# Landbird Conservation Plan

Version 1.0

East Gulf
Coastal Plain
Joint Venture

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**Cover Photograph:** Red-headed Woodpecker, Michael Carlo, U.S. Fish and Wildlife Service

# Executive Summary

The East Gulf Coastal Plain Joint Venture (EGCPJV) is a public-private partnership that provides a framework for regionally integrated bird conservation planning for the long-term sustainability of bird populations and their ecological communities.  The EGCPJV's Technical Advisory Team, under the direction of the Management Board, formed the Landbird Working Group (LWG) to address the population and habitat needs of landbirds, a group of species which have declined precipitously in North America since 1970 (Rosenberg et al. 2019).  The LWG was tasked with the development of a Landbird Conservation Plan (hereafter, the Plan) to include, at a minimum, quantified landbird population and habitat objectives for species that breed within the East Gulf Coastal Plain (EGCP) region.  This Plan is the first in a series of plans for conservation of various avifaunal taxa within the EGCP.  Bird populations are under increasing pressures from habitat loss and fragmentation, degradation and conversion to other land cover types and uses, in addition to myriad other stressors.  This Plan sets initial population and habitat objectives for priority landbirds, which breed in five broadly defined terrestrial systems: Eastern Interior Grasslands, Eastern Shrub-Scrub, Freshwater Forested Wetlands, Pine-Dominated Woodlands and Savannas, and Upland Hardwood & Pine-Hardwood Woodlands and Forests.  The Plan describes the process for selecting priority systems and species and reports a transparent, science-based approach to answering three fundamental questions in conservation planning:

- **How many birds?**

- **How much habitat?**

- **Where is the current habitat available and where do we need more?**

We determined priority landbird species (Chapter 2) based on priority lists in the Partners in Flight Landbird Conservation Plan (Rosenberg et al. 2016), the Partners in Flight (PIF) Avian Conservation Assessment Database (ACAD; Panjabi et al. 2019), the EGCPJV Implementation Plan (EGCPJV 2008), the U.S. Fish and Wildlife Service's (USFWS) Birds of Management Concern (USFWS 2008), State Wildlife Action Plans (SWAPs), and plans and lists from adjacent migratory bird joint ventures (hereafter, JVs). Priority species were selected if they (1) met priority list criteria, (2) were representative of the species using each terrestrial system in the JV, and (3) had sufficient data to calculate population and/or habitat objectives.  The initial list was refined using an average weighted scoring process, trends in the most recent 10 years of North American Breeding Bird Survey (BBS) data, and species ranges.  Each of the resulting 29 priority species was assigned to one or more of the five terrestrial systems prioritized in the Plan.

Population objectives (Chapter 3) for priority species were developed using the 10- and 30-year population targets in the Partners in Flight Landbird Conservation Plan (Rosenberg et al. 2016) to stabilize and/or increase bird populations in decline.  The LWG used a step-down process to refine population targets for Bird Conservation Regions (BCRs) 27 and 29 within the geography based on the proportion of current populations occurring within the JV boundary.  Habitat objectives were set for each broadly defined terrestrial system/habitat type using population objectives and species density estimates.  American Woodcock and Red-cockaded Woodpecker have existing plans (Kelley et al. 2008 and USFWS 2003, respectively) that specify population and habitat objectives within the East Gulf

Coastal Plain geography, and we chose to defer to these plans in lieu of calculating objectives based on the Partners in Flight Landbird Conservation Plan (Rosenberg et al. 2016). The working group determined that the species requiring the most habitat area to meet its population objective would be used to set the baseline habitat objective for each habitat type (Chapter 4). Habitat objectives were then allocated geographically for each State-by-BCR area based on the relative restoration potential of each

habitat type for each State-by-BCR area compared to the JV. For example, Mississippi x BCR-27 contains 46% of the JV-wide restoration potential for Eastern Interior Grasslands; thus, we allocated 46% of the JV-wide habitat objective for grasslands to Mississippi. Geographically-allocated habitat objectives and information about habitat condition inform how individual organizations can concentrate conservation efforts to meet local and regional objectives.

> **"Geographically-allocated habitat objectives and information about habitat condition inform how individual organizations can concentrate conservation efforts to meet local and regional objectives."**

The determination of priority species, population objectives, and habitat objectives includes many decision points and assumptions. We explicitly state critical assumptions (Chapter 3) and recognize the need to re-evaluate processes and associated assumptions as new information becomes available. This document represents our best estimation of the amount and placement of suitable habitat to meet breeding bird population objectives derived from national bird conservation plans. These objectives will be revisited regularly, and this Plan will be revised in subsequent iterations to include other aspects of landbird conservation (e.g., habitat objectives for wintering species, threats to habitat types; Chapter 5). This Plan outlines priority bird species for the East Gulf Coastal Plain and presents population and habitat objectives for these species by habitat. Throughout the Plan, we refer to the geography within our JV's administrative boundary in BCR 27 (Southeastern Coastal Plain) and the small portion within BCR 29 (the Piedmont) as the East Gulf Coastal Plain. Objective setting plays a critical role in supporting successful conservation delivery by our partners. We address how objectives support conservation decisions of administrators and land managers and acknowledge how defined goals provide a means to measure our success in conserving sustainable bird populations and communities (Chapter 5). Defining measurable population goals serves as a means to meet our overarching goal of conserving sustainable bird populations and their communities (USFWS 2008).

# Acronyms and Abbreviations Used

| | |
|---|---|
| ac | acres |
| ACAD | Avian Conservation Assessment Database |
| AI | Area Importance, referring to a score designated by Partners in Flight |
| BBS | Breeding Bird Survey |
| BCR | Bird Conservation Region |
| EGCP | East Gulf Coastal Plain (referring to the physiographic region) |
| EGCPJV | East Gulf Coastal Plain Joint Venture |
| FIA | Forest Inventory & Analysis Program |
| GAP | Gap Analysis Project |
| JV | Joint Venture |
| NABCI | North American Bird Conservation Initiative |
| NLCD | National Land Cover Database |
| PIF | Partners in Flight |
| SECAS | Southeast Conservation Adaptation Strategy |
| SWAP | State Wildlife Action Plan |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |

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## East Gulf Coastal Plain

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## East Gulf Coastal Plain

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# Introduction

The **East Gulf Coastal Plain Joint Venture** (EGCPJV) administrative boundary approximates the East Gulf Coastal Plain (EGCP) physiographic region defined by Partners in Flight (PIF; EGCPJV 2008). Although Joint Ventures generally align with Bird Conservation Regions (BCRs), delineation of JV boundaries is an imperfect process and often results in sections of **multiple BCRs residing within a single JV**. The EGCPJV's geographic area covers the portion of North American Bird Conservation Initiative (NABCI) BCR 27 (Southeastern Coastal Plain) that lies west of the Alabama-Georgia state line, includes much of the panhandle of Florida, much of central and southern Alabama and Mississippi, parts of western Tennessee and Kentucky, and eastern Louisiana. In central Alabama, the EGCPJV boundary also encompasses approximately 2.5 million acres (ac) of BCR 29 (Piedmont) and 670,000 ac of BCR 28 (Appalachian Mountains). To the west, the EGCPJV includes 724,000 ac of BCR 26 (Mississippi Alluvial Valley), mostly in Louisiana. To the north, the geography includes 135,000 ac of BCR 24 (Central Hardwoods). This plan establishes population and habitat



**Figure 1. The East Gulf Coastal Plain Joint Venture boundary relative to adjacent Joint Ventures.**

objectives for only BCRs 27 and 29 intersecting the administrative boundaries, as other BCRs are included in plans of the adjoining JVs: Appalachian Mountains, Atlantic Coast, Central Hardwoods, Gulf Coast, and Lower Mississippi Valley (Figure 1).
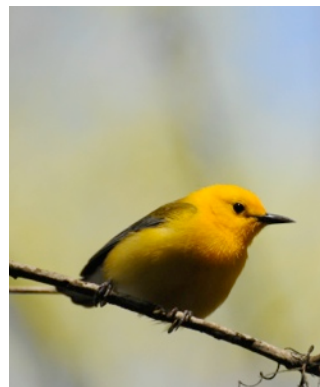


**Some birds of the East Gulf Coastal Plain, from left: Eastern Towhee/Jean Weller; Wood Thrush/Steve Maslowski; Prothonotary Warbler/National Digital Library; Eastern Wood-Pewee/Alan Schmierer**

# The East Gulf Coastal Plain: Physical Features and Vegetation

The EGCPJV's geography includes 62.63 million ac of diverse lands and waters.  Forest is the predominant land cover:  23% pine, 12% upland hardwoods, 12% mixed pine-hardwood forest, and 14% woody (or forested) wetlands (Figure 2, Table 1; Yang et al. 2018).  Agricultural land use (~20%) is common, particularly in the Black Belt prairie, the Loess Hills bordering the Mississippi Alluvial Valley, and parts of southern Alabama.  Developed areas (<7%), shrub-scrub conditions (<6%), and predominantly herbaceous land cover (<4%) are less common.

Historically, evergreen forest was prevalent in the EGCP physiographic region with the most common evergreen forest types dominated by longleaf pine (*Pinus palustris*), slash pine (*P. elliotti*), and loblolly pine (*P. taeda*), often with a co-dominant oak species (LANDFIRE 2014).  Current composition of pine has shifted toward loblolly and shortleaf pine due to their economic importance to modern silvicultural practices.  Ranked from greatest to least abundance by basal area, the current ratio of loblolly, shortleaf, slash, and longleaf pines is 4:2:1:1, respectively (Wilson et al. 2013).
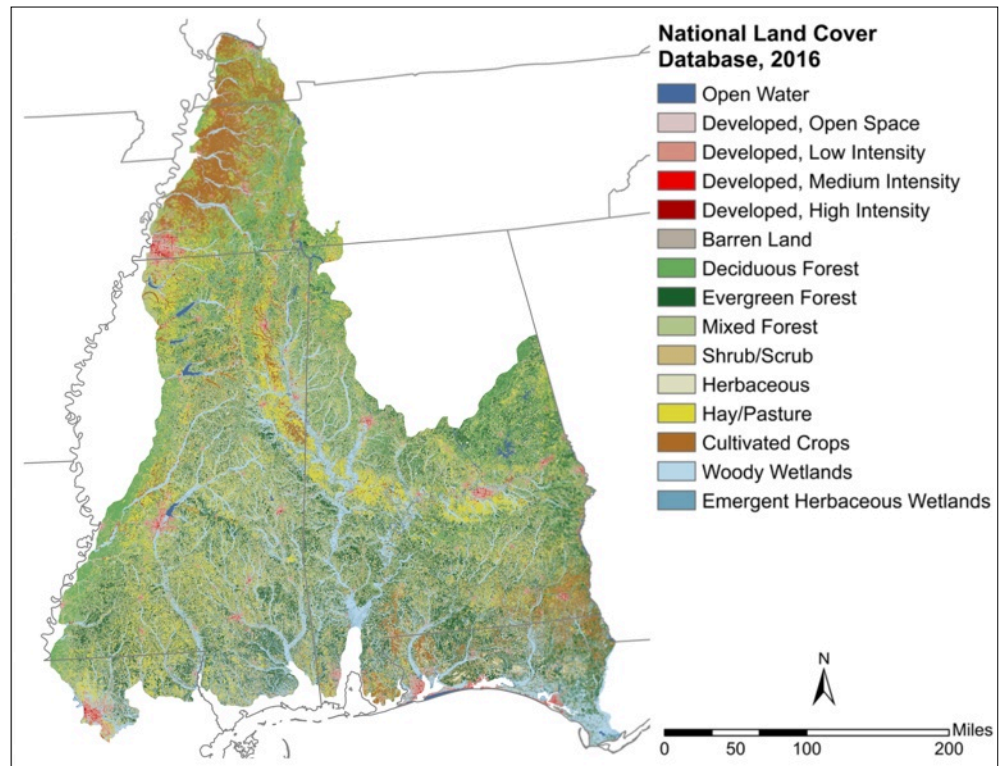


**Figure 2. Land use class and cover types in the East Gulf Coastal Plain derived from National Land Cover Database 2016 (Yang et al. 2018).**

Deciduous forest is concentrated along the Tennessee River and the Loess Hills and floodplain forests adjacent to the Mississippi Alluvial Valley. Mixed pine-hardwood forest is distributed throughout the region.  Agricultural development has substantially affected the landscape with approximately 12.45 million ac in agricultural production (hay, pasture, and cultivated crops), an area nearly equivalent to the geography's evergreen forests.  Cultivated crops include corn (*Zea mays*), cotton (*Gossypium hirsutum*), soybeans (*Glycine max*), wheat (*Triticum aestivum*), and peanuts (*Arachis hypogaea*) (USDA 2019). These are primarily located in areas of western Tennessee and Kentucky, the Black Belt Prairie region of Mississippi and Alabama, and along the Alabama-Florida state line.

The EGCP generally includes three ecological subregions (from McNab et al. 2007):

**Coastal Plains—Middle Section**
(Subregion 231B): Strongly rolling to hilly terrain with soils ranging from sands and silt to chalk and clays. Vegetation is variable and historically included oak-pine, loblolly-shortleaf pine, and oak-hickory cover types.

This subregion also includes the Blackland Prairie Ecoregion, a mosaic of prairie, shrubland, and forest named for its soil's dark, rich color. Prairies occurred in two distinct areas: the Black Belt, which runs in a narrow strip from east-central Mississippi to Georgia and northward in discrete fragments into Tennessee, and the smaller, more southerly Jackson Prairie Belt.  Surveys from the General Land Office in the 1830s show approximately 356,000 ac of prairies occurring in the Black Belt of Alabama and Mississippi and an additional 48,000 ac in the Jackson Prairie Belt in central Mississippi (Barone 2005a, b).  Because of its historic soil fertility, the Blackland Prairie Ecoregion has undergone major, agriculture-related shifts in land use, including the growth of cotton plantations beginning in the late eighteenth century and more recent increases in wheat, corn, soybeans, peanuts, and pine plantings (Webster and Bowman 2008).  These prairie belts have been reduced significantly from their pre-1830 extent, with perhaps only 500 ac of prairie remaining in Mississippi (Schotz et al. 2014) and with remnant fragments often occurring on drier or heavy clay soils less conducive to agriculture (Barone and Hill 2007).  Prairie and shrubland loss in this subregion has ramifications for numerous disturbance-dependent bird species (Gilbert and Ferguson 2019).

**Coastal Plains—Loess Section** (Subregion 231H): Irregular plains and gently rolling hills with deep, fine-textured loess soils.  Historic cover included oak-pine, loblolly-shortleaf pine, oak-hickory, and oak-gum-cypress forest types.

**Gulf Coastal Plains and Flatwoods Section** (Subregion 232B): Flat landscape of irregular or smooth plains on sand and clay soils.  Longleaf-slash pine, loblolly-shortleaf pine, and oak-hickory forest types have historically dominated this section with oak-gum-cypress forests occurring along rivers.

**Table 1.** Area (hectares and acres) of each land use class and cover type in the East Gulf Coastal Plain (source: National Land Cover Database 2016 [Yang et al. 2018]).

| LAND COVER | HECTARES | ACRES | % |
|---|---|---|---|
| Evergreen Forest | 5,803,385 | 14,339,521 | 23.2 |
| Woody Wetlands | 3,576,039 | 8,835,996 | 14.3 |
| Hay/Pasture | 3,159,287 | 7,806,249 | 12.7 |
| Mixed Forest | 3,122,317 | 7,714,899 | 12.5 |
| Deciduous Forest | 3,049,630 | 7,535,298 | 12.2 |
| Cultivated Crops | 1,877,414 | 4,638,882 | 7.5 |
| Developed, including Open Space | 1,666,164 | 4,116,908 | 6.7 |
| Shrub/Scrub | 1,473,366 | 3,640,524 | 5.9 |
| Herbaceous | 971,363 | 2,400,130 | 3.9 |
| Emergent Herbaceous Wetlands | 213,153 | 526,678 | 0.9 |
| Barren Land | 55,039 | 135,995 | 0.2 |
|  |  |  |  |
| Total | 24,967,157 | 61,691,080 | 100 |

# Natural Disturbances, History, and Land Use

Disturbance regimes are key in maintaining many vegetative communities in this geography. Natural and anthropogenic fire has shaped much of the uplands and flatwoods into a pyric landscape (Stanturf et al. 2002). The geography also hosts a diverse array of coastal, riverine, and non-alluvial wetlands moderated by hydroperiod, soils, and relatively infrequent fire. Tornadoes, hurricanes, and ice storms also provide isolated, seasonal disturbances which reset the forest succession process (Peterson 2000).



Longleaf pine woodland/Chuck Bargeron, University of Georgia, Bugwood.org

The EGCP's climate, topography, frequent lightning strikes, and early anthropogenic management converged to sustain a pyric landscape resulting in the dominance of floristically diverse longleaf pine ecosystems in the Lower and Middle Coastal Plains (Van Lear et al. 2005, Frost 2006, White and Harley 2016). Longleaf pine ecosystems occupied as much as 60 million ac in the southeastern U.S. prior to European settlement (Outcalt and Sheffield 1996). The frequent fire regime of the Coastal Plain was characterized by low-intensity fire occurring predominantly during the growing season at a biannual to 3-year fire return interval (Frost 2006, Huffman 2006, Stambaugh et al. 2011, White and Harley 2016). The resulting vegetative composition and structure promoted fire adaptations in numerous wildlife species, including many high-profile species currently at risk [e.g., Gopher Tortoise (*Gopherus polyphemus*), Pine Snake (*Pituophis melanoleucus*), Bachman's Sparrow (*Peucaea aestivalis*), and Red-cockaded Woodpecker (*Dryobates borealis*)].

Due to demand for longleaf pine timber and turpentine, grazing practices, clearing for row crops, and disruption of a frequent-fire regime, the extent of longleaf pine ecosystems declined to 20 million ac by 1935 (Landers et al. 1995, Outcalt and Sheffield 1996, Frost 2006). Large-scale fire suppression continued through the 1980s until concerns about declining fire-adapted wildlife [e.g., Northern Bobwhite (*Colinus virginianus*), Wild Turkey (*Meleagris gallopavo*)] and a modernized understanding of ecosystem processes and wildfire fuel mitigation strategies led to a renewed interest in managing land with fire (Van Lear et al. 2005, Frost 2006). By this time, longleaf pine ecosystems had been reduced to less than 3 million ac, with remnants concentrated in the panhandle of Florida, southern Alabama, and the Red Hills region of southwestern Georgia (Landers et al. 1995, Outcalt and Sheffield 1996). A fragmented landscape, establishment of shade-tolerant, fire-sensitive tree species [e.g., maple (*Acer* spp.) and hickory (*Carya* spp.)], landowner practices, smoke management concerns, and cost remain

**Forested wetland in Florida/Ryan Hagerty, U.S. Fish and Wildlife Service**

obstacles to the restoration of a pyrogenic landscape (Ryan et al. 2013, Wonkka et al. 2015).

