)	300,000	incr. 5% to 15%	300,000
TG, MG	Clay-colored Sparrow	44.2%	-0.88	(-1.34, -0.42)	0.65	(-0.44, 1.77)	25,000,000	NA	NA
TG, MG	Bobolink	34.5%	-0.17	(-0.75, 0.33)	-0.55	(-2.29, 0.88)	2,800,000	incr. 5% to 15%	NA
TG, MG	Western Meadowlark	17.0%	-2.02	(-2.35, -1.64)	-1.55	(-2.33, -0.83)	15,000,000	NA	NA
TG, MG	Grasshopper Sparrow	16.0%	-1.97	(-2.81, -1.05)	-0.37	(-2.79, 1.95)	5,000,000	-25% to -10%	5,000,000
DMG	Lark Bunting	10.9%	-3.3	(-6.72, -0.24)	5.32	(-6.59, 16.60)	1,000,000	-25% to -10%	1,000,000
TG	Greater Prairie-Chicken	9.1%	7.35	(-1.47, 19.85)	6.52	(-21.9, 38.69)	30,000	incr. 5% to 15%	60,000
DMG	Greater Sage-Grouse*	9.0%	NA	NA	NA	NA	432,000*	incr. 5% to 15%	NA
TG, MG, DMG	Ring-necked Pheasant	7.4%	0.73	(-0.12, 1.63)	0.44	(-2.26, 3.07)	3,500,000	NA	NA
TG, MG, DMG	Sharp-tailed Grouse	55.2%	0.45	(-1.27, 1.99)	1.14	(-3.64, 4.91)	160,000	NA	NA

* Greater Sage-Grouse population estimate is Global and not BCR 11 specific

State-specific Bird Conservation Plans

Many PPJV states have state-specific conservation plans for priority species ranging from State Wildlife Action Plans to species-specific plans such as Ring-necked Pheasant (*Phasianus colchicus*) and prairie grouse management plans. Similar to the NALCP and SOB, these plans are guiding documents and underscore the importance of these priority species to our conservation partners across the U.S. PPR. Often, these plans identify population objectives and specific needs related to priority species and species of concern. Individual PPJV State Tactical Plans will incorporate these state-level plans into stepped-down wetland and grassland habitat objectives for each state.


Neal & MJ Mishler

POPULATION AND HABITAT GOALS

The PIF Population Estimates Database (PIF Science Committee 2013) is maintained for estimates of landbird populations published in the NALCP. The database was updated in 2013 using BBS data from 1998-2007. The population estimates allow direct step-down of continental population objectives to regional (BCR, state) objectives by assigning a proportion of the continental objective to the region. BCR 11 population objectives for PPJV priority species were originally developed based on 2004 NALCP 30-year continental objectives. Although the BCR objectives offered a starting point for the development of regional habitat-based conservation approaches, continental objectives might not be appropriate at finer scales if population trends differ at those extents. Further, regional habitat trends may also differ substantially from continental trends. Basing objectives on reducing local declines may be necessary to maintain stable populations at the larger scale over the long term. This is particularly true when it remains unclear what segment of the annual cycle (i.e., breeding, migration or wintering) is the predominant driver of observed trends in priority grassland bird populations.

> "...setting population objectives require identifying appropriate temporal benchmarks and evaluating our capability to restore bird populations given the dynamics of landscape conditions and threats."
> 2016 North American Landbird Conservation Plan revision

We will work cooperatively with other joint ventures, particularly the Prairie Habitat Joint Venture and the Northern Great Plains Joint Venture, to develop population and habitat objectives for the four priority mixed-grass species following PIF recommendations.