While fire shaped the EGCP's uplands and piney flatwoods, the additional influence of hydroperiod and soils defined the various forested and non-forested coastal, riverine, and non-alluvial wetlands. Wetland hydroperiods may be derived from seasonal rainfall, riverine flooding, groundwater, or deep groundwater sources (Winger 1986), and fire can be moderately infrequent (Wade et al. 2000). Wetlands contain enormous biodiversity and provide key habitat for wintering Henslow's Sparrows (*Centronyx henslowii*; Plentovich et al. 1999, Tucker and Robinson 2003, Brooks and Stouffer 2011) and Rusty Blackbirds (*Euphagus carolinus*; Greenberg and Matsuoka 2010, Luscier et al. 2010), both of which have suffered widespread and large population declines. Mitigation, landowner assistance programs, and promotion of forested wetland restoration and management for waterfowl and riparian songbirds are addressing wetland loss, but often with mixed results. Dedicated conservation funding, including the federal Duck Stamp, paid for primarily by waterfowl hunters, appears to be aiding the recovery of waterfowl species, the only taxonomic group currently on the rise (Rosenberg et al. 2019). Hopefully, forested wetland and riparian forest landbirds will follow waterfowl's upward trajectory as habitat conservation and restoration efforts continue.

A study of North American avifauna abundance found that 2.5 billion (or 27%) of landbirds have been lost since 1970, with grassland birds incurring the highest proportional losses in abundance (53%; Rosenberg et al. 2019). Future land use and climate change models project additional habitat loss for numerous wildlife species (Bateman et al. 2016), and potential declines in habitat quantity and quality are greatest for species associated with open vegetative structure (Martinuzzi et al. 2013, Martinuzzi et al. 2015). Also of concern is increasing development pressure near areas set aside for conservation (e.g., National Wildlife Refuges; Hamilton et al. 2016), which can decrease connectivity among protected sites, reduce use of prescribed fire as a management tool, and alter hydrology—reducing suitable habitat surrounding these areas. As a result, agencies, public-private partnerships, and non-governmental organizations are re-evaluating conservation strategies, habitat goals, and apportionment of responsibilities in the context of land-use scenario and climate change vulnerability assessments (Bagne et al. 2014, Galbraith et al. 2014, Culp et al. 2017, Rempel and Hornseth 2017).

# The East Gulf Coastal Plain Joint Venture: History and Purpose

The EGCPJV is a public-private partnership seeking to advance the sustainable conservation of bird populations and their habitats.  Formed as a science-based, strategic approach to conservation at an ecoregional scale rather than a jurisdiction formed by political boundaries, the EGCPJV convenes Federal, State, non-governmental agency, university, and private stakeholders to address bird conservation in response to regional opportunities and threats.

The EGCPJV **Implementation Plan**, first published in 2008 (EGCPJV 2008), established the JV's mission to protect and restore bird populations of the EGCP geography by coordinating the effective conservation of key habitats.  The Implementation Plan articulated the EGCPJV's commitment to a science-based approach to conservation that is strategically implemented at the landscape-scale to maximize conservation benefits and to leverage human and financial resources.  The Implementation Plan positioned the JV as a key communicator and platform for alignment of bird conservation priorities for partner organizations and the broader regional conservation community.

The Implementation Plan also established the EGCPJV's mission and strategic conservation framework.  To advance the mission of sustainably protecting and restoring bird populations, management goals for priority species and their habitats are key.  The partnership has devoted its past resources to decision support (e.g., Open Pine Decision Support Tool), which serves as the basis for subsequent conservation planning and delivery.  The partnership is currently focusing on the identification of taxonomic priorities and the quantification of bird population and habitat objectives.  The EGCPJV builds upon the North American Bird Conservation Initiative (NABCI), the PIF Landbird Conservation Plan, the National Bobwhite Conservation Initiative, and numerous species recovery plans, which contribute to the growing body of knowledge pertaining to priority bird species' ecology, population status, threats, response to management, and paths to recovery.

**Eastern Kingbird/Jim Hudgins, U.S. Fish and Wildlife Service**

> "The EGCPJV's Landbird Conservation Plan sets biologically-derived habitat and population objectives.  The intent is for partner organizations, as individuals and in collaboration, to use objectives to focus the delivery of on-the-ground conservation projects."

The EGCPJV's Landbird Conservation Plan (hereafter, Plan) draws from the Implementation Plan and other national and regional bird conservation efforts to set biologically-derived habitat and population objectives.  The intent is for partner organizations, as individuals and in collaboration, to use objectives to focus the delivery of on-the-ground conservation projects.

# Goals of the Landbird Conservation Plan

The Plan defines quantitative, spatially-explicit bird population and habitat objectives derived from biological planning and conservation design processes. This Plan addresses three key questions:

1. How many birds are needed to sustain populations?

2. How much habitat is needed to sustain bird population targets identified in #1?

3. Where is current habitat, and where is additional habitat needed?

The Plan should assist partners in identifying strategies for conservation delivery that maximize contributions toward bird population objectives (EGCPJV 2008). These strategies are designed to either increase populations or lessen the rate of decline in species in steep decline. The Plan is a component of the JV's overall bird conservation strategy. The partnership is developing a suite of conservation plans for landbirds, waterbirds, shorebirds, and waterfowl, used in concert with decision support tools and partner expertise to support management decisions and prioritize conservation projects.



**Black Belt Prairie, Mississippi/Dwayne Estes**

# Overview of Process

The Plan identifies priority species and establishes both population and habitat objectives to inform future conservation delivery. This Plan has 10- and 30-year objectives to align with continental planning horizons (e.g., Partners in Flight Landbird Conservation Plan; Rosenberg et al. 2016) and sets expectations for evaluation of conservation delivery. Plan revision will be based on conservation delivery, monitoring, and evaluation outcomes (Figure 3).

The Landbird Working Group (hereafter, LWG) identified priority species (refer to Chapter 2) using a weighted process, which included the **Partners in Flight Watch List**, State Wildlife Action Plans



**Bachman's Sparrow/Alan Schmierer**

(SWAPs), plans from neighboring JVs, and other efforts. Each priority species was associated with one or more vegetative communities or systems (e.g., Eastern Interior Grasslands, Freshwater Forested Wetlands, Pine-dominated Woodlands and Savannas).

To develop population and habitat objectives, the LWG used a step-down process from the PIF Landbird Conservation Plan and species recovery plans prepared by the U.S. Fish and Wildlife Service (for Red-cockaded Woodpecker) and a taskforce and working group collaborating with the Association of Fish and Wildlife Agencies (for American Woodcock). Population and habitat objectives were established for states based on estimates of current bird populations, habitat availability, and the proportion of restorable habitat encompassed in each State-by-BCR area of the geography (refer to Chapters 3 and 4).

Ultimately, the success of the Plan is contingent on delivering habitat at the right spatial scale and location and on bird populations responding as predicted to improvements in habitat availability and condition.

**Figure 3. The East Gulf Coastal Plain Joint Venture Landbird Conservation Plan outlines an iterative process emphasizing collaborative, strategic, and outcome-driven avian conservation.**

# Priority Landbird Species

## Overview

Upon the partnership's formation, the EGCPJV's Technical Advisory Team and Management Board selected priority habitats to drive initial conservation efforts.  Priority habitats were selected based on conservation concern for species associated with each habitat type, the importance of each habitat to partner organizations, and the current quantity and quality of habitats within the geography (EGCPJV 2008).  The habitat framework includes five broadly defined terrestrial systems: Eastern Interior Grasslands, Eastern Shrub-Scrub, Freshwater Wetland, Pine-dominated Woodlands and Savannas, and Upland Hardwood & Pine-Hardwood communities (Table 2).  For habitat type descriptions, refer to the Appendices of the Implementation Plan (EGCPJV 2008).

The identification of priority bird species was the next step to refine biological planning within priority habitat types.  However, many species prioritization "lists" identifying important species to drive conservation efforts exist at the federal, regional, and state levels.  These lists often incorporate stakeholder efforts to identify priority species, and they frequently account for species population trends, range, and threats to sustainable populations.  The LWG acknowledged the extensive science behind existing prioritization efforts and, as a first step, aggregated priority lists from continental, regional, and state plans.  The LWG then developed a comprehensive weighting structure, described below, to identify and rank EGCPJV's priority landbird species.

**Table 2.** The East Gulf Coastal Plain Joint Venture habitat framework (from EGCPJV 2008).

| EGCPJV HABITAT FRAMEWORK |
| --- |
| **Eastern Interior Grasslands Communities** |
| Meadows & Prairies |
| Agricultural & Cropland |
| Pasture |
| Rank Herbaceous/Grasses |
| **Eastern Shrub-Scrub Communities** |
| Early-successional Hardwood/Pine |
| Manmade/Disturbed |
| **Freshwater Wetland Communities** |
| Freshwater Forested Wetlands |
| Bottomland Hardwood |
| Cypress-Tupelo |
| Bay Swamps & Depressional Wetlands |
| Shrub-scrub Swamp |
| Beaver Ponds/Meadows |
| Riparian |
| Riparian Woodland |
| Riparian Scrub/Edge |
| **Pine-Dominated Communities** |
| Pine Flatwoods/Mesic Pine (Open/Savanna) |
| Pine Uplands & Sandhills (Open/Savanna) |
| Pine Plantations |
| Other Pine Forest |
| **Upland Hardwood & Pine-Hardwood Communities** |
| Mixed Hardwoods |
| Loess Bluffs |
| Tennessee Plateau |
| Pine-Hardwood |
| Hardwood Plantations |

The initial species list included any landbirds addressed in the following:

- EGCPJV Implementation Plan (EGCPJV 2008),
- PIF Landbird Conservation Plan (Rosenberg et al. 2016),
- U.S. Fish and Wildlife Service (USFWS) Birds of Conservation Concern (USFWS 2008),
- Most recent SWAPs for
  - Alabama (ADCNR et al. 2015),
  - Florida (FWC 2012),
  - Kentucky (Kentucky's Comprehensive Wildlife Conservation Strategy 2013),
  - Louisiana (Holcomb et al. 2015),
  - Mississippi (Mississippi Museum of Natural Science 2015),
  - Tennessee (Tennessee SWAP Team 2015),
- and conservation plans from adjacent JVs.

Adjoining JV plans included:
- the Gulf Coast JV Landbird Conservation Plan (Vermillion et al. 2012) and
- Lower Mississippi Valley JV Landbird Plan (Twedt et al. 1999).

Supporting information came from:
- Central Hardwoods JV (Jones-Farrand et al. 2009, Bonnot et al. 2011, 2013),
- Atlantic Coast JV (ACJV, unpubl. report), and
- Appalachian Mountains JV (AMJV, unpubl. report).



Loggerhead Shrike/Alan Schmierer

Expert opinion and existing literature supported identification of associated habitat types for each species, and weighted rankings were used in combination with 10- and 30-year rates of decline from North American Breeding Bird Survey (BBS; Sauer et al. 2017) to finalize the list of priority bird species by habitat type.

The LWG identified 118 species for consideration within the Landbird Conservation Plan.  In order to refine the list of landbird species into a set of manageable priorities, the LWG used a hierarchical decision process, which included existing bird conservation efforts (Table 3), species population trends from the BBS, relative importance of the EGCP to the species, species characteristics, and habitat type.  The final priority list of 29 landbird species (see Table 4 below) was intended to reflect species suitable for long-term biological planning and conservation delivery.  This prioritization process was intentionally designed to be iterative and responsive to new science and shifting conservation needs.

# Prioritizing Species: Using a Weighted-Average Approach

To be consistent with landbird priorities in overlapping and adjacent geographies, the LWG considered 16 existing bird conservation plans and databases to refine the species list and set priorities (Table 3). Each plan was assigned a weight based on the plan's importance to landbird priorities in the EGCPJV's geography.  Species listed as Red, Yellow, or Tan Watch List species in the PIF Continental Landbird Conservation Plan received the greatest weight (20%) due to continental importance (Rosenberg et al. 2016).  PIF assigns Watch List status based on relative vulnerability of all landbirds for six factors: population size, breeding distribution, non-breeding distribution, threats during breeding season, threats during non-breeding season, and population trend.  Scores for each factor ranging from 5 (highest) to 1 (lowest) were used to develop continental concern groups with population goals:

- Red Watch List ("Recover"): Species with high vulnerability due to small population and range, high threats to breeding and non-breeding distributions and rangewide declines.

- Yellow Watch List ("Reverse Decline"): Species in decline with moderate to high threats.

- Common Birds in Steep Decline or Tan Watch List ("Stabilize"): Species in steep decline that are sufficiently abundant to prevent or delay PIF watch list status or federal listing under the Endangered Species Act of 1973 (ESA; 16 U.S.C. § 1531 et seq.).

**Table 3.** A weighted-average process was used to prioritize bird species in the East Gulf Coastal Plain Landbird Conservation Plan.  Species received a weighted average score from 0 (lowest) to 1.0 (highest) based on occurrence in 16 existing bird conservation plans.

| WEIGHT ASSIGNMENTS TO EXISTING BIRD CONSERVATION PLANS | |
|---|---|
| PIF Landbird Conservation Plan 2016: Continental Concern Group | 20.0% |
| Species of Greatest Conservation Need in State Wildlife Action Plans (Alabama, 2015; Florida, 2012; Kentucky, 2013; Louisiana, 2015; Mississippi, 2015; Tennessee, 2015; 10% per plan) | 60.0% |
| Area Importance (AI) in PIF Avian Conservation Assessment Database (ACAD)    AI must be ≥ 4 | 5.0% |
| PIF Avian Conservation Assessment Database (ACAD) Regional Concern for BCR 27 and BCR 29 | 5.0% |
| USFWS Birds of Management Concern | 2.5% |
| EGCPJV Implementation Plan 2008 | 2.5% |
| Priority in JV plans: Atlantic Coast, Lower Mississippi Valley (1.9% per plan)* | 3.8% |
| Priority in JV plans: Appalachian Mountains, Central Hardwoods, or Gulf Coast (0.4% per plan)* | 1.2% |
| *See section below for explanation of varying weights among JV plans. | |

Each state wildlife agency is responsible for developing a SWAP, which is updated every 10 years. Wildlife agencies develop lists of Species of Greatest Conservation Need within each SWAP based on conservation status, current and future threats, and socio-economic importance of species in their state. These lists are used to focus strategic conservation efforts and maximize state conservation successes. Landbirds identified as Species of Greatest Conservation Need in EGCPJV member states—Alabama, Florida, Kentucky, Louisiana, Mississippi, and Tennessee—each received a 10% weight if the species was identified in the most recent respective plan. Thus, 80% of weighting in the Plan's species prioritization process was derived from state-level SWAPs and the PIF Continental Landbird Plan.

While the PIF Continental Watch List provides a comprehensive list of species vulnerable to decline, the List generally does not incorporate regionality of species distributions. Thus, regional lists based solely on the PIF Continental Watch List include many species at the periphery of their range. PIF's ACAD (Panjabi et al. 2019) considers relative density and percent of species population within a BCR to develop an Area Importance (AI) score for each species occurring in each BCR (Panjabi et al. 2019). An AI score indicates the relative importance of a JV or region to a species based on the percent of the breeding population in the JV or region of interest. For the EGCPJV Landbird Conservation Plan, species with an AI score of $\geq 4$, meaning at least 20% of the breeding population is captured in the EGCP, received an additional 5% weighting.

PIF ACAD also has a Regional Concern designation for each BCR (Panjabi et al. 2019). Species of regional importance are identified based on multiple continental and regional AI criteria. Thus, a species need not be included on a PIF Continental Watch List to receive a Regional Concern designation. The LWG gave the PIF ACAD Regional Concern designation an additional 5% weighting.

The USFWS has developed a list of Birds of Management Concern, which includes bird species, subspecies, populations, and geographic segments of populations warranting management or conservation attention. These species are under federal jurisdiction afforded under the Migratory Bird Treaty Act (50 CFR Part 10). To be eligible for Birds of Management Concern designation, species must be a high-priority gamebird, on the Birds of Conservation Concern 2008 list (USFWS 2008), a federally-listed species under the Endangered Species Act, or a species or population that is considered overabundant, thus leading to management conflicts (USFWS 2011). Landbirds with the Birds of Management Concern designation received an additional 2.5% weighting in the species prioritization process.
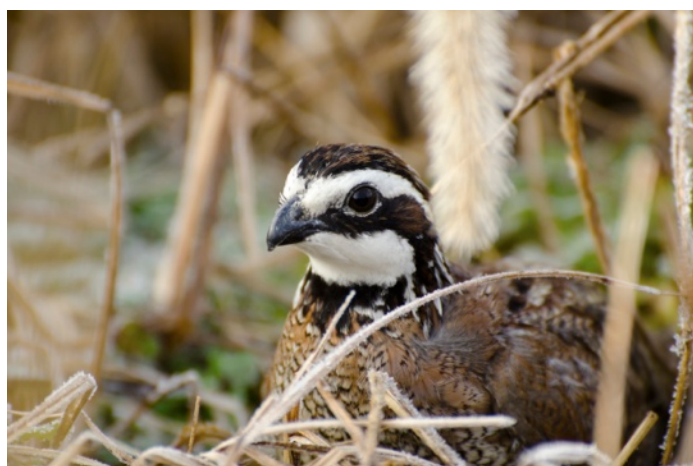


**Male Northern Bobwhite/Ben Robinson**

The EGCPJV's 2008 Implementation Plan identified 53 landbird species for consideration in biological planning within priority habitats identified in the habitat framework (Table 2). The selection of these landbirds was based on an evaluation of all breeding, wintering, and resident birds of the EGCP with relative conservation status and socioeconomic importance to the region (EGCPJV 2008). Landbirds in

the Implementation Plan received a 2.5% weighting in this Plan to maintain continuity with the foundational priorities and implementation goals identified by public and private partners during the JV's formation.

The five neighboring JVs have each developed a landbird conservation plan and/or a landbird priority species list.  Landbirds prioritized by neighboring JVs with a high degree of similarity in vegetative types to the EGCPJV (i.e., Atlantic Coast and Lower Mississippi Valley JVs) received 1.9% weighting.  Landbirds prioritized by the other neighboring JVs (i.e., Appalachian Mountains, Central Hardwoods, and Gulf Coast JVs) received 0.4% weighting.



**Two priority landbird species identified in the EGCPJV Implementation Plan: Rusty Blackbird and Grasshopper Sparrow/ Alan Schmierer**

The LWG calculated a weighted average score ranging from 1.0 (highest prioritization) to 0 (lowest prioritization) based on the weighting assignments given to existing bird conservation plans (Table 3).  An exhaustive list of species was considered for prioritization and Appendix A presents species' weighted average scores and their association with existing conservation plans.

## Finalizing Selection of Priority Species

The LWG next assigned each species to primary and secondary habitat types based on known life-history characteristics.  Species could be assigned to one or more of five broadly defined terrestrial systems: Eastern Interior Grasslands, Freshwater Forested Wetlands, Eastern Shrub-Scrub, Pine-dominated Woodlands and Savannas, and Upland Hardwood & Pine-Hardwood communities (Table 2).  LWG members provided expert opinion via a vote to determine habitat type assignments for each species remaining in consideration.  If at least three LWG members assigned a species to a habitat type, the habitat type served as the species' primary association.

Some species were assigned multiple habitat types as primary habitat associations.  For example, Northern Bobwhite was classified as using Eastern Interior Grasslands and Pine-dominated Woodlands and Savannas.  Species not assigned a primary habitat type (e.g., generalist species) were removed from consideration as priority species in this Plan.  Six species were ultimately assigned more than one primary habitat type: American Kestrel (southeastern subspecies; *Falco sparverius paulus*), Cerulean Warbler (*Setophaga cerulea*), Eastern Kingbird (*Tyrannus tyrannus*), Kentucky Warbler (*Geothlypis formosa*), Northern Bobwhite, and Yellow-billed Cuckoo (*Coccyzus americanus*).

After assigning each species primary habitat types, additional information was collected to assess each species distribution.  First, an evaluation was made as to whether the species' range was peripheral to the EGCP in order to direct conservation efforts to areas where core population needs could be addressed.  Species excluded were Golden-winged Warbler (*Vermivora chrysoptera*), Canada Warbler

(*Cardellina canadensis*), Least Flycatcher (*Empidonax minimus*), Ruffed Grouse (*Bonasa umbellus*), Brown Creeper (*Certhia americana*), Black-capped Chickadee (*Poecile atricapillus*), Black-throated Blue Warbler (*Setophaga caerulescens*), Short-eared Owl (*Asio flammeus*), LeConte's Sparrow (*Ammospiza leconteii*), Bobolink (*Dolichonyx oryzivorus*), Greater Prairie-chicken (*Tympanuchus cupido*), Lark Sparrow (*Chondestes grammacus*), White-tailed Kite (*Elanus leucurus*), Burrowing Owl (*Athene cunicularia*), Vesper Sparrow (*Pooecetes gramineus*), Savannah Sparrow (*Passerculus sandwichensis*), and Bell's Vireo (*Vireo bellii*).

After removing marginal-range species, it was next determined if the weighted average score of the species was ≥0.5.  All species with a core range and ≥0.5 weighted average within each habitat type were retained.  However, if the species weighted average was <0.5  but the population was experiencing a significant 10-year decline based on the North American BBS, it was also retained.  This included Yellow-billed Cuckoo, Eastern Wood-Pewee (*Contopus virens*), Field Sparrow (*Spizella pusilla*), Eastern Meadowlark (*Sturnella magna*), Eastern Kingbird, Eastern Towhee (*Pipilo erythrophthalmus*), and Indigo Bunting (*Passerina cyanea*).

The final priority landbird list includes 29 species (Table 4).  These breeding species are in need of conservation in this geography and are assumed to be representative of species requiring similar habitats.

> **"The final priority landbird list includes 29 species (Table 4).  These breeding species are in need of conservation in this geography and are assumed to be representative of species requiring similar habitats."**



**Louisiana Waterthrush/Alan Schmierer**

**Table 4.** Priority landbirds in the East Gulf Coastal Plain by primary habitat type.



**Eastern Meadowlark/Alan Schmierer**



**Kentucky Warbler/Alan Schmierer**



**American Kestrel/Alan Schmierer**

| PRIORITY LANDBIRDS ASSOCIATED WITH PRIMARY HABITAT TYPES | |
| --- | --- |
| **Eastern Interior Grasslands** | |
| American Kestrel (SE) | *Falco sparverius paulus* |
| Eastern Kingbird | *Tyrannus tyrannus* |
| Eastern Meadowlark | *Sturnella magna* |
| Field Sparrow | *Spizella pusilla* |
| Grasshopper Sparrow | *Ammodramus savannarum* |
| Henslow's Sparrow | *Centronyx henslowii* |
| Loggerhead Shrike | *Lanius ludovicianus* |
| Northern Bobwhite | *Colinus virginianus* |
| **Eastern Shrub-Scrub** | |
| Eastern Kingbird | *Tyrannus tyrannus* |
| Eastern Towhee | *Pipilo erythrophthalmus* |
| Indigo Bunting | *Passerina cyanea* |
| Painted Bunting | *Passerina ciris* |
| Prairie Warbler | *Setophaga discolor* |
| **Freshwater Forested Wetland** | |
| American Woodcock | *Scolopax minor* |
| Cerulean Warbler | *Setophaga cerulea* |
| Kentucky Warbler | *Geothlypis formosa* |
| Louisiana Waterthrush | *Parkesia motacilla* |
| Prothonotary Warbler | *Protonotaria citrea* |
| Rusty Blackbird | *Euphagus carolinus* |
| Swainson's Warbler | *Limnothlypis swainsonii* |
| Swallow-tailed Kite | *Elanoides forficatus* |
| Yellow-billed Cuckoo | *Coccyzus americanus* |
| **Pine-Dominated** | |
| American Kestrel (SE) | *Falco sparverius paulus* |
| Bachman's Sparrow | *Peucaea aestivalis* |
| Northern Bobwhite | *Colinus virginianus* |
| Red-cockaded Woodpecker | *Dryobates borealis* |
| **Upland Hardwood & Pine-Hardwood** | |
| Cerulean Warbler | *Setophaga cerulea* |
| Chuck-will's-widow | *Antrostomus carolinensis* |
| Eastern Whip-poor-will | *Antrostomus vociferous* |
| Eastern Wood-Pewee | *Contopus virens* |
| Kentucky Warbler | *Geothlypis formosa* |
| Red-headed Woodpecker | *Melanerpes erythrocephalus* |
| Wood Thrush | *Hylocichla mustelina* |
| Worm-eating Warbler | *Helmitheros vermivorum* |
| Yellow-billed Cuckoo | *Coccyzus americanus* |

# Setting Population and Habitat Objectives

## Overview

The LWG set population and habitat objectives for species in five broadly defined terrestrial systems: Eastern Interior Grasslands, Eastern Shrub-Scrub, Freshwater Forested Wetlands, Pine-dominated Woodlands and Savannas, and Upland Hardwood & Pine-Hardwood Woodlands and Forests.  For Eastern Interior Grasslands, population and habitat objectives were set for two habitat subtypes, prairie and agricultural land cover.  Prairie is important to some grassland bird species negatively associated with agricultural land use (e.g., Eastern Kingbird and Eastern Meadowlark; Gilbert and Ferguson 2019), whereas other grassland species readily use improved pasture and field edges (e.g., Loggerhead Shrike; Froehly et al. 2019).

Objective setting involved a seven-step process: 1) estimate current population sizes, 2) determine current population size in each habitat type, 3) calculate population objectives, 4) determine a range of species densities, 5) calculate habitat objectives, 6) assign habitat objectives to State-by-BCR areas, and 7) calculate the State-by-BCR habitat shortage (Figure 4).

Step 1. **Estimate current populations** in the East Gulf Coastal Plain.

Step 2. **Determine current population size in each habitat type** by multiplying the JV population size by the proportion of each habitat type in the EGCP landscape. For species assigned to more than one primary habitat type, current population size is divided between primary habitat types.

Step 3. **Calculate population objectives** by multiplying current population in each habitat type by the PIF population goal (Rosenberg et al. 2016).

Step 4. **Determine range of species densities** for each species in each of its primary habitat types.

Step 5. **Calculate habitat objectives** by multiplying population objectives (Step 3) by species density ranges (Step 4), using information specific to habitat type.

Step 6. **Assign habitat objectives to State-by-BCR areas** using condition indices in the SECAS Blueprint. Divide restorable area in each State-by-BCR area by total restorable area in the EGCP. Then, multiply this restorability proportion by JV-wide habitat objectives.

Step 7. **Calculate the State-by-BCR habitat shortage** by subtracting the State-by-BCR habitat objective from current State-by-BCR habitat availability.

*Figure 4. The seven-step process for establishing population and habitat objectives in the Plan.*

Habitat objectives were assigned to State-by-BCR areas based on indicators of past habitat occurrence and restorability.  Habitat shortages were calculated as the difference between estimates of current habitat availability and habitat objective for each State-by-BCR area.

## Estimating Current Populations in the EGCP

To establish population objectives, the LWG began with estimates of current population size from PIF's ACAD.  The ACAD uses landbird population estimates derived primarily from count data by the North American BBS with adjustments for species detectability (Link and Sauer 2002, Sauer et al. 2013, Sauer et al. 2017, Panjabi et al. 2019).  When necessary, count data were extrapolated for portions of species ranges occurring outside BBS coverage (Panjabi et al. 2019).  Other data were used when appropriate (Rosenberg et al. 2016) per details provided in the Handbook to the PIF Landbird Population Estimates Database (Will et al. 2018).  The ACAD did not estimate population sizes for American Woodcock, Eastern Whip-poor-will, or Rusty Blackbird.  For all other priority species, the LWG estimated current population sizes based on the process described below.

A three-step process was used to calculate population estimates of priority landbird species:

1. Calculate population estimates for each species in BCRs 27 and 29.
2. Calculate the proportion of each species' potential distribution in BCR 27's and BCR 29's within the JV's geographical boundary.
3. Calculate BCR population estimate to the EGCP.

**Step 1. Calculating population estimates for each species in BCRs 27 and 29:**

Population estimates were calculated for each priority species in each BCR determining the percentage of a species range occurring in a BCR as the percentage of the global population occurring in a BCR and multiplying that by the global population size:

$$\text{Population}_{BCR\ 27} = \text{Population}_{Global} \times (\%\ \text{Population}_{Global}\ \text{in BCR 27})$$

$$\text{Population}_{BCR\ 29} = \text{Population}_{Global} \times (\%\ \text{Population}_{Global}\ \text{in BCR 29})$$

**Step 2. Determining the proportion of species' potential distribution by BCR:**

U.S. Geological Survey's (USGS) Gap Analysis Project (GAP) delineated species range and predicted distribution maps for more than 2,000 species occurring in the United States (USGS 2018). GAP's predicted distribution maps were generated based on suitable environmental and land cover conditions for individual species using remotely-sensed data (USGS 2018).  Habitat suitability for each species was determined by Birds of North America (Poole and Gill 1996) and Birds of the World (Poole and Gill 2020) species accounts and peer-reviewed literature.  These predicted distribution maps were intended for use at the landscape scale and could not

> **Example: Population estimates for Bachman's Sparrow are calculated as follows:**
>
> $$\text{Population}_{BCR\ 27} = 170{,}000 \times 0.6567\text{, where } 0.6567 \text{ is the \% Population}_{Global}\ \text{in BCR 27}$$
>
> $$\text{Population}_{BCR\ 27} = 111{,}639$$
>
> $$\text{Population}_{BCR\ 29} = 170{,}000 \times 0.007\text{, where } 0.007 \text{ is the \% Population}_{Global}\ \text{in BCR 29}$$
>
> $$\text{Population}_{BCR\ 29} = 1{,}190$$

be adjusted for fine-scale or highly ephemeral vegetation structure (e.g., shrub cover at individual properties).

Species distributions occur well outside the JV boundaries and often in multiple BCRs.  To determine the extent a species distribution which occurs in the EGCP portion of BCR 27 or BCR 29 or, alternatively, to determine the responsibility the partnership has for a species relative to other JVs, the LWG used GAP predicted species distribution maps to calculate the proportion of the predicted distribution in the EGCP portion of BCRs 27 and 29 for each species (see equation below).

**Step 3. Calculate the species population estimate for the EGCP:**

The population estimate for each species in the JV was then calculated by multiplying the BCR-level population estimate by the ratio of potential species distribution (measured in acres) in each BCR then summing across BCRs within the JV geography.

$$\text{Population }_{EGCP} = [\text{Population }_{BCR\ 27} \times (\text{Distribution }_{BCR\ 27\ in\ EGCP} / \text{Distribution }_{BCR\ 27})] +$$

$$[\text{Population }_{BCR\ 29} \times (\text{Distribution }_{BCR\ 29\ in\ EGCP} / \text{Distribution }_{BCR\ 29})]$$

A complete list of priority landbird species and their respective population estimates is provided in Table 6 (see p. 22). Six species were assigned to more than one primary habitat type.  For these species, the LWG determined the proportion of each habitat type currently in the EGCP and divided the JV-wide population estimate accordingly.

> **Continuing with the Bachman's Sparrow example:**
>
> $$\text{Population }_{EGCP} = [111{,}639 \times (44{,}072{,}871 / 87{,}666{,}846)] + [1{,}190 \times (794{,}942 / 4{,}619{,}726)]$$
>
> $$\text{Population }_{EGCP} = 56{,}124 + 204$$
>
> $$\text{Population }_{EGCPJV} = 56{,}328$$

> **For example,** Cerulean Warbler was assigned to Forested Wetlands and Upland Hardwood & Pine-Hardwood Woodlands and Forests. Based on estimates of the proportion of each habitat type using National Land Cover Database 2016 (Yang et al. 2018), the LWG apportioned 25% of Cerulean Warbler's JV-wide population estimate to Forested Wetlands and 75% to Upland Hardwoods & Pine-Hardwood Woodlands and Forests.

After reflecting on how grassland birds use the various sub-classes of Eastern Interior Grasslands (see Table 2 in Chapter 2), the LWG decided to apportion population estimates of grassland priority species to two sub-classes: prairie and agriculture. The Grassland Condition Index in the Middle Southeast geography of the Southeast Conservation Adaptation Strategy (SECAS) Blueprint (Gray and Jones-Farrand 2019; Appendix D) estimates the occurrence of prairie and agricultural land covers.  The LWG used condition index scores of nine and higher to delineate prairie and scores of two to eight to delineate agricultural land cover.  Using the relative proportion of these two sub-classes (86% agriculture, 14% prairie) of Eastern Interior Grasslands, the LWG apportioned population estimates of grassland priority species to each sub-class.

## Setting Population Objectives

Population objectives were established using the current population estimates (described above) and conservation targets.  Population objectives were designed to align with 10-year and 30-year

conservation targets in the PIF Landbird Conservation Plan (Rosenberg et al. 2016) and to allow conservation partners, many of which have their own 10-year plans, to track progress at two time intervals.  Of the 29 EGCP priority landbird species, 18 are listed in a PIF continental concern group and have a continental population objective calculated in the PIF Landbird Conservation Plan (Rosenberg et al. 2016).  Continental population objectives were set differently for Red Watch List, Yellow Watch List, and Tan Watch List species.

For Red Watch List species, Bachman's Sparrow and Red-cockaded Woodpecker, continental population objectives were straightforward, encouraging population increases of 25-35% in the 10-year short-term with 30-year long-range increases of at least 75%.

Yellow Watch List population objectives were flexible to individual species' needs, with short-term objectives related to stabilizing populations by slowing the rate of decline and long-range objectives of small population increases.  Although a 10-year population objective allowing for a population decline seems counter-intuitive, the rates of decline allowed in the PIF Landbird Conservation Plan are lower than current estimated rates of decline.  For example, Cerulean Warbler populations have experienced a loss of 72% between 1970 and 2014, marking one of the most dramatic songbird declines in PIF ACAD records.  Thus, allowing small population losses during a stabilization period is preferable to current rates of decline and is compatible with 30-year population objectives of increasing bird numbers.

For Tan Watch List species, called "Common Birds in Steep Decline", the population objectives aimed to reduce the current rate of decline by 40-65%, allowing for a decline of 10% to 25% from current population numbers as conservation efforts occur over the next 30 years.

- **Red Watch List ("Recover")**

    - 10-year objective: Increase population 25-35%

    - 30-year objective: Increase population 75-100%

- **Yellow Watch List ("Reverse Decline")**

    - 10-year objective: Reduce rate of population decline, allowing 2-22% short-term decline

    - 30-year objective: Increase population 5-15% for long-term population health

    - Exception: Henslow's Sparrow; Increase population 3% in EGCP BCR 29

- **Common Birds in Steep Decline or Tan Watch List ("Stabilize")**

    - 10-year objective: Stabilize populations, allowing 5-25% decline

    - 30-year objective: Limit population decline to 10-25%

PIF population objectives and the corresponding habitat objectives were intended for bird conservation within species' respective breeding ranges.  The geography provides critical wintering habitat for some priority landbird species (e.g., Henslow's Sparrow, Rusty Blackbird).  However, there is difficulty in estimating current wintering population sizes, as wintering objectives are absent for these species in the PIF Plan (Rosenberg et al. 2016).  Wintering population objectives will be addressed in a subsequent update to this Plan when additional data are available.

In addition to PIF population objectives, the Red-cockaded Woodpecker has population objectives outlined in its Recovery Plan (USFWS 2003) due to its protected status under the U.S. Endangered Species Act.  The LWG started with Recovery Plan population objectives for BCR 27 to formulate Red-cockaded Woodpecker population and habitat objectives within the JV boundary.  Additionally, although American Woodcock does not have a PIF population objective, the American Woodcock Conservation Plan (Kelley et al. 2008) outlines population targets.  For the remaining 10 species without PIF or recovery plan population objectives, the LWG assigned maintenance objectives (i.e., maintain current habitat availability to support these species populations).

Eastern Whip-poor-will and Rusty Blackbird population estimates do not exist in ACAD, and neither have recovery or conservation plans.  Because population objectives are based on population estimates, no objectives were calculated.  Again, the LWG assigned maintenance objectives for these species and, as data become available, population objectives will be calculated and included in future updates to the Plan.

## Setting Habitat Objectives

*JV-wide Habitat Objectives.* The range of PIF population objectives and the variable densities of birds found in habitat of varying quality led us to present population objectives as ranges.  The smaller value represents the minimum acreage required to reach the smallest population objective, and the largest value represents the maximum acreage required to meet the largest population objective.  Targeted surveys could lead to more precise habitat objectives.

Habitat objectives were calculated based on population objectives and estimated density for each species.  To obtain species density estimates, the LWG conducted a systematic literature search for publications with density estimates for the 18 priority species with PIF continental concern group designations.  We included publications from all habitat types and BCRs in the eastern United States in our search.  The LWG used published density estimates to propose a density range for each species (see Appendix C).  For some species, density estimates were limited or entirely lacking for this geography.  Therefore, estimates from neighboring BCRs and JVs were used to inform proposed densities, with preference for estimates from similar vegetative communities, locations closest to BCR 27, and studies with large sample sizes.  Single publications were found with density data for American Woodcock and Chuck-will's-widow, so the LWG defaulted to habitat objectives set in the Conservation Plan (Kelley et al. 2008) for American Woodcock, and set no habitat objectives for Chuck-will's-widow.  The LWG defaulted to habitat objectives for Red-cockaded Woodpecker set forth in the Recovery Plan (USFWS 2003).

Because population objectives and species density estimates are presented as ranges, four possible habitat objectives can be calculated (Table 5).  The lower and upper bounds are calculated as follows:

$$\text{Habitat Objective}_{Lower} = \text{Population Objective}_{Lower} / \text{Density}_{Upper}$$

$$\text{Habitat Objective}_{Upper} = \text{Population Objective}_{Upper} / \text{Density}_{Lower}$$

**Table 5.** Matrix of tradeoffs between population objectives and species density values.

| | | SPECIES DENSITY | |
| --- | --- | --- | --- |
| | | Lower | Upper |
| POPULATION OBJECTIVE | Lower | • Meets the minimum PIF population goal<br>• Considers issues with resilience and encroachment<br>• May fail to meet the minimum PIF goal if widespread habitat loss occurs | • Meets the minimum PIF population goal<br>• Requires the least land area<br>• Requires high quality habitat<br>• Considers habitat maintenance |
| POPULATION OBJECTIVE | Upper | • Meets the PIF "best-case" population goal<br>• Requires the most land area<br>• Considers issues with resilience and encroachment | • Meets the PIF "best-case" population goal<br>• Requires high quality habitat<br>• Considers habitat maintenance |

Minimum PIF population goals (Rosenberg et al. 2016) can be met by maintaining fewer acres of high-quality habitat, which support high densities of birds.  In contrast, meeting maximum population goals in a landscape with lower quality habitat requires maintenance of many more acres.  If landscapes support high bird densities, the higher PIF population goal (and the resulting EGCP population objective) may be achieved in a much smaller area.  Alternatively, partner agencies may have opportunities to manage for landbird species at varying habitat qualities and densities in order to meet objectives.