The 2016 NALCP also provided guidance on developing population objectives for priority species and highlighted an approach used by the Bobolink Working Group to allocate trend-based population objectives by BCR. The Bobolink (*Dolichonyx oryzivorus*) breeding range includes portions of 23 different BCRs with approximately 29% of its estimated breeding population in the PPJV area of BCR 11. Currently, some BCRs have positive population trends, others negative, and all have different amounts of Bobolink habitat. Over the 30-year period from 2016-2046, the Bobolink Conservation Plan objective is to slow the annual rate of population decline to 0% per year, as measured by the BBS, stabilizing the entire population at more than 85% of the 2016 population (Figure 9). Applying a uniform population trend objective of 0% to every region is not reasonable due to the large differences across BCRs. Alternatively, applying a range of trend objectives by BCR to balance the positive and negative trends, is a more reasonable approach to achieve stable populations (Table 5). Habitat objectives can be estimated based on breeding density estimates per unit suitable habitat area in the region. The approach is a logical alternative to developing BCR-specific population goals that are stepped down to habitat goals. Over the 5-year timeframe of this landbird plan, the intent of the PPJV is to use similar methods to develop population and habitat objectives for priority grassland birds of conservation concern. We will work cooperatively with other joint ventures, particularly the Prairie Habitat Joint Venture and the Northern Great Plains Joint Venture, to develop population and habitat objectives for the four priority mixed-grass species following PIF recommendations (see Andres et al. 2012).

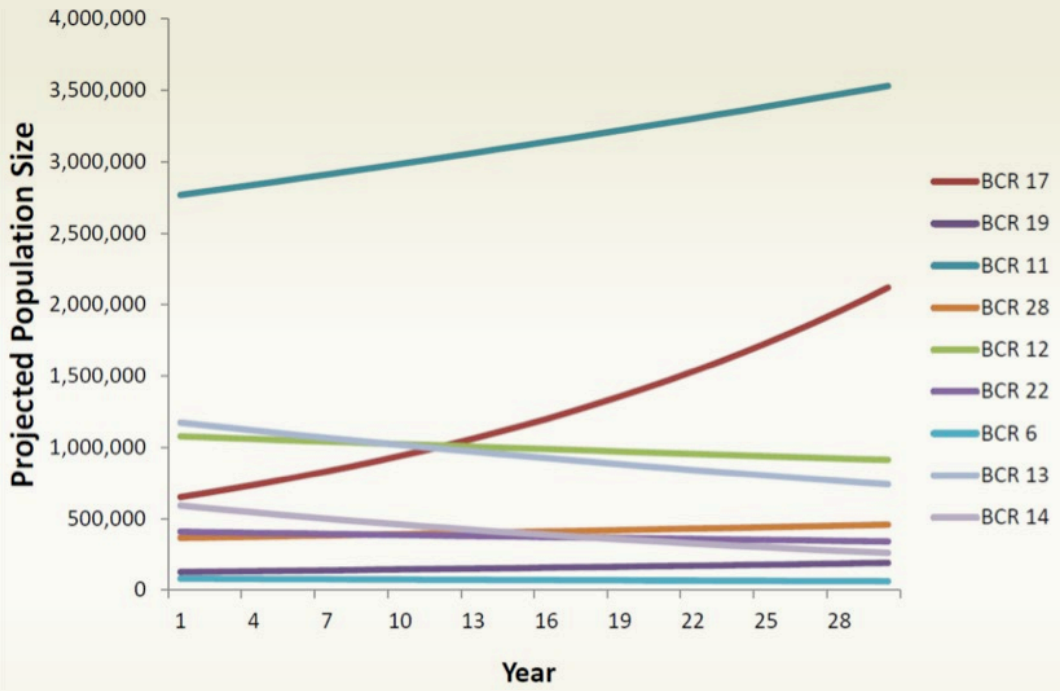

Figure 9. Projected populations of Bobolink in different BCRs that will meet a breeding range-wide population objective of stabilizing the entire population at more than 85% of current (2016) size after 30 years (2016 NALCP)

Table 5. Bobolink stable population trend objectives by BCR.