> **Again, using Bachman's Sparrow as an example:** lower and upper bounds of the 10-year habitat objective are calculated thus:
>
> Habitat Objective $_{Lower}$ = Population Objective $_{Lower}$ / Density $_{Upper}$
>
> Habitat Objective $_{Lower}$ = 70,411 / 0.243
>
> Habitat Objective $_{Lower}$ = 289,757
>
> Habitat Objective $_{Upper}$ = Population Objective $_{Upper}$ / Density $_{Lower}$
>
> Habitat Objective $_{Upper}$ = 76,044 / 0.162
>
> Habitat Objective $_{Upper}$ = 469,407

It is assumed that in meeting all population and habitat objectives, conservation delivery improves and provides additional habitat, resulting in increasing bird populations. However, caution must be used in assuming higher density always indicates increasing population trends.  In some instances, habitat isolation or fragmentation may result in high densities of breeding pairs but lower nesting success (i.e., population sink; Van Horne 1983).

Further, habitat loss occurring within the same timeframe is not considered.  An agency or partnership choosing to manage low-density populations to achieve the lowest population goal may be set back due to habitat losses occurring outside the agency's or partnership's control.

The lower and upper bounds of population and habitat objectives for all 29 priority landbird species are provided in Table 6.  In Appendix D, a range of habitat objectives based on varying densities are presented and should support decisions driven by biological, land area, and human and financial constraints.

> "An agency or partnership choosing to manage low-density populations to achieve the lowest population goal may be set back due to habitat losses occurring outside the agency's or partnership's control."

**Table 6.** Ten- and thirty-year population and habitat objectives for priority landbird species in the East Gulf Coastal Plain.

| POPULATION AND HABITAT OBJECTIVES FOR PRIORITY LANDBIRD SPECIES | | | | | |
|---|---|---|---|---|---|
| | Current EGCP Population | 10-year Population Objective | 10-year Habitat Objective (ac) | 30-year Population Objective | 30-year Habitat Objective (ac) |
| Partners in Flight Continental Concern Group: **Red Watch List ("Recover")** **Population Objective:** Recovery Plan target, or increase current population by 25-35% by 2030 and 75-100% by 2050. | | | | | |
| Bachman's Sparrow | 56,100 | 70,400-76,000 | 290,000-469,800 | 98,600-112,700 | 406,000-696,000 |
| Red-cockaded Woodpecker[1] | 6,100 | 3,100[2] | 610,000 | 3,100[2] | 610,000 |
| Partners in Flight Continental Concern Group: **Yellow Watch List ("Reverse Decline")** **Population Objective:** Stabilize population with no more than 2-22% decline by 2030; increase population by 5-15% by 2050. | | | | | |
| Cerulean Warbler | 1,700 | 1,300-1,600 | 3,600-16,300 | 1,800-1,900 | 4,800-19,100 |
| Eastern Whip-poor-will[3] | unknown | | | | |
| Henslow's Sparrow[4,5] | | | | | |
| Kentucky Warbler | 247,600 | 196,600-247,000 | 694,000-10,173,000 | 264,700-289,900 | 934,300-11,937,700 |
| Prairie Warbler | 577,500 | 482,100-605,700 | 1,749,900-10,576,700 | 649,000-710,800 | 2,355,700-12,411,500 |
| Prothonotary Warbler | 424,500 | 331,300-416,300 | 511,700-2,057,300 | 446,000-488,500 | 688,800-2,414,200 |
| Red-headed Woodpecker | 134,300 | 106,500-133,800 | 328,900-3,306,300 | 143,400-157,000 | 442,800-3,879,800 |
| Wood Thrush | 1,031,300 | 855,600-1,075,000 | 2,114,400-26,564,900 | 1,151,800-1,261,500 | 2,846,200-31,173,100 |

| | Current EGCP Population | 10-year Population Objective | 10-year Habitat Objective (ac) | 30-year Population Objective | 30-year Habitat Objective (ac) |
|---|---|---|---|---|---|
| **POPULATION AND HABITAT OBJECTIVES FOR PRIORITY LANDBIRD SPECIES , CONTINUED** | | | | | |
| Partners in Flight Continental Concern Group: **Common Birds in Steep Decline ("Stabilize")** <br> **Population Objective:** Slow rate of decline, stabilizing population at no more than 5-25% decline by 2030; stabilize population with no more than 10- 25% decline compared to current population by 2050. | | | | | |
| Chuck-will's-widow | 1,178,300 | 897,500-1,136,900 | not calculated[6] | 897,500-1,077,100 | not calculated[6] |
| Eastern Meadowlark | 416,400 | 329,800-417,700 | 1,555,800-9,619,000 | 329,800-395,700 | 1,555,800-9,112,700 |
| Field Sparrow | 413,200 | 326,600-413,700 | 3,595,800-13,172,500 | 326,600-391,900 | 3,595,800-12,479,200 |
| Grasshopper Sparrow | 90,000 | 83,200-105,400 | 383,100-1,301,600 | 83,200-99,800 | 383,100-1,233,100 |
| Loggerhead Shrike | 137,500 | 103,700-131,300 | 427,000-3,245,300 | 103,700-124,400 | 427,000-3,074,500 |
| Northern Bobwhite | 269,800 | 205,100-259,800 | 862,200-4,701,800 | 205,100-246,200 | 862,200-4,454,300 |
| Rusty Blackbird[3] | unknown | | | | |
| Yellow-billed Cuckoo | 756,000 | 585,400-741,500 | 11,418,500-15,321,100 | 585,400-702,500 | 11,418,500-14,514,700 |
| Partners in Flight Continental Concern Group: **None** <br> **Population Objective:** Maintain and monitor current populations. | | | | | |
| American Kestrel (SE)[7] | 700 | | | | |
| American Woodcock | unknown | 550,000[2] | 2,718,200[2] | 550,000[2] | 2,718,200[2] |
| Eastern Kingbird | 1,201,200 | | | | |
| Eastern Towhee | 6,368,300 | | | | |
| Eastern Wood-Pewee | 389,300 | | | | |
| Indigo Bunting | 6,456,500 | | | | |
| Louisiana Waterthrush | 25,000 | | | | |
| Painted Bunting | 99,700 | | | | |
| Swainson's Warbler | 53,100 | | | | |
| Swallow-tailed Kite | 5,100 | | | | |
| Worm-eating Warbler | 35,300 | | | | |

[1] Red-cockaded Woodpecker population objective is given as number of potential breeding groups (PBGs), defined as an adult female and adult male occupying the same cluster with or without one or more helpers (USFWS 2003).

[2] Population and habitat objectives for Red-cockaded Woodpecker and American Woodcock were established in Recovery Plan for the Red-cockaded Woodpecker (USFWS 2003) and in American Woodcock Conservation Plan (Kelley et al. 2008).

[3] Population estimates are not available for Eastern Whip-poor-will and Rusty Blackbird.  Current population size must be known to calculate population objectives based on PIF-established objectives (Rosenberg et al. 2016).  Since these species do not have a recovery plan with USFWS that might otherwise provide objectives, objectives for Eastern Whip-poor-will and Rusty Blackbird remain uncalculated.

[4] Henslow's Sparrow breeds only in the BCR 29 portion of the EGCPJV geography. The BCR 27 portion of the EGCP remains an important component of Henslow's Sparrow wintering grounds, and this will be addressed in subsequent versions of the Plan.

[5] Henslow's Sparrow is the only species in the Yellow Watch List "Prevent Decline" category.

[6] Density estimates were not available for calculating habitat objectives.

[7] The LWG suspects that the current population estimate for American Kestrel under-represents actual population size due to detection issues for this species.

***State-by-BCR Habitat Objectives.***  Habitat objectives were also calculated for each species at the State-by-BCR level, and expressed in terms of current habitat amount (typically high or moderate quality), 10-year habitat objectives, and habitat shortages (i.e., additional habitat needed to meet 10-year objectives, where appropriate).  State-by-



**Prescribed burns in longleaf pine help maintain habitat quality/Amity Bass, Louisiana Dept. of Wildlife and Fisheries**

BCR habitat objectives were subtracted from current habitat availability to yield habitat shortages.  When habitat classes exhibited

**What is a habitat condition index?**

The LWG used habitat condition indices developed for the Middle Southeast portion of the SECAS - Conservation Blueprint (Gray and Jones-Farrand 2019) to identify habitat condition for each JV habitat class.  Condition index scores of 0-14 reflect a range from non-habitat (0), to potential (i.e., restorable) habitat (1-13), to highest quality, intact habitat (14) for each JV priority habitat class.  Scores greater than 0 were used to apportion habitat objectives based on the proportion of current or restorable habitat in each State-by-BCR area relative to the entire EGCP.  For example, for Eastern Interior Grasslands, prairie was defined as Grassland Condition Index scores of $\geq 9$, and improved agriculture was defined by scores of 3-8.  For Freshwater Forested Wetlands, Upland Hardwood & Pine-Hardwood Woodlands and Forests, Upland Hardwood Forests, and Upland Hardwood Woodlands, the LWG defined current habitat as having moderate or high quality within fragmented or intact landscapes (for example, Forested Wetlands Condition Index scores of 7, 8, 10, 11, 13, and 14).  See Appendix E for more information.

shortages, restorable acres (i.e., potential habitat) of each priority habitat class were used in calculations. Habitat quality was determined using habitat condition indices derived from the Middle Southeast portion of the SECAS Blueprint for JV habitat classes (Gray and Jones-Farrand 2019; see box and Appendix E).

In cases of habitat shortage State-by-BCR habitat objectives were calculated by dividing the area of low quality or potential habitat (i.e., restorable habitat) in each State-by-BCR by the total restorable area of each habitat type in the EGCP. This restorability factor was then multiplied by JV-wide habitat objectives. For example, 26.95% of restorable Eastern Interior Grasslands occur in Alabama-BCR 27. The JV-wide habitat objective for Eastern Interior Grasslands was multiplied by 0.2695 to determine Alabama-BCR 27's habitat objective.

Population and habitat objectives were then summarized by primary habitat class, with habitat objectives further defined for each State-by-BCR (see next chapter). For each habitat class, the species with the greatest habitat-area requirement served as the representative target species when estimating habitat objectives at the State-by-BCR level. If the habitat area requirement for the target species was met, it was assumed habitat objectives for all other priority species in the habitat class were also met. One underlying assumption of this Plan is that our target species are truly representative of a group of priority avifauna within a given habitat type. However, the LWG is aware species may have varying habitat condition requirements.

> "For each habitat class, the species with the greatest habitat-area requirement served as the representative target species. If the habitat area requirement for the target species was met, it was assumed habitat objectives for all other priority species in the habitat class were also met."



**Bachman's Sparrow/Eric Soehren**

# Critical Assumptions

Underpinning the Plan's population and habitat objectives are key assumptions which need to be considered as part of bird population monitoring efforts:

1. All LWG members had similar or equal influence over the processes and decisions made in this Plan.

2. The LWG assumes the Plan will result in better, more efficient, and effective conservation decisions and on-the-ground actions (i.e., implementation), thereby leading to improvement in habitat quantity and/or quality. The LWG assumes the Plan will be used to inform conservation delivery. Outcome-based and effects monitoring can evaluate this assumption and determine the return-on-investment of human and financial resources.

3. Selection of priority species is inherently subjective. Species prioritization was influenced, unintentionally and otherwise, by a number of factors: the plans chosen and the weighting assigned to each plan to calculate average weighted scores; criteria for species removal and inclusion; and the biases of LWG members.

4. Species assignments to one or more primary habitat types, based on literature and expert opinion, are assumed accurate and representative for all species and habitat types in the EGCP. The LWG assigned species to primary habitat types during an internal review. These habitat assignments have not been reviewed externally.

5. Current population estimates and GAP species distribution maps are assumed to be representative of actual species' distributions.

6. Population objectives for American Woodcock and Red-cockaded Woodpecker were established by recovery plans (Kelley et al. 2008 and USFWS 2003, respectively). It was assumed that those recovery plans include more regionally-appropriate and directed objectives than objectives from the PIF Landbird Conservation Plan (Rosenberg et al. 2016).



**Red-cockaded Woodpecker/Alan Schmierer**

7. Population objectives are stated in terms of abundance without regard to population demographics. Thus, rates of population loss or increase disproportionately affected by one demographic group are not accounted for in the population objective calculations.

8. Density estimates used to calculate habitat objectives are representative of both the quantity of various land covers and quality of habitat across the EGCP. Density can be a misleading indicator of habitat quality (Van Horne 1983); isolated patches of habitat with high densities of breeding pairs and nests can have low productivity (i.e., population sink).

9. Condition indices used to calculate current habitat availability and total current and restorable habitat accurately represent the condition of priority habitat types in the EGCP. All underlying assumptions of the condition indices, including definitions of habitat type and quality, are inherent assumptions in the Plan's presented calculations of habitat shortages.

10. Increasing habitat availability on the landscape is assumed, by default, to result in realized population responses (i.e., increases in density or abundance) and lead to corresponding population increases. Habitat objectives do not incorporate populations' reproductive potential (or among-species variation), barriers to dispersal (e.g., isolation of populations, habitat connectivity, environmental permeability), density-dependent mechanisms, source-sink population dynamics, habitat and community saturation points, or factors that influence populations on migratory pathways or wintering grounds.

11. A species with the greatest habitat-area requirements is a reasonable proxy for other species assigned to a given habitat type and is broadly representative of the avian community.

12. Restoration to achieve habitat objectives will occur on appropriate sites within suitable dispersal distance of existing populations and where ongoing habitat management to maintain habitat quality is feasible.



**Swallow-tailed Kite/Alan Schmierer**

# Terrestrial Systems: Objectives and Condition Summary

**GRASSLANDS AT-A-GLANCE**

**Representative Priority Species:**
Eastern Meadowlark & Field Sparrow

**Current Prairie:** 276,856 ac
**JV-wide Objective:** 148,000 to 702,900 ac
**JV-wide Prairie Shortage:** Up to 426,000 ac

**Current Improved Ag:** 9,217,091 ac
**JV-wide Objective:** 3,485,900 to 12,615,500 ac
**JV-wide Improved Ag Shortage:** Up to 3,398,400 ac


Eastern Interior Grassland/Sara Hollerich, USFWS

## Habitat Description and Current Status

Eastern Interior Grasslands are comprised of meadows and prairies, pasture and cropland, and other land covers dominated by grasses.  The geography currently contains an estimated 276,856 ac of prairie and 9.2 million ac of improved agricultural land cover.  Although the Implementation Plan (EGCPJV 2008) emphasizes the importance of native warm-season grasses, very little natural prairie remains in the EGCP, and agriculture practices often favor non-native and/or cool-season grasses.  Most remaining Eastern Interior Grasslands are located in the former Black Belt and Jackson Prairie Belt of Alabama and Mississippi.  Expansion and intensification of agricultural land use is often cited as the leading cause for declining grassland birds, sparking research and implementation of set-aside programs such as the Conservation Reserve Program (McConnell and Burger 2011, Evans et al. 2014, West et al. 2016, Quinn et al. 2017).

## Priority Bird Species

Species in this terrestrial system include grassland obligates and species whose occupancy is often associated (either positively or negatively) with some level of agricultural land use (e.g., Eastern Kingbird and Eastern Meadowlark [Gilbert and Ferguson 2019]; Loggerhead Shrike [Froehly et al. 2019]).  Due to the wide range of habitat needs and land cover use by grassland birds, the LWG developed habitat objectives for "true" prairie (i.e., remnants of the Black Belt and Jackson Prairie Belt) and for agricultural land (including improved pasture and hay fields, or "improved agriculture").  The LWG does not include row crops grown in monoculture as grassland bird habitat.

**Calculating Habitat Objectives**

The LWG calculated habitat objectives separately for prairie and agricultural land use using the Grassland Condition Index developed as an update to the SECAS Conservation Blueprint (Gray and Jones-Farrand 2019).
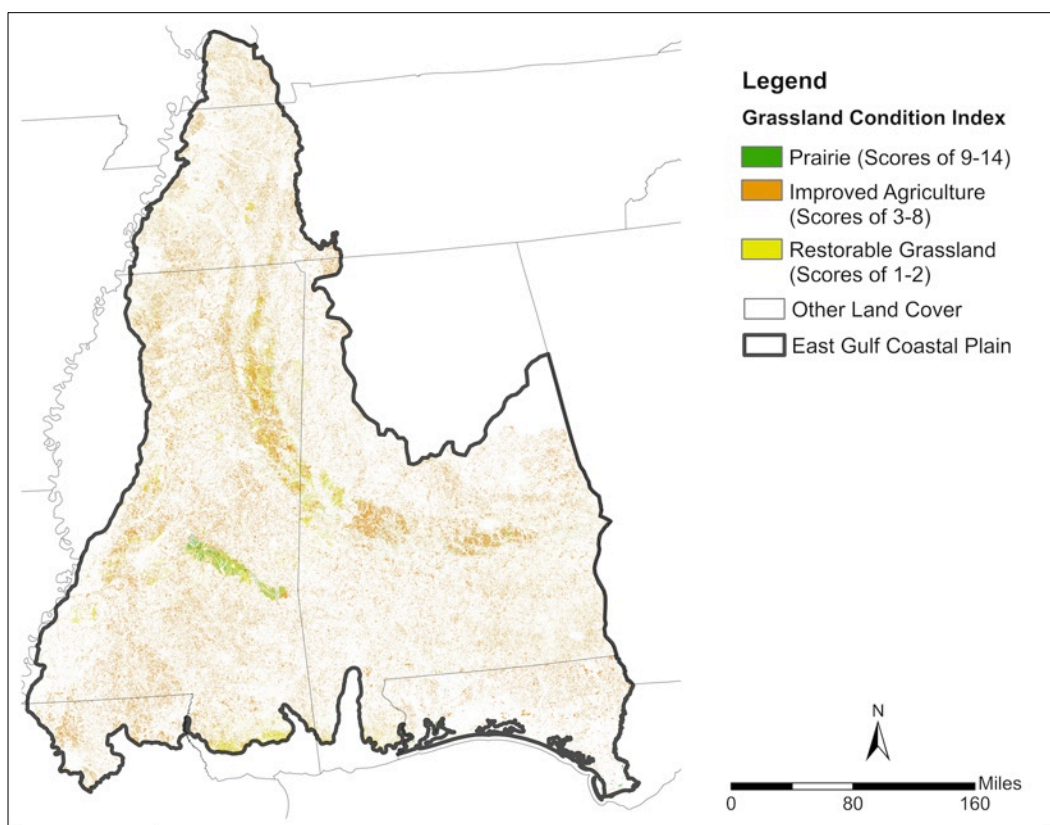


*Figure 5. Prairie, improved agriculture, and restorable Eastern Interior Grasslands in the East Gulf Coastal Plain (Gray and Jones-Farrand 2019).*

The Grassland Condition Index describes grasslands in terms of site quality (high, moderate, low) and landscape quality (intact, fragmented, very fragmented) and assigns an index score ranging from 1 (potential habitat very far from a moderate or large patch of existing habitat) to 14 (grassland with high quality within an intact landscape). The Grassland Condition Index also assigns a management objective (maintain, enhance, restore). For the purposes of this Plan, prairie is defined as having an index score of at least 9, and improved agriculture land use is defined as having an index score of 3 to 8 (Figure 5).

Separate prairie and agricultural land use habitat objectives were calculated by multiplying grassland species' total habitat objectives by the proportion of current landscape in prairie and agricultural land use. This calculation assumes that the Eastern Interior Grasslands priority species select habitat types and conditions in the same proportion at which they occur on the landscape. While studies have documented negative associations of occupancy with agriculture (Murphy 2003, Gilbert and Ferguson 2019), this Plan relies on species density estimates to account for differential selection and preference. For example, if prairie can sustain a particular species at a higher density, then the potential selection or preference for prairie is reflected in the species' habitat objective).

Eastern Interior Grasslands serve as the primary habitat type for eight species of priority landbird species. Six species are in a PIF continental concern group and thus have 10-year and 30-year habitat objectives (Table 7). Based on area-size requirements to meet 10-year habitat objectives, Eastern Meadowlark and Field Sparrow set the minimum habitat targets for prairie and improved agriculture, respectively.

**Table 7.** Ten- and thirty-year habitat objectives (ac) for priority landbirds associated with Eastern Interior Grasslands. The species in bold sets habitat objectives for this suite of priority birds.

| HABITAT OBJECTIVES FOR PRIORITY SPECIES IN EASTERN INTERIOR GRASSLANDS | | |
|---|---|---|
| | 10-year Habitat Objective (ac) | 30-year Habitat Objective (ac) |
| Grassland: Prairie[1] | | |
| American Kestrel (SE) | Maintain enough habitat to support current populations. | |
| Eastern Kingbird | | |
| **Eastern Meadowlark** | **148,000-702,900** | **148,000-665,900** |
| Field Sparrow | 109,900-557,000 | 109,900-527,600 |
| Grasshopper Sparrow | 28,000-177,300 | 28,000-168,000 |
| Henslow's Sparrow | Wintering species | |
| Loggerhead Shrike | 58,200-442,000 | 58,200-418,700 |
| Northern Bobwhite | 71,700-318,000 | 71,700-301,200 |
| Grassland: Improved Agriculture[2] | | |
| American Kestrel (SE) | Maintain enough habitat to support current populations. | |
| Eastern Kingbird | | |
| Eastern Meadowlark | 1,407,800-8,916,100 | 1,407,800-8,446,800 |
| **Field Sparrow** | **3,485,900-12,615,500** | **3,485,900-11,951,600** |
| Grasshopper Sparrow | 355,100-1,124,400 | 355,100-1,065,200 |
| Henslow's Sparrow | Wintering species | |
| Loggerhead Shrike | 368,900-2,803,300 | 368,900-2,655,800 |
| Northern Bobwhite | 636,900-4,033,500 | 636,900-3,821,300 |
| [1] Grassland Condition Index score of at least 9 | | |
| [2] Grassland Condition Index scores 3-8 | | |

Eastern Meadowlark requires the most prairie habitat to achieve 10-year and 30-year minimum population objectives. Maintaining 148,000 to 702,900 ac of prairie should allow other priority species to meet their respective population and habitat objectives in the prairie subcategory of Eastern Interior Grasslands. Field Sparrow and Northern Bobwhite exhibited large variances in density based on habitat quality, site location, and other factors.

If Eastern Interior Grasslands are maintained in high quality and with connectivity which can support higher bird densities, less habitat may be required to meet population objectives.



**Field Sparrow/Laurie Sheppard, USFWS**

"Focusing efforts in Alabama and Mississippi could produce a substantial landscape-level impact if conservation connects enhanced and restored grasslands to prairie in the Black Belt and Jackson Prairie Belt regions."

Eastern Interior Grasslands currently occupy 9.5 million ac, of which only 276,856 ac qualify as prairie. The bulk of the grassland shortage (both prairie and improved agriculture) occurs in Alabama and Mississippi (Table 8). Focusing efforts in these two states could produce a substantial landscape-level impact if conservation connects enhanced and restored grasslands to prairie in the Black Belt and Jackson Prairie Belt regions. Florida and Mississippi are the only states that currently meet the lower-range 10-year Eastern Interior Grasslands habitat objective for prairie (Table 8).

**Table 8.** Eastern Interior Grasslands 10-yr habitat objectives (ac), determined by target species Eastern Meadowlark (prairie) and Field Sparrow (agricultural land use), for each State-by-BCR area within the East Gulf Coastal Plain.

| HABITAT OBJECTIVES FOR EACH STATE-BY-BCR | | | | | | | |
|---|---|---|---|---|---|---|---|
| | AL | | FL | KY | LA | MS | TN |
| | BCR 27 | BCR 29 | | | | | |
| **Grasslands: Prairie[1]** | | | | | | | |
| Current Habitat | 53,301 | 0 | 88,216 | 49 | 99 | 134,351 | 840 |
| 10-year Objective | 39,900-189,400 | 3,100-14,600 | 16,500-78,600 | 2,600-12,400 | 5,200-24,900 | 67,900-322,600 | 12,700-60,400 |
| Habitat Needed to Meet Objectives | 0-136,100 | 3,100-14,600 | Maintain current levels | 2,600-12,400 | 5,100-24,800 | 0-188,200 | 11,900-59,600 |
| **Grasslands: Improved Agriculture[2]** | | | | | | | |
| Current Habitat | 2,547,826 (55,574)[3] | 214,611 (0) | 1,060,155 (18,409) | 178,212 (0) | 366,654 (6,326) | 3,991,981 (34,175) | 857,652 (346) |
| 10-year Objective | 939,400-3,399,900 | 72,200-261,100 | 389,700-1,410,400 | 61,400-222,000 | 123,400-446,600 | 1,600,000-5,790,500 | 299,800-1,084,900 |
| Habitat Needed to Meet Objectives | 0-852,100 | 0-46,500 | 0-350,200 | 0-43,800 | 0-79,900 | 0-1,798,500 | 0-227,200 |

[1] Grassland Condition Index score of at least 9
[2] Grassland Condition Index scores 3-8
[3] Included parenthetically under improved agriculture are acres with appropriate burn history and/or vegetation height (index scores 5 and 8), which may support species often classified as grassland-obligate or negatively associated with some agricultural land uses

Shrub-scrub habitat/John Gruchy, Mississippi Dept. of Wildlife, Fisheries and Parks

### Habitat Description and Current Status

Eastern Shrub-Scrub includes early successional hardwood and pine and manmade or disturbed environments.  The geography currently contains an estimated 2 million ac of Eastern Shrub-Scrub, as determined by the National Land Cover Database (NLCD) 2016 class "shrub-scrub" (Figure 6; Yang et al. 2018).  Eastern Shrub-Scrub historically occurred in a climax successional condition within mosaics of prairie, shrubland, and woodland.  Today, much of Eastern Shrub-Scrub occurs as ephemeral shrubland within planted pine mosaics where shrubby conditions occur in the first five years after planting (Jones et al. 2009, Lane et al 2011a,b, Iglay et al. 2012, Jones et al. 2012).



**Prairie Warbler/Alan Schmierer**

In timberlands with regular harvest and relatively even flow of timber volume, the percentage of area in shrub-scrub condition is relatively constant, though the conditions shift across the landscape as regenerating stands transition to closed canopy and older stands are harvested (Greene et al. 2019a,b).  Although satellite data show concentrations of shrubland in the panhandle of Florida and areas of Alabama, Mississippi, and Louisiana where pine plantings are common, the condition and amount of climax Eastern Shrub-Scrub is largely unknown. It is also uncertain the extent to which young pine stands are classified as shrub-scrub versus pine forest in NLCD.

> "The condition and amount of climax Eastern Shrub-Scrub is largely unknown."
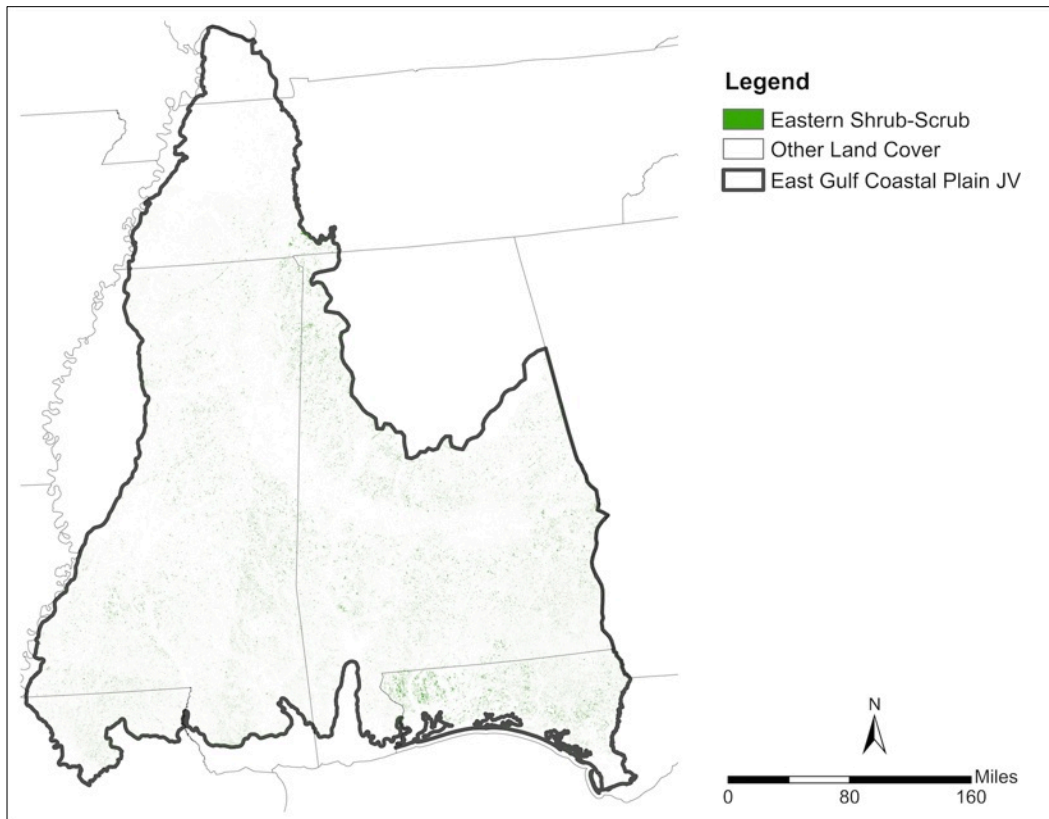
*Figure 6. Occurrence of Eastern Shrub-Scrub terrestrial system in the East Gulf Coastal Plain (National Land Cover Database 2016; Yang et al. 2018).*

**Priority Bird Species**

Eastern Shrub-Scrub serves as the primary habitat type for five priority landbird species. Prairie Warbler is the only species in the PIF continental concern group, thus it serves as the target species for Eastern Shrub-Scrub habitat objectives (Table 9). Prairie Warbler's density estimates vary substantially, leading to wide ranges in Eastern Shrub-Scrub habitat objectives.

**Table 9.** Ten- and thirty-year habitat objectives (ac) for priority landbirds primarily associated with Eastern Shrub-Scrub. The species in bold sets habitat objectives for this suite of priority birds.

| HABITAT OBJECTIVES FOR PRIORITY SPECIES IN EASTERN SHRUB-SCRUB | | |
|---|---|---|
| | 10-year Habitat Objective (ac) | 30-year Habitat Objective (ac) |
| Eastern Kingbird | | |
| Eastern Towhee | Maintain enough habitat to support current populations. | |
| Indigo Bunting | | |
| Painted Bunting | | |
| **Prairie Warbler** | **90,400-151,400** | **121,700-177,700** |

## Calculating Habitat Objectives

Updates to the SECAS Conservation Blueprint did not include Shrub-Scrub as a priority land cover class. As a result, NLCD 2016 landcover of "shrub-scrub" was used to calculate current habitat, restorability, and habitat shortages. The NLCD layer was extracted through the SECAS Blueprint condition indices. No areas classified as a habitat in a condition index layer were considered potential shrub-scrub, which eliminated the potential to double count.

Although Eastern Shrub-Scrub is present in each State-by-BCR area, Alabama, Florida, and Mississippi could have enough acreage to support priority avifauna (Table 10). Kentucky and Tennessee currently meet the 10-year habitat objective. All priority species assigned to Eastern Shrub-Scrub use habitat types other than climax shrub-scrub, including fallow agricultural fields, regenerating pine stands, ecotones and edges. Inclusion of these secondary and ephemeral habitat types may be necessary to meet population and habitat objectives. For edge- and area-sensitive species, enhancing and restoring low-quality Eastern Shrub-Scrub in intact landscapes may accelerate population recovery.

> "For edge- and area-sensitive species, enhancing and restoring low-quality Eastern Shrub-Scrub in intact landscapes may accelerate population recovery."

**Table 10.** Current habitat, 10-year objectives, and habitat shortages (ac) of Eastern Shrub-Scrub for each State-by-BCR area in the East Gulf Coastal Plain as determined by Prairie Warbler. Current habitat is determined by the percentage of current shrubland encompassed by a state (Yang et al. 2018).

| Habitat Objectives for each State-by-BCR | | | | | | | |
|---|---|---|---|---|---|---|---|
| | AL | | FL | KY | LA | MS | TN |
| | BCR 27 | BCR 29 | | | | | |
| Current Habitat | 748,582 | 77,833 | 333,641 | 1,144 | 78,755 | 697,612 | 64,719 |
| 10-year Objective | 33,800-56,600 | 3,500-5,900 | 15,000-25,200 | 50-100 | 3,600-6,000 | 31,500-52,800 | 2,900-4,900 |
| Habitat Shortage | Maintain current levels | Maintain current levels | Maintain current levels | Maintain current levels | Maintain current levels | Maintain current levels | Maintain current levels |

**Fall cypress at Sam D. Hamilton Noxubee National Wildlife Refuge, MS/USFWS**

## Habitat Description and Current Status

Freshwater Forested Wetlands include bottomland hardwoods, cypress-tupelo, bay swamps and depressional wetlands, shrub-scrub swamp, and beaver ponds and meadows.  Wetlands contain enormous biodiversity and provide key wintering habitat for Henslow's Sparrows (Plentovich et al. 1999, Tucker and Robinson 2003, Brooks and Stouffer 2011) and Rusty Blackbirds (Greenberg and Matsuoka 2010, Luscier et al. 2010).  The EGCP geography currently has an estimated 2.9 million ac of Freshwater Forested Wetlands in moderate to high quality within fragmented or intact landscapes.

## Priority Bird Species

Forested Wetlands serve as the primary habitat type for nine priority landbird species.  Five of these species are in a PIF continental concern group and have 10-year and 30-year habitat objectives (Table 11).  American Woodcock requires the most Forested Wetland to achieve 10-year and 30-year minimum population objectives.



**American Woodcock/Ricky Layson, Ricky Layson Photography, Bugwood.org**

**Table 11.** Ten- and thirty-year habitat objectives (ac) for priority landbird species primarily associated with Freshwater Forested Wetlands.  The species in bold sets habitat objectives for this suite of priority birds.

| HABITAT OBJECTIVES FOR PRIORITY SPECIES IN FRESHWATER FORESTED WETLANDS | | |
|---|---|---|
| | 10-year Habitat Objective (ac) | 30-year Habitat Objective (ac) |
| **American Woodcock** | **1,359,100-2,718,200** | **1,359,100-2,718,200** |
| Cerulean Warbler | 900-4,000 | 1,200-4,700 |
| Kentucky Warbler | 170,600-2,500,000 | 229,600-2,933,700 |
| Louisiana Waterthrush | Maintain enough habitat to support current populations. | |
| Prothonotary Warbler | 511,700-2,057,300 | 688,800-2,414,200 |
| Rusty Blackbird | Maintain enough habitat to support current populations. | |
| Swainson's Warbler | | |
| Swallow-tailed Kite | | |
| Yellow-billed Cuckoo | 507,900-1,500,900 | 507,900-1,421,900 |

## Calculating Habitat Objectives

Habitat objectives were calculated using the Forested Wetlands Condition Index from the SECAS Blueprint update (Gray and Jones-Farrand 2019).  The Forested Wetland Condition Index describes this habitat type in terms of site quality (high, moderate, low) and landscape quality (intact, fragmented, very fragmented) and assigns an index score ranging from 0 to 14 (Figure 7).
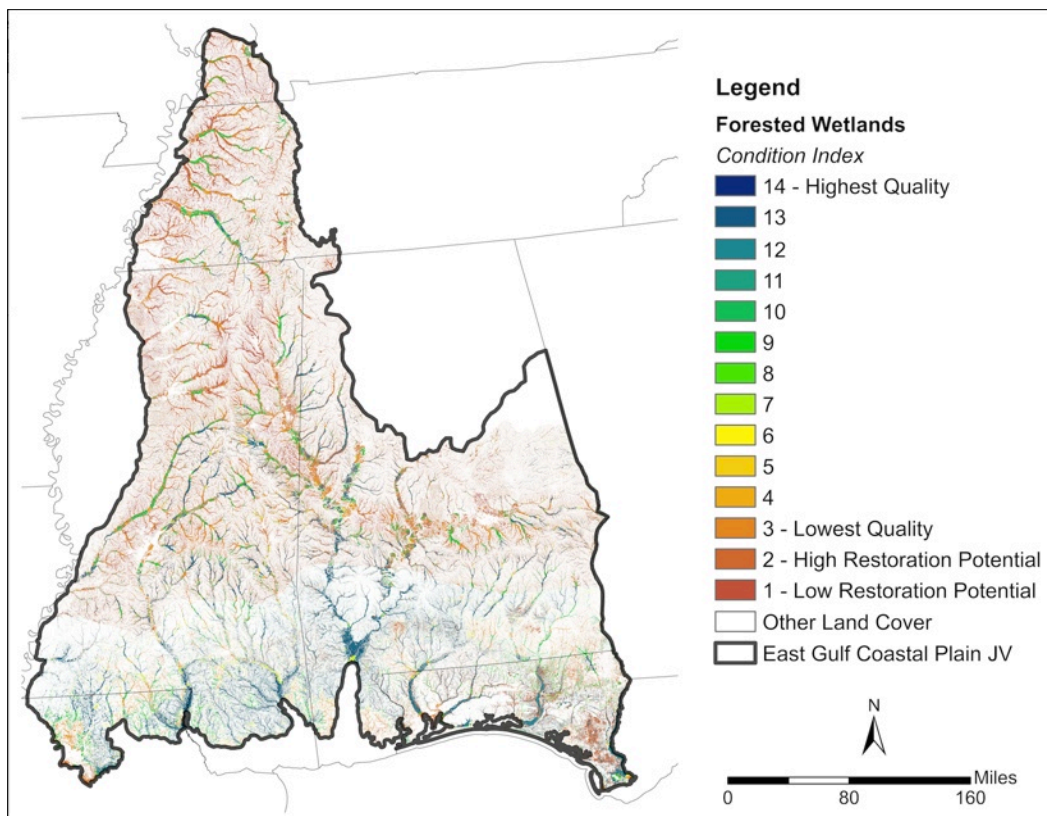


*Figure 7. Forested Wetlands in the East Gulf Coastal Plain (Gray and Jones-Farrand 2019).*

Forested Wetlands currently occupy 16.7 million ac, and approximately 2.9 million ac are in high or moderate site quality in either an intact or fragmented landscape. The BCR 27 portion of Alabama, Florida, Louisiana, and Mississippi currently meet their 10-year habitat objectives (Table 12). For Forested Wetland species insensitive to fragmentation or edge, an additional 773,143 ac of habitat occurs in very fragmented landscapes of high or moderate site quality. For edge- and area-sensitive species, enhancing and restoring low quality Forested Wetlands in intact landscapes may accelerate population recovery (Table 13).