BCR	BCR Name	Country	Population Estimate	Area of Region (km^2)	Area of Range (km^2)	Population Estimate Unrounded	% of global population	Actual BBS Trend % (1985 - 2012)	Annual Trend Goal Year 10+
18	Shortgrass Prairie	US	5,000	150,920	24,371	5,251	0	4.59	1.20
17	Badlands and Prairies	US	660,000	361,915	296,251	651,428	8	4.02	1.20
24	Central Hardwoods	US	3,570	193,685	7,233	3,524	0	3.13	1.20
19	Central Mixed Grass Prairie	US	132,100	232,377	94,456	127,512	2	0.44	1.20
11	Prairie Potholes	US	2,380,000	414,628	414,618	2,367,178	29	-0.26	0.00
11	Prairie Potholes	CAN	404,000	462,707	408,853	400,690	5	-0.36	0.00
28	Appalachian Mountains	US	368,820	278,125	169,583	364,948	5	-0.36	0.78
8	Boreal Softwood Shield	CAN	88,500	1,057,447	154,098	92,838	1	-0.72	0.51
10	Northern Rockies	US	37,300	506,287	262,615	40,066	0	-3.18	0.12
10	Northern Rockies	CAN	30,000	382,730	23,140	28,752	0	1.29	0.12
12	Boreal Hardwood Transition	US	580,000	221,184	221,175	575,252	7	-0.75	0.00
12	Boreal Hardwood Transition	CAN	440,000	390,084	262,000	502,021	6	-3.54	-0.57
22	Eastern Tallgrass Prairie	US	410,800	519,495	379,665	408,063	5	-2.19	-0.63
6	Boreal Taiga Plains	CAN	81,000	266,916	57,209	79,946	1	-2.47	-0.84
30	New England/ Mid-Atlantic Coast	US	22,080	31,729	30,178	23,014	0	-2.55	-0.90
13	Lower Great Lakes/ St. Lawrence	US	270,000	88,310	88,309	311,729	4	-1.22	0.00
13	Lower Great Lakes/ St. Lawrence	CAN	910,000	112,947	112,915	861,208	11	-4.01	-1.00
23	Prairie Hardwood Transition	US	566,130	229,492	229,491	564,829	7	-3.53	-1.66
29	Piedmont	US	3,390	65,417	11,273	3,443	0	-4.45	-2.36
14	Atlantic Northern Forest	US	309,000	156,664	156,377	313,046	4	-2.24	0.00
14	Atlantic Northern Forest	CAN	279,000	200,755	200,697	278,906	3	-6.49	-1.00
9	Great Basin	US	26,510	691,283	81,930	25,865	0	-7.32	-4.00
9	Great Basin	CAN	900	60,293	34,391	942	0	-8.81	-5.97

Grassland Bird Conservation Areas (GBCAs) offer an interim solution for habitat goals until refined species-specific objectives can be estimated with current models. The PPJV integrated Type 3 GBCAs into priority grasslands for breeding waterfowl habitat objectives (see Waterfowl Plan). Priority grasslands are those Type 3 GBCAs that are accessible to over 25 breeding duck pairs per mile and at the greatest risk of conversion to cropland (i.e., have high suitability for farming as defined by NRCS SSURGO land capability classes 1-4). This integrated approach allows JV partners to leverage waterfowl conservation funding for actions that also benefit breeding grassland bird populations.

In addition to grasslands, primary habitats in the PPJV administrative area include wetlands, and, to a lesser extent, riparian woodlands and sagebrush steppe. But, because almost all PPJV priority species are associated with grasslands, grassland habitat conservation is the focus for the Joint Venture's landbird conservation efforts. Meeting trend-based population objectives for priority species requires maintaining or increasing the amount of suitable habitat and/or improving the quality of habitats already protected where breeding can successfully occur. Much work remains to be done to translate population objectives into meaningful, quantitative habitat objectives.

Scott Somershoe

Key Planning Assumptions

- Global and regional population size estimates derived from BBS data, which was not designed for this purpose, rely on diverse assumptions (see Rich et al. 2004, Thogmartin et al. 2006, Thogmartin et al. 2010) and have a level of error that can only be approximated. Estimates will continue to be improved or revised and posted on the PIF website (www.partnersinflight.org).
- Population estimates and objectives derived from the NALCP and PIF database use the best current information, but will continue to be revised and refined using local input and direct interaction with joint venture technical committees and partners.
- Quality and quantity of breeding habitat limits the populations of declining bird species. Even if species are limited by migration habitat or wintering habitat elements, maintaining the availability of suitable nesting habitat is still essential to the long-term stability of these populations.
- Population objectives are based on past population trends and are independent of population size estimates. Changes in population size estimates will have no effect on objectives, but improved trend estimates could have large effects.
- Continued conversion of native grasslands to agriculture and other uses is unavoidable. Maintaining or increasing populations of priority birds will require a combination of protection, restoration, and active management of existing habitat to provide desired conditions for priority bird species.
- It will be possible to continue to build and refine landscape models for use in conservation design to identify the best projects for landbirds and other taxa.