**Table 12.** Current habitat, 10-year objectives, and habitat shortages (ac) of Forested Wetlands for each State-by-BCR area within the East Gulf Coastal Plain.

| HABITAT OBJECTIVES FOR EACH STATE-BY-BCR | | | | | | | |
|---|---|---|---|---|---|---|---|
| | AL | | FL | KY | LA | MS | TN |
| | BCR 27 | BCR 29 | | | | | |
| Forested Wetlands: High or Moderate Site Quality in Intact or Fragmented Landscape[1] | | | | | | | |
| Current Habitat | 1,051,963 | 20,715 | 306,230 | 11,073 | 248,892 | 1,136,651 | 130,476 |
| 10-year Objective | 409,800-819,500 | 21,700-43,500 | 133,500-266,900 | 31,500-63,100 | 61,400-122,900 | 551,900-1,103,800 | 149,000-298,200 |
| Habitat Needed to Meet Objectives | Maintain current levels | 1,000-22,800 | Maintain current levels | 20,400-52,000 | Maintain current levels | Maintain current levels | 0-167,700 |

[1] Forested Wetland Condition Index scores of 7, 8, 10, 11, 13, or 14

**Table 13.** Forested Wetlands current habitat availability (ac) is determined by the percentage of current or restorable forested wetlands in the East Gulf Coastal Plain encompassed by a state.

| CURRENT HABITAT CONDITION FOR EACH STATE-BY-BCR | | | | | | | |
|---|---|---|---|---|---|---|---|
| | AL | | FL | KY | LA | MS | TN |
| | BCR 27 | BCR 29 | | | | | |
| Forested Wetlands: High or Moderate Site Quality in Intact or Fragmented Landscape[1] | | | | | | | |
| Current | 1,051,963 | 20,715 | 306,230 | 11,073 | 248,892 | 1,136,651 | 130,476 |
| Forested Wetlands: High or Moderate Site Quality in Very Fragmented Landscape[2] | | | | | | | |
| Current | 235,355 | 3,746 | 42,742 | 12,916 | 58,964 | 313,853 | 105,548 |
| Forested Wetlands: Low Site Quality in Intact Landscape[3] | | | | | | | |
| Current | 681,402 | 11,354 | 325,815 | 378 | 178,897 | 625,087 | 13,764 |

[1] Forested Wetland Condition Index scores of 7, 8, 10, 11, 13, or 14
[2] Forested Wetland Condition Index scores of 4 or 5
[3] Forested Wetland Condition Index score of 12

**PINE AT-A-GLANCE**

**Representative Priority Species:**
Red-cockaded Woodpecker

**Current High Quality, Intact Pine-dominated Woodlands and Savannas:**
626,187 ac

**JV-wide Objective:** 610,000 ac

**RCW Habitat Shortage:** No JV-wide deficit due to ample habitat availability in Florida, but local deficits are apparent in Alabama, Louisiana, and Mississippi. Continuing prescribed burning will be central to maintaining current pine woodlands and savannas.

**Longleaf Pine Woodlands/Chuck Bargeron, University of Georgia, Bugwood.org**

**Habitat Description and Current Status**

Pine-dominated Woodlands and Savannas include pine flatwoods and mesic pine, pine uplands and sandhills, and pine plantations with an emphasis on open woodland and savanna conditions.  The geography currently has an estimated 4.8 million ac of high and moderate quality Pine-dominated Woodlands and Savannas in intact and fragmented landscapes, though only 626,186 ac are considered high quality, intact habitat.  Although progress has been made to restore longleaf pine and frequent fire regimes in much of the Southeastern Coastal Plain, much of the Southeast's pinelands remain in closed-canopy forest or pine plantations.  A substantial amount of potential open-pine habitat in good configuration is of poor condition, and much also has poor landscape configuration (Gray and Jones-Farrand 2019).  The limited acres in both good configuration and condition are concentrated in southeastern Alabama and Florida's panhandle, an area with a legacy of longleaf pine retention and prescribed fire practices on private lands (Landers et al. 1995, Outcalt and Sheffield 1996).

The trajectory of pine growth and industry standard management practices result in pine plantation stands rotating through periods of regeneration (also called early successional or shrub-scrub condition), canopy closure prior to a timber thinning, and open forest after thinning and prior to final harvest.  In parts of the geography with a high proportion of evergreen forest in pine plantations, such as central Mississippi, southern Alabama, and Florida's panhandle, timberlands provide a shifting mosaic of ephemeral open forest conditions, which can be used by Bachman's Sparrow and Northern Bobwhite for about 4 years (Iglay et al. 2018, Greene et al. 2019a,b).

## Priority Bird Species

Pine-dominated Woodlands and Savannas serve as the primary habitat type for four priority landbird species. Three of these species are in a PIF continental concern group and have 10-year and 30-year habitat objectives (Table 14). Red-cockaded Woodpecker requires the most habitat to achieve 10-year and 30-year minimum population objectives.

**Table 14.** Ten- and thirty-year habitat objectives (ac) for priority landbird species primarily associated with Pine-dominated Woodlands and Savannas. The species in bold sets habitat objectives for this suite of priority landbirds.

| HABITAT OBJECTIVES FOR PRIORITY SPECIES IN PINE-DOMINATED | | |
|---|---|---|
| | 10-year Habitat Objective (ac) | 30-year Habitat Objective (ac) |
| American Kestrel (SE) | Maintain enough habitat to support current populations. | |
| Bachman's Sparrow | 290,000-469,800 | 406,000-696,000 |
| Northern Bobwhite | 153,600-350,200 | 153,600-331,800 |
| **Red-cockaded Woodpecker[1]** | **610,000** | **610,000** |

[1]10- and 30-year habitat objectives based from Red-cockaded Woodpecker Recovery Plan (USFWS 2003).

## Calculating Habitat Objectives

The LWG calculated habitat objectives for the Pine-dominated habitat type using three condition indices from the SECAS Blueprint Update: Longleaf Pine Flatwoods, Longleaf Pine Woodlands, and Shortleaf-Loblolly Pine Woodlands (Gray and Jones-Farrand 2019). These condition indices are analogous to other indices developed for the Blueprint. The highest quality pine woodlands and savannas are concentrated in the panhandle of Florida and southern Alabama with some significant patches occurring in southern Mississippi (Figure 8). Existing pine woodlands and flatwoods that could be enhanced to higher quality have the greatest footprint in southern Mississippi and adjacent to the Black Belt Prairie region.

Ten-year objectives for Pine-dominated Woodlands and Savannas as determined by Red-cockaded Woodpecker are presented in Table 15. Because Red-cockaded Woodpecker has specific habitat requirements with a narrow range of structural and vegetative conditions, additional site quality and landscape conditions may be needed to support the larger suite of open pine species. Also, if open pine-associated species occupy moderate-condition sites at lower densities, there may be sufficient habitat currently on the ground to meet requirements for species with less specific habitat requirements than Red-cockaded Woodpecker (Table 16). Furthermore, species that are less edge- and area-sensitive could occupy fragmented landscapes with high quality. However, the landscapes' risk to additional fragmentation and site degradation needs careful consideration.
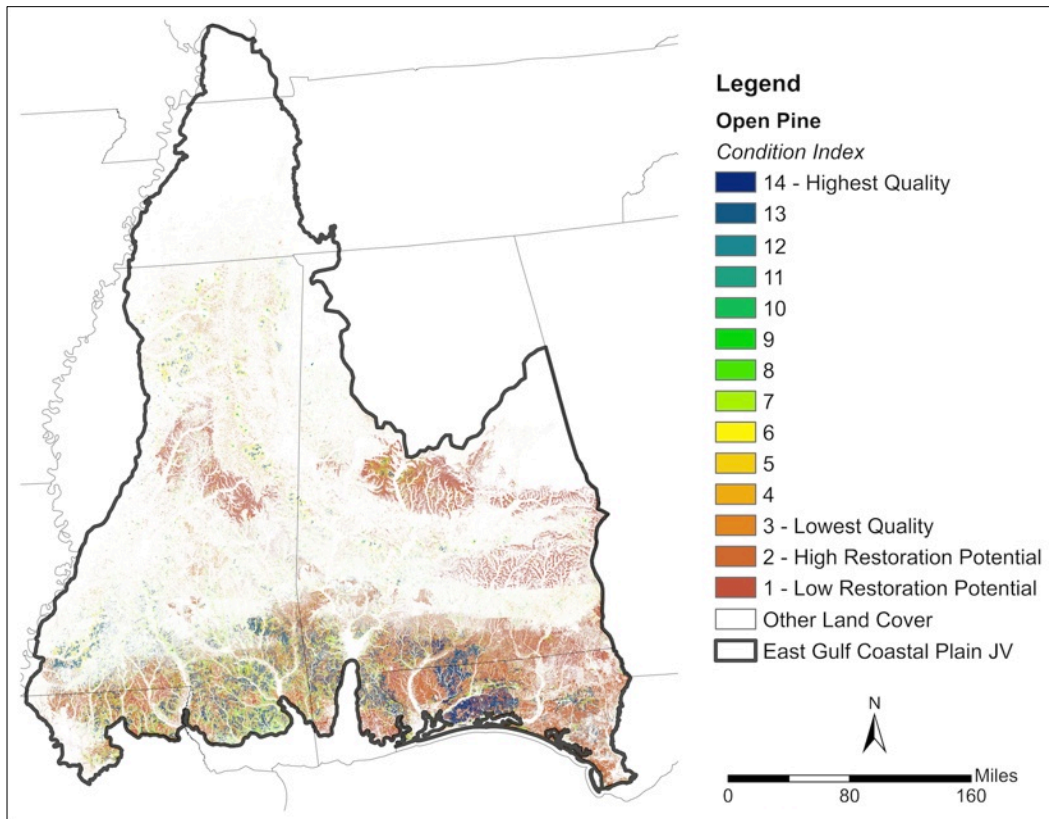
*Figure 8. Condition summary of Pine-dominated Woodlands and Savannas, commonly referred to as "open pine," in the East Gulf Coastal Plain (Gray and Jones-Farrand 2019).*

**Table 15.** Current habitat, 10-year objectives, and habitat shortages (ac) for High quality, intact Pine-dominated Woodlands and Savannas for each State-by-BCR area within the East Gulf Coastal Plain as determined by Red-cockaded Woodpecker. (Note: Red-cockaded Woodpecker does not have a range of population/habitat objectives so single values are displayed.)

| | HABITAT OBJECTIVES FOR EACH STATE-BY-BCR | | | | | | |
|---|---|---|---|---|---|---|---|
| | AL | | FL | KY | LA | MS | TN |
| | BCR 27 | BCR 29 | | | | | |
| Pine-dominated Woodlands and Savannas: High Quality, Intact | | | | | | | |
| Current Habitat | 168,662 | 0 | 286,716 | 0 | 28,027 | 142,720 | 62 |
| 10-year Habitat Objective | 226,100 | 4,500 | 128,400 | 0 | 42,000 | 207,600 | 1,400 |
| Habitat Needed to Meet Objective | 57,400 | 4,400 | Maintain current levels | Maintain current levels | 14,000 | 64,900 | 1,300 |

**Table 16.** Pine-dominated Woodlands and Savannas current habitat availability (ac) as determined by the percentage of current or restorable pine habitats in the East Gulf Coastal Plain at the State-by-BCR level.

| | | CURRENT HABITAT CONDITION FOR EACH STATE-BY-BCR | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | AL | | FL | KY | LA | MS | TN |
| | | BCR 27 | BCR 29 | | | | | |
| **Pine-dominated Woodlands and Savannas: High Quality in Intact or Fragmented Landscape** | | | | | | | | |
| High Quality | Intact Landscape[1] | 168,662 | 0 | 286,716 | 0 | 28,027 | 142,720 | 62 |
| | Fragmented Landscape[2] | 246,584 | 1,369 | 60,348 | 12 | 57,870 | 331,924 | 7,470 |
| **Pine-dominated Woodlands and Savannas: Moderate Quality in Intact or Fragmented Landscape** | | | | | | | | |
| Moderate Quality | Intact Landscape[3] | 427,165 | 35 | 335,994 | 0 | 70,544 | 548,968 | 203 |
| | Fragmented Landscape[4] | 587,359 | 9,042 | 113,873 | 12 | 152,592 | 1,196,052 | 21,071 |
| **Pine-dominated Woodlands and Savannas: Low Quality in Intact Landscape, Restoration Potential, Other** | | | | | | | | |
| Low Quality | Intact Landscape[5] | 48,220 | 22 | 29,648 | 0 | 15,078 | 157,137 | 74 |
| High Restoration Potential (Near existing med-large habitat patches)[6] | | 1,786,475 | 10,719 | 1,787,259 | 0 | 387,142 | 1,281,449 | 2 |
| Other Pine Woodland and Forest Condition[7] | | 1,816,321 | 78,530 | 271,321 | 0 | 232,205 | 1,007,694 | 2,792 |

[1]Condition index score of 14
[2]Condition index score of 5, 8, or 11
[3]Condition index score of 13
[4]Condition index score of 4, 7, or 10
[5]Condition index score of 12
[6]Condition index score of 2
[7]Condition index scores not included in above categories

Pine-Hardwoods/USDA Forest Service

**HARDWOODS & PINE-HARDWOODS AT-A-GLANCE**

**Representative Priority Species:**
Yellow-billed Cuckoo

**Current Hardwoods & Pine-Hardwoods:** 6,976,884 ac[1]

**JV-wide Objective:** 10,910,700 to 13,820,200 ac

**Hardwoods & Pine-Hardwoods Shortage:** 3,933,800 to 6,843,300 ac

[1] *In moderate to high site quality and fragmented to intact landscapes*

**Habitat Description and Current Status**

Upland Hardwood & Pine-Hardwood Woodlands and Forests include mixed hardwoods (e.g., Loess bluffs, the Tennessee Plateau), pine-hardwood forest, and hardwood plantations. The geography currently encompasses an estimated 6.98 million ac of these habitats. In the most recent Southern Forest Futures Project report for the Southern States, Upland Hardwood & Pine-Hardwood Woodlands and Forests were forecasted to decline in area through 2060 in every future land use-urbanization scenario examined (Wear and Greis 2013). Reduction in Upland Hardwoods was strongly linked to the rate of urbanization, and losses were forecasted as substantial (8-14% of Upland Hardwoods current area for all southern states) regardless of timber markets (Wear and Greis 2013). The Southern Forest Futures Project forecasted a 17-38% decline in the current cover of oak-pine forest type for the southern states, and these declines were more influenced by timber markets than rates of urbanization. Although a greater proportion of these woodlands and forests are forecasted to be lost in the Piedmont and Southern Appalachians, even small reductions in this geography can greatly impact priority species. Conservation of Upland Hardwood & Pine-Hardwood Woodlands and Forests is critical in order to meet population objectives for priority species.

**Priority Bird Species**

Hardwoods & Pine-Hardwoods serve as the primary habitat type for nine priority landbird species. Five species are in PIF continental concern groups and have 10-year and 30-year habitat objectives (Table 17). Yellow-billed Cuckoo requires the most habitat to achieve 10-year and 30-year minimum population objectives, thus was selected as the representative species for this habitat type. Due to large variances in bird density across various habitat qualities, locations, site uses, and other factors, the range of habitat objectives for Kentucky Warbler, Red-headed Woodpecker, and Wood Thrush are quite wide.

**Table 17.** Ten- and thirty-year habitat objectives (ac) for priority landbird species primarily associated with Upland Hardwood & Pine-Hardwood Woodlands and Forests. The species in bold sets habitat objectives for this suite of priority birds.

| HABITAT OBJECTIVES FOR PRIORITY SPECIES IN UPLAND HARDWOOD & PINE-HARDWOOD WOODLANDS AND FORESTS | | |
| --- | --- | --- |
| | 10-year Habitat Objective (ac) | 30-year Habitat Objective (ac) |
| Cerulean Warbler | 2,700-12,300 | 3,700-14,400 |
| Chuck-will's-widow | Maintain enough habitat to support current populations. | |
| Eastern Whip-poor-will | | |
| Eastern Wood-Pewee | | |
| Kentucky Warbler | 523,500-7,673,000 | 704,700-9,004,100 |
| Red-headed Woodpecker | 328,900-3,306,200 | 442,800-3,879,800 |
| Wood Thrush | 2,114,400-26,564,900 | 2,846,200-31,173,133 |
| Worm-eating Warbler | Maintain enough habitat to support current populations. | |
| **Yellow-billed Cuckoo** | **10,910,700-13,820,200** | **10,910,600-13,092,800** |

## Calculating Habitat Objectives

The LWG calculated habitat objectives for this grouping using three condition indices developed for the SECAS Blueprint: Mixed Forest, Upland Hardwood Forest, and Upland Hardwood Woodland (Gray and Jones-Farrand 2019).  The greatest concentration of high-quality hardwoods and mixed forests occurs in Alabama, Mississippi, and in small pockets of Tennessee (Figure 9).  In Tennessee, a nearly continuous, north-south swath along the Tennessee River contains an abundance of this habitat type in moderate to high quality, but in a currently fragmented landscape.  Other places with notable restoration potential include Central Mississippi and along the edge of BCR 29 in Alabama.



**Yellow-billed Cuckoo/Alan Schmierer**

Upland Hardwoods & Pine-Hardwood Woodlands and Forests currently occupy 7.0 million ac in high or moderate site quality in either an intact or fragmented landscape.  The BCR 29 portion of Alabama is the only State-by-BCR area which currently meets its 10-year habitat objective (Table 18).  For species not sensitive to fragmentation or edge, an additional 4.0 million ac of habitat can be found in very fragmented landscapes of high or moderate site quality (Table 19).  For edge- and area-sensitive species, enhancing low quality habitat in intact landscapes (1.2 million ac) may accelerate population recovery.  Much of this enhancement opportunity occurs in Alabama, Mississippi, and Tennessee.