Grassland Bird Research Needs

- Identify demographic factors (i.e., vital rates) limiting population growth and the relative effects of breeding and wintering habitat conditions on those factors.
- Develop full life cycle models and sensitivity analyses to assess how density and demographic performance vary spatially and temporally in the breeding, wintering, and migration ranges of select species and how these differences affect populations.
- Understand how landscape composition affects demographic success (i.e., survival, fecundity) for multiple species at local (e.g., pasture, refuge) and regional scales.
- Identify best management practices to improve habitat quality for grassland birds in degraded native grasslands (i.e., moderately to highly invaded by exotic plants).
- Improve broad-scale maps of grassland vegetation structure and composition. Map exotic versus native vegetation and develop a remotely-sensed index of grassland biomass relevant to birds' density and/or reproductive success.
- Evaluate habitat quality for breeding priority species across the existing environmental gradient, from protected native grasslands to reconstructed cropland and restored exotic grasslands.
- Continue to assess the level of threats to populations represented by energy expansion and associated infrastructure, agriculture expansion, and other actions landscape stressors resulting in destruction, fragmentizing or degrading the current extent of grasslands.
- Investigate how various landowner decisions affect biological outcomes for priority species to inform conservation policy decisions.
- Identify methods to improve public engagement in grassland conservation through promotion of ecosystem services on working agricultural lands and marketing campaigns involving grasslands.
- Test assumptions associated with roadside surveys, specifically habitat selection bias and species detectability.
- Develop a composite strategic conservation plan for the 4 priority mixed-grass specialist species (Sprague's Pipit, McCown's Longspur, Chestnut-collared Longspur, and Baird's Sparrow) incorporating beneficial management practices.

Kevin Barnes

ACTIONS AND TREATMENTS

Habitat problems affecting priority grassland birds in the region include fragmentation of native vegetation, loss of wetlands and associated nesting cover, mismanagement of grazing, encroachment of invasive species (e.g., crested wheatgrass, Kentucky bluegrass), and the conversion of native prairie to other uses. Populations of many avian predators, and nest parasites such as cowbirds, have increased dramatically in response to anthropogenic activities. Habitat conservation strategies for other prairie wildlife, including migratory birds addressed by the other bird initiatives, will not differ substantially from those strategies implemented to meet the needs of waterfowl. Implementation strategies will focus on protection, restoration, and enhancement of prairie wetland and grassland communities. Perhaps the single most important conservation action for grassland birds is to protect the remaining grasslands in the PPJV administrative area from conversion to other uses.

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Actions and treatments associated with grass-based agriculture (i.e., livestock production) on privately owned, native prairie should also be addressed. Emphasis must be placed on maintaining livestock production. Strategies should include a wide array of incentive-based management tools to encourage livestock grazing that maintains appropriate vegetative structure to support priority nesting birds,

which in turn will help prevent the conversion of native prairie to cropland. Where cropland conversion has already taken place, the PPJV must work to continue Farm Bill programs such as the Conservation Reserve Program (CRP) and its successor program administered under the Agricultural Conservation Easement Program (AECP) to restore and maintain vegetative cover (preferably native plants) into perpetuity.

The Joint Venture will capitalize on those opportunities where modifications to habitat programs designed for waterfowl will provide key habitat elements for other species. The primary approach to grassland conservation throughout the majority of the PPJV administrative area will be GBCAs with continued development and refinement of BBS-driven models (e.g., Niemuth et al. 2008) to identify the highest priority areas for conservation efforts based on the known distribution, density, and/or abundance of priority bird species.


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Many grassland birds are nomadic by nature, perhaps as an inherent response to historic wet and dry cycles. This provides some resiliency in these populations, but because of the geographic expanse of the PPJV area, suitable habitat must be present throughout the distribution of the species to reach population objectives. While general approaches to grassland conservation for landbirds can be consistent across the PPJV area, each of the primary grassland ecoregions, particularly the tallgrass ecoregion, will require a different emphasis to meet the need of priority species, as described below.

In the tallgrass portion of the PPJV administrative area, restoration of grassland is nearly the only conservation option, since most of the native grassland has been lost to agricultural conversion and other uses. Due to its high level of conservation concern, the Greater Prairie-Chicken should be a priority species for conservation efforts in tallgrass areas, with Bobolink and Grasshopper Sparrow as secondary priority species. Biological planning here includes lek-focused, population connectivity-driven models for Greater Prairie-Chicken. The Minnesota Prairie Conservation Plan (Minnesota Prairie Plan Working Group 2011) identified priority dispersal corridors between suitable habitat areas necessary to connect established prairie grouse populations and re-colonize restored habitat.

Habitat conservation in the mixed-grass and dry mixed-grass ecoregions should focus protection efforts where the remaining habitat harbors the highest number of individuals of priority species. Restoration efforts should focus on those where the most notable declines of these species have occurred and where meaningful “blocks” or “patches” of suitable habitat can be created. For example, South Dakota’s Habitat Pays initiative is a joint effort between the state’s Game, Fish, and Parks agency and its Department of Agriculture. This program connects farmers and ranchers with resource advisors to help restore and maintain habitat in areas that most benefit wildlife. Primary priority species in these ecoregions include Baird’s Sparrow, Sprague’s Pipit, Chestnut-collared Longspur, McCown’s Longspur, and Ring-necked Pheasant. In these habitats, the use of fire, grazing, and exotic plant control to create a mixture of grassland conditions should meet the need of these species.

Although only a small portion of sagebrush steppe exists in the PPJV administrative area, the habitat has received considerable attention recently, primarily due to Greater Sage-Grouse conservation concerns. Some opportunities exist to help partners with sagebrush conservation within the PPJV area in the dry mixed-grass ecoregion of Montana. Approximately 9% of the continental population of Greater Sage-Grouse occurs in the region, and Montana PPJV partners are contributing resources to conserve sage-grouse habitat. There are opportunities to work closely with the Northern Great Plains JV on conservation actions for this species and its habitat.

PROGRAMMATIC ELEMENTS

Grassland bird conservation actions generally follow the same programmatic elements of protection, restoration, and enhancement established for waterfowl conservation. Grassland management actions, such as invasive species control, may be used to maintain species compositions and overall grassland productivity and resilience. However, many area-dependent grassland bird species may require larger blocks of grass or connectivity to existing patches of habitat across the landscape, thus, additional or further refinement of programmatic elements of conservation may be necessary. A conceptual matrix of conservation actions can further guide efforts on the landscape for these species (Figure 10). The 2011 Minnesota Prairie Conservation Plan employed similar concepts in the development of prairie core focal areas and connective corridors. Corridors can maximize the benefits of existing habitat and native prairie throughout the landscape; they are priority areas in which to concentrate protection and restoration efforts to achieve maximum efficiency and promote landscape-scale connectivity. The conceptual matrix may be more applicable to non-migratory priority game birds (e.g., prairie grouse), but similar approaches can be used with migratory birds that select habitat at multiple landscape scales and can fly over barriers. Clearly defining species-specific scale selection, habitat connectivity, and area-dependence will be important to refining the conceptual matrix for highly mobile and migratory species.