> **For edge- and area-sensitive species, enhancing low quality habitat in intact landscapes (1.2 million ac) may accelerate population recovery, particularly in AL, MS, and TN.**
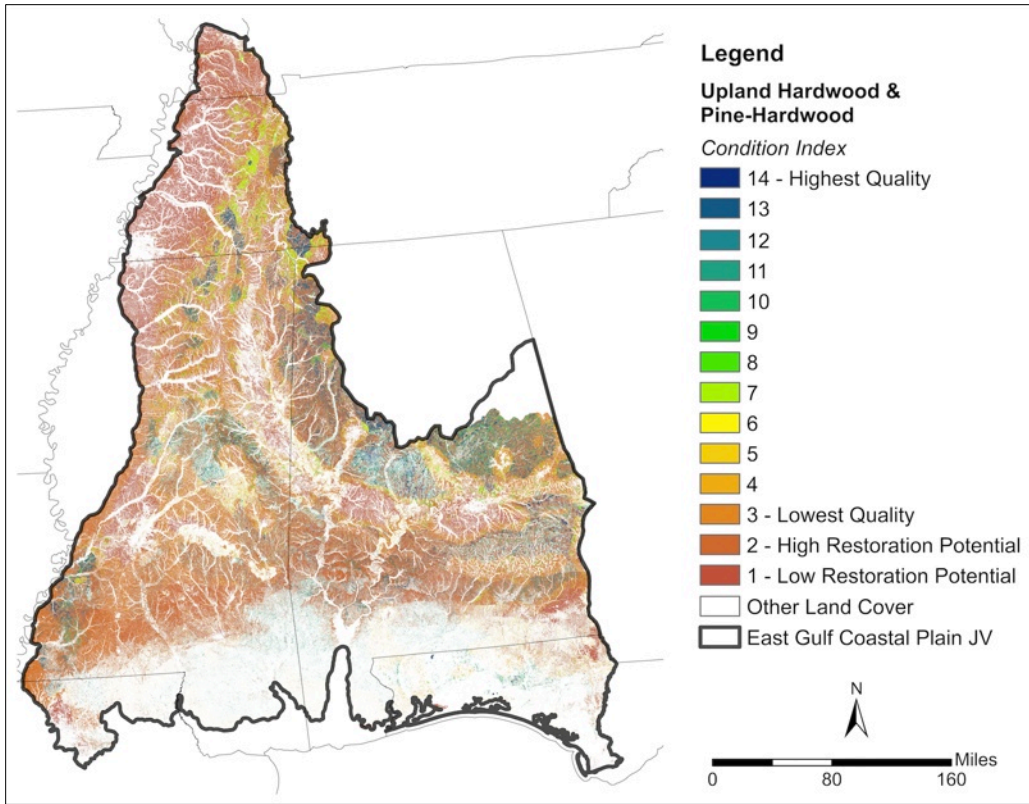
*Figure 9. Condition summary of Upland Hardwood & Pine-Hardwood Woodlands and Forests in the East Gulf Coastal Plain (Gray and Jones-Farrand 2019).*

**Table 18.** Upland Hardwood & Pine-Hardwood Woodlands and Forests current available habitat (ac) for high or moderate quality, intact or fragmented Upland Hardwood & Pine-Hardwood Woodlands and Forests for each State-by-BCR area within the East Gulf Coastal Plain as determined by Yellow-billed Cuckoo.

| HABITAT OBJECTIVES FOR EACH STATE-BY-BCR | | | | | | | |
|---|---|---|---|---|---|---|---|
| | AL | | FL | KY | LA | MS | TN |
| | BCR 27 | BCR 29 | | | | | |
| Upland Hardwood & Pine-Hardwood: High or Moderate Site Quality in Intact or Fragmented Landscapes[1] | | | | | | | |
| Current | 3,072,160 | 770,973 | 101,086 | 36,436 | 82,498 | 2,539,814 | 373,917 |
| 10-year Objective | 3,839,500-4,863,300 | 593,500-751,800 | 159,300-201,800 | 270,600-342,700 | 130,900-165,800 | 4,545,400-5,757,500 | 1,371,500-1,737,200 |
| Habitat Needed to Meet Objective | 767,300-1,791,100 | Maintain current levels | 58,200-100,700 | 234,200-306,300 | 48,400-83,300 | 2,005,600-3,217,700 | 997,600-1,363,300 |
| [1] Upland Hardwoods Condition Index scores of 7,8,10,11,13, or 14 | | | | | | | |

**Table 19.** Upland Hardwood & Pine-Hardwood Woodlands and Forests habitat availability (ac) as determined by the percentage of current or restorable Upland Hardwood & Pine-Hardwood Woodlands and Forests in the East Gulf Coastal Plain at the State-by-BCR level.

| HABITAT OBJECTIVES FOR EACH STATE-BY-BCR | | | | | | | |
|---|---|---|---|---|---|---|---|
| | AL | | FL | KY | LA | MS | TN |
| | BCR 27 | BCR 29 | | | | | |
| Upland Hardwood & Pine-Hardwood: High or Moderate Quality in Intact or Fragmented Landscapes[1] | | | | | | | |
| Current Habitat | 3,072,160 | 770,973 | 101,086 | 36,436 | 82,498 | 2,539,814 | 373,917 |
| Upland Hardwood & Pine-Hardwood: High or Moderate Quality in Very Fragmented Landscapes[2] | | | | | | | |
| Current Habitat | 1,173,714 | 144,168 | 162,990 | 81,787 | 23,947 | 1,947,889 | 490,214 |
| Upland Hardwood & Pine-Hardwood: Low Quality in Intact Landscapes[3] | | | | | | | |
| Current Habitat | 754,933 | 26,816 | 4,749 | 0 | 9,420 | 295,268 | 127,872 |
| [1] Upland Hardwoods Condition Index scores of 7,8,10,11,13, or 14 [2] Upland Hardwoods Condition Index scores of 4 or 5 [3] Upland Hardwoods Condition Index scores of 12 | | | | | | | |



**Worm-eating Warbler/Vern Wilkins, Indiana University, bugwooddotorg**

# State-level Habitat Objectives Summary

An important message for conservation partners working at the state-level includes identification of habitat objectives and summary of additional habitat needed within each priority JV habitat type. Table 20 below summarizes the aforementioned information across habitat types. This information may be useful in state-level planning efforts, as well as a means to measure successes in conservation and restoration efforts.

**Table 20.** Ten-year habitat objectives (ac) and shortages by priority habitat and state in the East Gulf Coastal Plain.

| STATE-LEVEL HABITAT OBJECTIVES | | | | | | |
|---|---|---|---|---|---|---|
| | | Eastern Interior Grasslands-Prairie | Eastern Interior Grasslands-Improved Agriculture | Eastern Shrub-Scrub | Freshwater Forested Wetlands | Pine-dominated Woodlands and Savannas | Upland Hardwood & Pine Hardwood |
| Alabama[1] | 10-year Habitat Objective | 43,000 - 204,000 | 1,011,600 - 3,661,000 | 37,300 - 62,500 | 431,500 - 863,000 | 230,600 | 4,433,000 - 5,615,100 |
| | Habitat Needed to Meet Objective | 3,100 - 150,700 | 0 - 898,600 | Maintain current levels | 1,000 - 22,800 | 61,800 | 767,300 - 1,791,100 |
| Florida | 10-year Habitat Objective | 16,500 - 78,600 | 389,700 - 1,410,400 | 15,000 - 25,200 | 133,500 - 266,900 | 128,400 | 159,300 - 201,800 |
| | Habitat Needed to Meet Objective | Maintain current levels | 0 - 350,200 | Maintain current levels | Maintain current levels | Maintain current levels | 58,200 - 100,700 |
| Kentucky | 10-year Habitat Objective | 2,600 - 12,400 | 61,400 - 222,000 | 50 - 100 | 31,500 - 63,100 | Maintain current levels | 270,600 - 342,700 |
| | Habitat Needed to Meet Objective | 2,600 - 12,400 | 0 - 43,800 | Maintain current levels | 20,400 - 52,000 | Maintain current levels | 234,200 - 306,300 |

| | | Eastern Interior Grasslands-Prairie | Eastern Interior Grasslands-Improved Agriculture | Eastern Shrub-Scrub | Freshwater Forested Wetlands | Pine-dominated Woodlands and Savannas | Upland Hardwood & Pine Hardwood |
|---|---|---|---|---|---|---|---|
| | **STATE-LEVEL HABITAT OBJECTIVES (CONTINUED)** | | | | | | |
| Louisiana | 10-year Habitat Objective | 5,200 - 24,900 | 123,400 - 446,600 | 3,600 - 6,000 | 61,400 - 122,900 | 42,000 | 130,900 - 165,800 |
| | Habitat Needed to Meet Objective | 5,100 - 24,800 | 0 - 79,900 | Maintain current levels | Maintain current levels | 14,000 | 48,400 - 83,300 |
| Mississippi | 10-year Habitat Objective | 67,900 - 322,600 | 1,600,000 - 5,790,500 | 31,500 - 52,800 | 551,900 - 1,103,800 | 207,600 | 4,545,400 - 5,757,500 |
| | Habitat Needed to Meet Objective | 0 - 188,200 | 0 - 1,798,500 | Maintain current levels | Maintain current levels | 64,900 | 2,005,600 - 3,217,700 |
| Tennessee | 10-year Habitat Objective | 12,700 - 60,400 | 299,800 - 1,084,900 | 2,900 - 4,900 | 149,000 - 298,200 | 1,400 | 1,371,500 - 1,737,200 |
| | Habitat Needed to Meet Objective | 11,900 - 59,600 | 0 - 227,200 | Maintain current levels | 0 - 167,700 | 1,300 | 997,600 - 1,363,300 |

1 BCR 27 and 29 are combined for Alabama's habitat objectives

2 Prairie & Improved Agriculture combined totals



**Swainson's Warbler/Alan Schmierer**

# Conservation Delivery, Measuring Success, and Outlook

This Plan presents priority bird species for the East Gulf Coastal Plain Joint Venture and presents population and habitat objectives for these species by habitat.  Objective setting plays a critical role in supporting successful conservation efforts by our partners.  Conservation delivery includes actions taken to protect, restore, and enhance habitat.  It is vital to any successful conservation initiative and a central tenet of the EGCPJV's mission (EGCPJV 2008).  Defining measurable population objectives is an important step in meeting our ultimate goal of sustaining  populations by addressing ecological requirements of the birds (USFWS 2008).  While science planning efforts are critical to defining priorities and objectives, conservation delivery translates objectives into tangible habitat improvements (both quantity and quality) to support bird populations. The role of population objectives in bird conservation is explained in a PIF technical series document (Andres et al. 2020).  Population objectives can be used to:

**Support conservation delivery** by serving as biological targets (Andres et al. 2020).  These targets support efficient and effective conservation delivery by providing a biological foundation for strategic planning and often entail additional conservation design efforts and development of products such as decision support tools.

**Communicate and market** the demonstrated needs for conservation (Andres et al. 2020).  Audiences include internal and external JV partners, the general public, funding entities, and other organizations making decisions about the amount of funding available for bird conservation.

**Measure success** by serving as a performance metric for assessing conservation accomplishments (Andres et al. 2020).  Measuring success is critical in evaluating conservation implementation and adapting methods and processes as needed.  Within partnerships, population objectives allow partners to determine their responsibility and measure their contributions to the larger JV's objectives.

In recent years, there has been an increased focus by many entities on accountability and measuring conservation success (USFWS 2008).  Setting objectives with transparent and defensible methods and delivering results is critical and maintains confidence in the ability to communicate likely outcomes (USFWS 2008).  A solid scientific foundation provides measurable objectives, focuses conservation delivery, communicates likely and actual conservation outcomes, and measures success. The objectives presented in this Plan serve as a foundation for measuring success, increasing our partnership's ability to contribute meaningfully to the efforts of the larger bird conservation community.



**Chuck-will's-widow/Alan Schmierer**

# Supporting Conservation Delivery

This Plan provides a list of prioritized species and 10- and 30-year population and habitat objectives. Species prioritization efforts result in broad agreement across the EGCP geography for organizations, including state wildlife agencies, which have approved State Wildlife Action Plans. For example, priority species can be central to single or multi-state proposals for habitat management and can also serve as target species for monitoring and research programs addressing information gaps or assumptions made during planning (see Chapter 3, Critical Assumptions). Species monitoring is a way to evaluate the effectiveness of habitat delivery and other conservation actions.

Population objectives are foundational to conservation planning and the development of decision support tools. While we have developed broad habitat objectives to meet population objectives, both of these objectives can be refined and improved. Future needs include more detailed identification of population-limiting factors for priority species and the application of population-habitat relationship models to facilitate the development of tools directing the 'what' and the 'where' of conservation delivery (USFWS 2008). Decision support tools often identify priority conservation areas and support decisions through:



**Cerulean Warbler, top left; Henslow's Sparrow, right; Eastern Whip-poor-will bottom left/Alan Schmierer**

1. Identification of focal areas where conservation can be directed by funding through State Wildlife Grants, the National Fish and Wildlife Foundation, and Farm Bill programs

2. Development of geographic-based criteria, which can be used to rank projects against each other ensuring implementation of the most beneficial projects

3. Justification of funds requested in proposals by indicating how restoration or management of a certain number of acres will support a number of birds and contribute to population objectives

4. Prioritized work planning to ensure efficient use of resources including work capacity and monetary funding tied to specific conservation outcomes (USFWS 2008)

5. Provision of targets allowing multiple partners to 'own' their portion of objectives, develop plans to meet them, and roll up successes across agencies and the geography to measure success.

Implementation of on-the-ground actions based on biological planning and conservation design results in the implementation of specific conservation actions on identified parts of the landscape (USFWS 2008). Managers constantly make decisions about what conservation treatments to apply and where to

apply them, and conservation design can assist in focusing implementation. Managers have access to a variety of tools developed from the best available data and information to make those decisions.

Managers are familiar with conservation issues on lands that they manage and are often best suited to develop appropriate conservation strategies.   Depending on the habitat, current land ownership, and management history, land managers might consider myriad conservation delivery actions: land acquisition or easements, restoration and stewardship (e.g., tree or grassland planting, tree thinning,

> **"The partnership relies on the expertise and local knowledge of land managers to implement needed conservation action at the local scale, which roles up to effective, landscape-scale conservation."**

prescribed burning, mowing or haying, or invasive species removal [see Zenzal et al. 2019]).  The partnership relies on the expertise and local knowledge of land managers to implement needed conservation action at the local scale, which roles up to effective, landscape-scale conservation.



**Jeremy French and Brittney Viers (left) of the Southeastern Grasslands Initiative and Zach Tinkle of Paris Landing State Park, after seeding a grassland restoration project**

Lastly, broad habitat objectives presented in the Plan indicate the number of acres needed to support bird population objectives.  These habitat objectives can be used to assess the ability and desire of conservation partners and the public to achieve objectives as they are stated.  Communicating the objectives with internal and external partners is also useful and provides an opportunity for feedback about feasibility and potential tradeoffs inherent in achieving these goals (USFWS 2008).

## Marketing and Communicating Conservation Goals

JV partners must agree on priorities, objectives, and ultimately on how partners contribute individually to collective goals.  Partners use objectives to gauge the ability, willingness, and openness of their organization to making decisions in ways to help meet objectives.  Open dialogue at the management board level among organizations is critical, because a commitment and understanding of how each partner can contribute to collective goals is important.  For example, a state or county agency may be better prepared to provide education programs to engage the public, whereas a federal agency like the Natural Resources Conservation Service generally has far more resources to work on private lands in collaboration with landowners.

> **"Joint Venture partners must agree on priorities, objectives, and ultimately on how partners contribute individually to collective goals."**

This plan provides the critical first step by developing objectives which answer the question "how much is needed."  How to actually achieve those objectives requires both planning and clear, open

communication.  Accountability, agreement, and buy-in to organizational contributions also requires transparent communication among and within partner agencies, among JV partners, and among the conservation community and the public.

# Measuring Success

Success inherently depends on the mission, goals, organizational structure, metrics used to evaluate outcomes, and the spatial and temporal scales of interest.  The goal of the EGCPJV and its partners is the restoration and maintenance of healthy bird populations.  Here, we define success relative to the population and habitat objectives in the Plan and aspirational goals outlined in the Implementation Plan (EGCPJV 2008).

This EGCPJV Landbird Conservation Plan provides the first quantitative bird population and habitat objectives for the EGCPJV.  Success will require a commitment to tracking habitat and population changes to determine if the objectives presented in this Plan are sufficient to meet the EGCPJV's and PIF's bird population targets.  Ultimately, the EGCPJV will evaluate its success by determining how conservation action affects the ability of our landscapes to sustain species (USFWS 2008).  Delivering a certain number of acres on the landscape is only a means for achieving success.  However, to meet biological outcomes linked to the partnership's mission, conservation delivery must result in positive biological outcomes as expressed by population objectives set in this Plan.  Successful landbird conservation is achieved when habitat in the EGCP geography is no longer limiting priority species from reaching population objectives and when habitat gains meet or exceed habitat losses.

> "Successful landbird conservation is achieved when habitat in the EGCP geography is no longer limiting priority species from reaching population objectives and when habitat gains meet or exceed habitat losses."

This Plan was developed with the expectation that individual EGCPJV partners use objectives to plan and implement programs and projects that contribute to the larger partnership's biological objectives.  Self-monitoring by partners allows for an evaluation of how contributions of acquired, managed, and restored acres support biological population objectives.  Monitoring can also allow evaluation of assumptions made during biological planning and assessing management impacts on bird populations.

Annual BBS data, field studies, and feedback from managing agencies are central to tracking bird populations.  Advances in satellite imagery can track additional metrics related to habitat condition and bird migration patterns.  Further, tracking habitat gains and losses will be central to assessing and refining future objectives.  While the EGCPJV Technical Advisory Team calls for this Plan to be revisited every 10 years, progress toward achieving population and habitat objectives should be tracked at shorter intervals, at minimum every 5 years.

The Plan provides population and habitat objectives to sustain populations of priority landbird species within the EGCP.  This Plan will be re-evaluated every 10 years, and it will include additional conservation considerations in subsequent iterations.  The LWG will evaluate the success of the EGCPJV and its partners in meeting population and habitat objectives and will adjust objectives as needed to meet the

30-year step-down PIF population goal for the EGCP.  Three areas of particular focus in subsequent iterations are: (1) addressing critical assumptions within this Plan; (2) evaluating habitat needs of wintering landbird species; and (3) assessing the overall challenges to conservation delivery. Population and habitat objectives are the product of years-long discussions and multi-step calculations. Inherent in these discussions and calculations are many assumptions, outlined in Chapter 3, Critical Assumptions.  This list of 12 assumptions (and/or potential biases) will be addressed in Plan updates as new information from scientific studies, managing agencies, and evaluations of Plan outcomes become available.  Three critical assumptions rise to the top of research and monitoring priorities:

1. The Plan will be used and result in improvements in conservation decisions and implementation and thereby lead to improvements in habitat quantity and/or quality.

2. Condition indices and their use in this Plan accurately reflect habitat conditions required by priority species.

3. Increasing habitat availability will result in positive population responses.



**Indigo Bunting/Steve Maslowski**

Outcome-based monitoring efforts are central to the evaluation of the first and third research priorities. As remote sensing technology and its derivative datasets improve and increase in diversity, condition indices of priority habitat types may be adjusted.  In addition, ground-truthing exercises, continued measurements by the U.S. Forest Service Forest Inventory and Analysis Program, and feedback from managing agencies can address knowledge gaps and verify the effectiveness of using condition indices to estimate habitat types and potential or real habitat shortages.

The LWG anticipates future iterations of this Plan to address needs of wintering species and species requiring migratory stopover habitat in this geography. Additionally, monitoring efficacy associated with conservation delivery efforts is a critical information need. Datasets used in this Plan do not address wintering species in the geography, making stepped-down PIF population goals incalculable for this critical season.  The LWG, partners, and other experts must determine if current habitat objectives are likely to meet population goals and habitat needs of wintering species (e.g., Henslow's Sparrow, Rusty Blackbird).

Bird populations are under increasing pressures from habitat loss and fragmentation, degradation and conversion to other land cover types and uses, in addition to a myriad of other stressors.  Updates to the Landbird Conservation Plan will identify conservation challenges and system-specific threats, including those the partnership can influence to conserve landbirds in the EGCP.  This geography continues to face many challenges, and the EGCPJV will continue to act as a resource and forum for its partners to assess the efficacy of conservation delivery methods and coordinate conservation action to address the myriad conservation challenges facing priority landbird species.

**Painted Bunting/Alan Schmierer**

# Literature Cited

Alabama Department of Conservation and Natural Resources [ADCNR], Terwilliger Consulting Inc., and Conservation Southeast Inc. 2015. *Alabama Wildlife Action Plan: 2015-2025*. Montgomery, AL: Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries.

Andres, B. A., B. L. Altman, A. M. Bartuszevige, C. J. Beardmore, R. Dettmers, D. T. Jones-Farrand, E. J. Laurent, R. S. Mordecai, J. M. Tirpak, W. Vermillion, and J. A. Wheeler. 2020. Considerations for establishing bird population and habitat objectives to further conservation within habitat Joint Ventures. Partners in Flight Technical Series No. 9. Partners in Flight website: https://partnersinflight.org/resources/pif-tech-series/

Bagne, K. E., M. M. Friggens, S. J. Coe, and D. M. Finch. 2014. The importance of assessing climate change vulnerability to address species conservation. Journal of Fish and Wildlife Management 5(2): 450-462; e1944-687X.

Barone, J. A. 2005a. Historical presence and distribution of prairies in the black belt of Mississippi and Alabama. Castanea 70(3): 170-183.