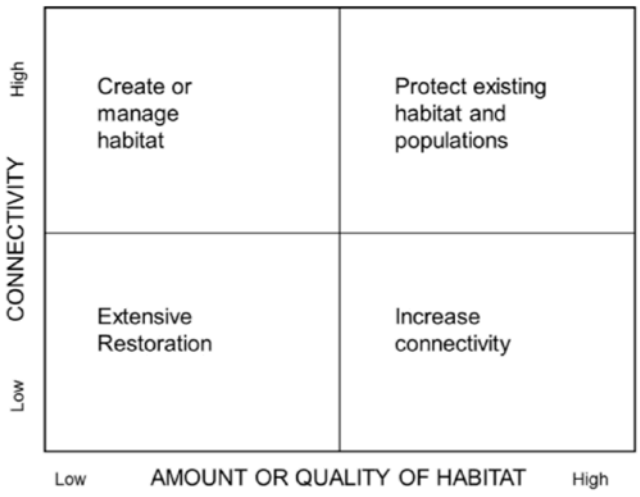

Figure 10. A conceptual decision matrix for area dependent grassland bird conservation that displays the recommended action in relation to combinations of amount of grassland habitat and connectivity in the landscape.

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SPATIAL PRIORITIZATION

The spatially-explicit GBCA model has been particularly important for PPJV grassland bird conservation since it is the primary tool used for integrating grassland bird and waterfowl conservation. The empirical models described in the Biological Models subsection above provide decision support tools for partners to prioritize conservation actions for specific species of interest. Although the models allow PPJV planners to identify the best places for protection, additional information may be needed to spatially target the other treatments of enhancement and restoration. Using GIS, landscape change scenarios can be applied with existing spatial models to identify the best tactics to employ in particular geographic areas. Regression coefficients from models can be used to estimate the response of individual species to amount of CRP lands, native grasslands, tree cover, and wetlands, which will increase efficiency of restoration and enhancement efforts, particularly outside the core area for grassland bird species. Similar modeling efforts in Kansas showed strong consistency in response to habitat type among species, which greatly simplifies interpretation of results and on-the-ground implementation (HAPET office, unpublished data; Figure 11).

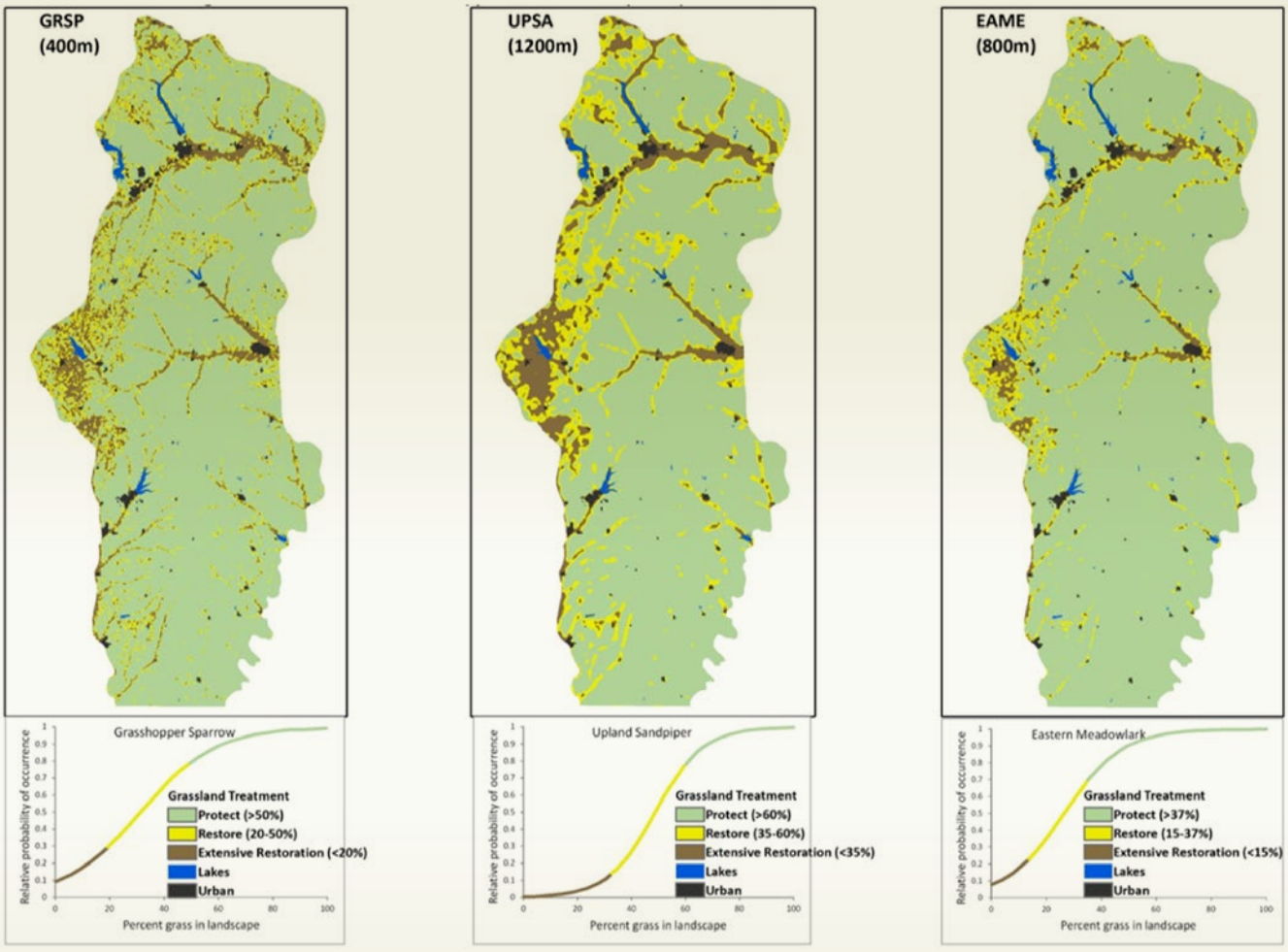

Figure 11. The USFWS HAPET office used BBS data and analyses to identify areas within the Flint Hills of Kansas that were best suited for grassland retention and restoration for three species of grassland birds – Grasshopper Sparrow, Upland Sandpiper, and Eastern Meadowlark. Probability plots below each map were developed using parameter estimates in model output that were then applied to landscape data to create the maps.

MONITORING LANDSCAPE CHANGE AND EVALUATING DEMOGRAPHIC RESPONSE

Progress toward landbird objectives will be monitored through the Breeding Bird Survey (BBS) and associated modeling efforts, and through specific monitoring and research projects designed to measure response by these species as conservation measures are implemented. The latter will be supported by the PPJV to the extent possible where a better understanding of how declining migratory birds respond to landscape change is needed. In Montana, for example, the Montana Bird Conservation Partnership has supported the Integrated Monitoring in Bird Conservation Regions (IMBCR) conducted by the Bird Conservancy of the Rockies. IMBCR objectives include using annual population estimates to monitor population trends and evaluate causes of population changes. These tools derived from IMBCR monitoring program will complement the ongoing BBS modeling effort.

Demographic monitoring is a primary concern for conservation of grassland birds in the PPJV administrative area. Two research projects designed to address demographic knowledge gaps are currently receiving PPJV support.

Demographic monitoring is a primary concern for conservation of grassland birds in the PPJV administrative area. Two research projects designed to address demographic knowledge gaps are currently receiving PPJV support. The Bird Conservancy of the Rockies is monitoring demographic rates in breeding and wintering grassland bird populations, investigating migratory connectivity, and developing an integrated population monitoring model to explore the influence of seasonal demographic rates on the population dynamics of Baird's Sparrow and Grasshopper Sparrow. PPJV partners are also working with Montana State University to fund a proposal to investigate abundance, nest density, and nest success as they relate to habitat quality for priority northern grassland birds in the Montana PPR. The research focuses on breeding Chestnut-collared Longspurs, Sprague's Pipits, McCown's Longspurs, and Baird's Sparrows.


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Other projects have been initiated by organizations to monitor landscape change within the PPJV landscape. The Plains and Prairie Potholes Landscape Conservation Cooperative (PPPLCC), for example, has adopted an approach to track the loss of native grasslands to cropland from 2008 to the present. The PPPLCC boundaries include the administrative areas of the PPJV, PHJV and NGPJV. Administered by World Wildlife Fund with PPPLCC funding support, the project is known as *Plowprint* and defines the "best of what's left" for prioritization by various agencies and groups working throughout the Northern Great Plains. Further refinement of the project to include biological context, in terms of priority species, to the existing native grasslands and the addition of restored grasslands can potentially add value to the program for PPJV partners.

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