Barone, J. A. 2005b. Historical distribution of prairies in the Jackson Prairie Belt and in western Mississippi. Journal of the Mississippi Academy of Science 50: 144-148.

Barone, J. A., and J. G. Hill. 2007. Herbaceous flora of blackland prairie remnants in Mississippi and western Alabama. Castanea 72(4): 226-234.

Bateman, B. L., A. M. Pidgeon, V. C. Radeloff, J. Vanderwal, W. E. Thogmartin, S. J. Vavrus, and P. J. Heglund. 2016. The pace of past climate change vs. potential bird distributions and land use in the United States. Global Change Biology 22: 1130-1144.

Bonnot, T. W., F. R. Thompson, III, J. J. Millspaugh. 2011. Extension of landscape-based population viability models to ecoregional scales. Biological Conservation 144:2041-2053.

Bonnot, T. W., F. R. Thompson, III, J. J. Millspaugh, D. T. Jones-Farrand. 2013. Landscape-based population viability models demonstrate importance of strategic conservation planning for birds. Biological Conservation 165:104-114.

Brooks, M. E., and P. C. Stouffer. 2011. Interspecific variation in habitat preferences of grassland birds wintering in southern pine savannas. The Wilson Journal of Ornithology 123(1): 65-75.

Culp, L. A., E. B. Cohen, A. L. Scarpignato, W. E. Thogmartin, and P. P. Marra. 2017. Full annual cycle climate change vulnerability assessment for migratory birds. Ecosphere 8(3): e01565.

East Gulf Coastal Plain Joint Venture [EGCPJV]. 2008. Implementation Plan, Version 1. East Gulf Coastal Plain Joint Venture, Auburn, Alabama.

Evans, K. O., L. W. Burger, S. K. Riffell, M. D. Smith, D. J. Twedt, R. R. Wilson, S. Vorisek, K. Heyden, and C. Rideout. 2014. Avian response to conservation buffers in agricultural landscapes during winter. Wildlife Society Bulletin 38(2): 257-264.

Florida Fish and Wildlife Conservation Commission [FWC]. 2012. *Florida's Wildlife Legacy Initiative: Florida's State Wildlife Action Plan.* Tallahassee, FL: Florida Fish and Wildlife Conservation Commission.

Froehly, J. L., A. K. Tegeler, C. M. Bodinof Jachowski, and D. S. Jachowski. 2019. Effects of scale and landcover on Loggerhead Shrike occupancy. Journal of Wildlife Management 83(2): 426-434.

Frost, C. 2006. History and future of the longleaf pine ecosystem. *In*: Walker, L. R., S. Jose, E. J. Jokela, and R. W. Howarth. The Longleaf Pine Ecosystem: Ecology Silviculture, and Restoration. Springer Science and Business Media.

Galbraith, H., D. W. DesRochers, S. Brown, and J. M. Reed. 2014. Predicting vulnerabilities of North American shorebirds to climate change. PLoS ONE 9(9): e108899.

Gilbert, N. A., and P. F. B. Ferguson. 2019. Landscape patterns associated with occupancy of disturbance-dependent birds in the blackland prairie ecoregion of Alabama and Mississippi. Southeastern Naturalist 18(3): 381-404.

Gray, T., and T. Jones-Farrand. 2019. Modeling habitat connectivity to support state wildlife action plans in the Mid-South. Technical Report to U.S. Fish and Wildlife Service.

Greenberg, R., and S. M. Matsuoka. 2010. Rusty Blackbird: Mysteries of a species in decline. Special Section: Rangewide Ecology of the Declining Rusty Blackbird. The Condor 112(4): 770-777.

Greene, R. E., R. B. Iglay, K. O. Evans, T. B. Wigley, and D. A. Miller. 2019a. Estimating capacity of managed pine forests in the southeastern U.S. to provide open pine woodland condition and gopher tortoise habitat. Forest Ecology and Management 432: 200-208.

Greene, R. E., R. B. Iglay, and K. O. Evans. 2019b. Providing open forest structural characteristics for high conservation priority wildlife species in southeastern U.S. pine plantations. Forest Ecology and Management 453: e117594.

Hamilton, C. M., M. Baumann, A. M. Pidgeon, D. P. Helmers, W. E. Thogmartin, P. J. Heglund, and V. C. Radeloff. 2016. Past and predicted future effects of housing growth on open space conservation opportunity areas and habitat connectivity around National Wildlife Refuges. Landscape Ecology 31(9): 2175-2186.

Holcomb, S. R., A. A. Bass, C. S. Reid, M. A. Seymour, N. F. Lorenz, B. B. Gregory, S. M. Javed, and K. F. Balkum. 2015. *Louisiana Wildlife Action Plan*. Baton Rouge, LA: Louisiana Department of Wildlife and Fisheries.

Huffman, J. M. 2006. Historical fire regimes in southeastern pine savannas. Dissertation. Louisiana State University and Agricultural and Mechanical College. Baton Rouge, Louisiana. ProQuest Dissertations Publishing, 2006.

Iglay, R. B., S. Demarais, T. B. Wigley, and D. A. Miller. 2012. Bird community dynamics and vegetation relationships among stand establishment practices in intensively managed pine stands. Forest Ecology and Management 283: 1-9.

Iglay, R. B., R. E. Greene, B. D. Leopold, and D. A. Miller. 2018. Bird conservation potential of fire and herbicide treatments in thinned pine stands. Forest Ecology and Management 409: 267-275.

Jones, P. D., S. L. Edwards, S. Demarais, and A. W. Ezell. 2009. Vegetation community responses to different establishment regimes in loblolly pine (*Pinus taeda*) plantations in southern MS, USA. Forest Ecology and Management 257: 553-560.

Jones, P. D., S. Demerais, and A. W. Ezell. 2012. Successional trajectory of loblolly pine (*Pinus taeda*) plantations established using intensive management in southern Mississippi, USA. Forest Ecology 265: 116-123.

Jones-Farrand, D. T., J. M. Tirpak, F. R. Thompson, III, D. J. Twedt, C. K. Baxter, J. A. Fitzgerald, W. B. Uihlein, III. A decision support tool for setting population objectives for priority landbirds in the Central Hardwoods and West Gulf Coastal Plain/Ouachitas Bird Conservation Regions. Proceedings of the Fourth International Partners in Flight Conference: Tundra to Tropics 377-387.

Kelley, J., S. Williamson, and T. R. Cooper, editors. 2008. American Woodcock Conservation Plan: A Summary of and Recommendations for Woodcock Conservation in North America. Woodcock Task Force, Migratory Shore and Upland Game Bird Working Group, and Association of Fish and Wildlife Agencies: Wildlife Management Institute Publication.

*Kentucky's Comprehensive Wildlife Conservation Strategy.* 2013. Frankfort, KY: Kentucky Department of Fish and Wildlife Resources.

Landers, J. L., D. H. Van Lear, and W. D. Boyer. 1995. The longleaf pine forests of the Southeast: Requiem or renaissance? Journal of Forestry 93(11): 39-44.

LANDFIRE. 2014. Biophysical Settings, LANDFIRE 1.4.0. U.S. Department of the Interior, Geological Survey. Accessed September 9, 2017.

Lane, V. R., K. V. Miller, S. B. Castleberry, D. A. Miller, T. B. Wigley, G. M. Marsh, and R. L. Mihalco. 2011a. Plant community responses to a gradient of site preparation intensities in pine plantations in the Coastal Plain of North Carolina. Forest Ecology and Management 262: 370-378.

Lane, V. R., K. V. Miller, S. B. Castleberry, R. J. Cooper, D. A. Miller, T. B. Wigley, G. M. Marsh, and R. L. Mihalco. 2011b. Bird community responses to a gradient of site preparation intensities in pine plantations in the Coastal Plain of North Carolina. Forest Ecology and Management 262: 1668-1678.

Link, W. A., and J. R. Sauer. 2002. A hierarchical analysis of population change with application to cerulean warblers. Ecology 83(10: 2832-2840.

Luscier, J. D., S. E. Lehnen, and K. G. Smith. 2010. Habitat occupancy by rusty blackbirds wintering in the lower Mississippi Alluvial Valley. The Condor: An International Journal of Avian Biology 112(4): 841-848.

Martinuzzi, S., V. C. Radeloff, J. V. Higgins, D. P. Helmers, A. J. Plantinga, and D. J. Lewis. 2013. Key areas for conserving United States' biodiversity likely threatened by future land use change. Ecosphere 4(5): 58.

Martinuzzi, S., J. C. Withey, A. M. Pidgeon, A. J. Plantinga, A. J. McKerrow, S. G. Williams, D. P. Helmers, and V. C. Radeloff. 2015. Future land-use scenarios and the loss of wildlife habitats in the southeastern United States. Ecological Applications 25(1): 160-171.

McConnell, M., and L. W. Burger. 2011. Precision conservation: A geospatial decision support tool for optimizing conservation and profitability in agricultural landscapes. Journal of Soil and Water Conservation 66(6): 347-354.

McNab, W. H., D. T. Cleland, J. A. Freeouf, J. E. Keys, Jr., G. J. Nowacki, and C. A. Carpenter, comps. 2007. Description of ecological subregions: sections of the conterminous United States [CD-ROM]. Gen. Tech. Report WO-76B. Washington, DC: U.S. Department of Agriculture, Forest Service. 80 p.

Mississippi Museum of Natural Science. 2015. *Mississippi State Wildlife Action Plan*. Jackson, MS: Mississippi Department of Wildlife, Fisheries, and Parks, Mississippi Museum of Natural Science.

Murphy, M. T. 2003. Avian population trends within the evolving agricultural landscape of Eastern and Central United States. The Auk 120(1): 20-34.

Outcalt, K. W., and R. M. Sheffield. 1996. The longleaf pine forest: Trends and current conditions. Resource Bull. SRS-9. Asheville, North Carolina: U.S. Department of Agriculture, Forest Service, Southern Research Station. 28 p.

Panjabi, A. O., W. E. Easton, P. J. Blancher, A. E. Shaw, B. A. Andres, C. J. Beardmore, A. F. Camfield, D. W. Demarest, R. Dettmers, R. H. Keller, K. V. Rosenberg, and T. Will. 2019. Avian Conservation Assessment Database Handbook, Version 2019. Partners in Flight Technical Series No. 8. Available from pif.birdconservancy.org/acad_handbook.pdf

Peterson, C. J. 2000. Catastrophic wind damage to North American forests and potential impact of climate change. The Science of the Total Environment 262: 287-311.

Plentovich, S., N. R. Holler, and G. E. Hill. 1999. Habitat requirements of Henslow's sparrows wintering in silvicultural lands of the Gulf Coastal Plain. The Auk 116(1): 109-115.

Poole, A. F., and F. B. Gill, eds. 1996. *The Birds of North America*. Ithaca, NY: Cornell Lab of Ornithology.

Poole, A. F., and F. B. Gill, eds. 2020. *The Birds of the World*. Ithaca, NY: Cornell Lab of Ornithology.

Quinn, J. E., T. Awada, F. Trindade, L. Fulginiti, and R. Perrin. 2017. Combining habitat loss and agricultural intensification improves our understanding of drivers of change in avian abundance in a North American cropland anthrome. Ecology and Evolution 7(3): 803-814.

Rempel, R. S., and M. L. Hornseth. 2017. Binational climate change vulnerability assessment of migratory birds in the Great Lakes Basins: Tools and impediments. PLoS ONE 12(2): e0172668.

Rosenberg, K. V., A. M. Dokter, P. J. Blancher, J. R. Sauer, A. C. Smith, P. A. Smith, J. C. Stanton, A. Panjabi, L. Helft, M. Parr, and P. P. Marra. 2019. Decline of the North American avifauna. Science 366: 120-124.

Rosenberg, K. V., J. A. Kennedy, R. Dettmers, R. P. Ford, D. Reynolds, C. J. Beardmore, P. J. Blancher, R. E. Bogart, G. S. Butcher, A. Camfield, D. W. Demarest, W. E. Easton, B. Keller, A. Mini, A. O. Panjabi, D. N. Pashley, T. D. Rich, J. M. Ruth, H. Stabins, J. Stanton, and T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.

Ryan, K. C., E. E. Knapp, and J. M. Varner. 2013. Prescribed fire in North American forests and woodlands: history, current practice, and challenges. Frontiers in Ecology and the Environment 11 (Online Issue 1): e15-e24.

Sauer, J. R., W. A. Link, J. E. Fallon, K. L. Pardieck, and D. J. Ziolkowski, Jr. 2013. The North American Breeding Bird Survey 1966-2011: Summary Analysis and Species Accounts. North American Fauna 79: 1-32.

Sauer, J. R., D. K. Niven, J. E. Hines, D. J. Ziolkowski, Jr., K. L. Pardieck, J. E. Fallon, and W. A. Link. 2017. The North American Breeding Bird Survey, Results and Analysis 1966-2015. Version 2.07.0217. Laurel, MD: U.S. Geological Survey Patuxent Wildlife Research Center.

Schotz, A., R. Evans, and M. Pyne. 2014. Ecological System Comprehensive Report: Southern Coastal Plain Blackland Prairie and Woodland. NatureServe [accessed September 20, 2019].

Stambaugh, M. C., R. P. Guyette, and J. M. Marschall. 2011. Longleaf pine (*Pinus palustris* Mill.) fire scars reveal new details of a frequent fire regime. Journal of Vegetation Science 22: 1094-1104.

Stanturf, J. A., D. D. Wade, T. A. Waldrop, D. K. Kennard, and G. L. Achtemeier. 2002. Chapter 25: Background paper: Fire in the southern forest landscapes. *In* Wear, D. N., and J. G. Greis, eds. 2002. Southern forest resource assessment. Gen. Tech. Rep. SRS-53. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 635 p.

Tennessee SWAP [SWAP] Team. 2015. *Tennessee State Wildlife Action Plan 2015*. Nashville, TN: Tennessee Wildlife Resources Agency.

Tucker, Jr., J. W., and W. D. Robinson. 2003. Influence of season and frequency of fire on Henslow's sparrow (*Ammodramus henslowii*) wintering on Gulf Coast pitcher plant bogs. The Auk 120(1): 96-106.

Twedt, D. J. C. R. Loesch. 1999. Forest area and distribution in the Mississippi alluvial valley: implications for breeding bird conservation. Journal of Biogeography 26:1215-1224.

U.S. Department of Agriculture [USDA]. 2019. 2017 Census of Agriculture, United States: Summary and State Data. Geographic Area Series 51(Pt. 51), AC-17A-51. United States Department of Agriculture, National Agricultural Statistics Service. Available at: https://www.nass.usda.gov/Publications/AgCensus/2017/#full_report [accessed September 20, 2019].

U.S. Fish and Wildlife Service [USFWS]. 2003. Recovery plan for the red-cockaded woodpecker (*Picoides borealis*): second revision. U.S. Fish and Wildlife Service, Atlanta, GA. 296 p.

U. S. Fish and Wildlife Service [USFWS]. 2008. Strategic Habitat Conservation Handbook. U. S. Fish and Wildlife Service, Arlington, Virginia.

U.S. Fish and Wildlife Service [USFWS]. 2011. Birds of Management Concern and Focal Species. U.S. Fish and Wildlife Service, Migratory Bird Program. Available at: https://www.fws.gov/migratorybirds/pdf/management/BMCFocalSpecies.pdf [accessed September 23, 2019].

U.S. Geological Survey [USGS]. 2018. Gap Analysis Project, U.S. Geological Survey—Gap Analysis Project Species Range Maps CONUS_2001: U.S Geological Survey data release, **https://doi.org/10.5066/F7V122T2**

Van Horne, B. 1983. Density as a misleading indicator of habitat quality. The Journal of Wildlife Management 47(4): 893-901.

Van Lear, D. H., W. D. Carroll, P. R. Kapeluck, and R. Johnson. 2005. History and restoration of the longleaf pine-grassland ecosystem: Implications for species at risk. Forest Ecology and Management 211: 150-165.

Vermillion, W. G., B. Eley, B. C. Wilson, S. A. Heath, and M. W. Parr. 2012. Gulf Coast Joint Venture Landbird Conservation Plan, Bird Conservation Regions 25, 26, & 27, Gulf Coast Joint Venture Region. 56 pp.

Wade, D. D., B. L. Brock, P. H. Brose, J. B. Grace, G. A. Hoch, and W. A. Patterson III. 2000. Fire in eastern ecosystems. P. 53-96 *in* Brown, J. K., J. K. Smith, eds. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-42. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Wear, D. N., J. G. Greis, eds. 2013. The Southern Forest Futures Project: technical report. Gen. Tech. Rep. SRS-GTR-178. Asheville, NC: USDA-Forest Service, Southern Research Station. 542 p.

Webster, G. R., and J. Bowman. 2008. Quantitatively delineating the black belt geographic region. Southeastern Geographer 48(1): 3-18.

West, A. S., P. D. Keyser, C. M. Lituma, D. A. Buehler, R. D. Applegate, and J. Morgan. 2016. Grasslands bird occupancy of native warm-season grass. Journal of Wildlife Management 80(6): 1081-1090.

White, C. R., and G. L. Harley. 2016. Historical fire in longleaf pine (*Pinus palustris*) forests of south Mississippi and its relation to land use and climate. Ecosphere 7(11): e01458.

Will, T., J. C. Stanton, K. V. Rosenberg, A. O. Panjabi, A. F. Camfield, A. E. Shaw, W. E. Thogmartin, and P. J. Blancher. 2018. Handbook to the Partners in Flight Population Estimates Database, Version 3.0. PIF Technical Series No. 7.

Wilson, B. T., A. J. Lister, R. I. Reimann, and D. M. Griffith. 2013. Live tree species basal area of the contiguous United States (2000-2009). Newtown Square, PA: USDA Rocky Mountain Research Station.

Winger, P. V. 1986. Forested wetlands of the southeast: Review of major characteristics and role in maintaining water quality. Resource Pub. 163. Washington, D.C.: U.S. Department of the Interior, Fish and Wildlife Service.

Wonkka, C. L., W. E. Rogers, and U. P. Kreuter. 2015. Legal barriers to effective ecosystem management: Exploring linkages between liability, regulations, and prescribed fire. Ecological Applications 25(8): 2382-2393.

Yang, L., S. Jin, P. Danielson, C. G. Homer, L. Gass, S. M. Bender, A. Case, C. Costello, J. A. Dewitz, J. A. Fry, M. Funk, B. J. Granneman, G. C. Liknes, M. B. Rigge, and G. Xian. 2018. A new generation of the United States National Land Cover Database—Requirements, research priorities, design, and implementation strategies. ISPRS Journal of Photogrammetry and Remote Sensing 146: 108-123.

Zenzal, Jr., T. J., W. G. Vermillion, J. R. Ferrato, L. A. Randall, R. C. Dobbs, and H. Q. Baldwin. 2019. GoMAMN Strategic Bird Monitoring Guidelines: Landbirds. Pages 25-70 *in* R. R. Wilson, A. M. V. Fournier, J. S. Gleason, J. E. Lyons, and M. S. Woodrey (eds.), Strategic Bird Monitoring Guidelines for the Northern Gulf of Mexico. Mississippi Agricultural and Forestry Experiment Station Research Bulletin 1228, Mississippi State University. 324 pp.

# Appendix A

## Determining Priority Landbird Species

Table A.1. List of landbird species eligible for priority species designation in the East Gulf Coastal Plain. The 29 priority species (emboldened) have a score of at least 0.5 (or, if the score is less than 0.5, the species is a priority if a significant 10-year decline is evident in the North American Breeding Bird Survey [Sauer et al. 2017], can be associated with a primary habitat type (i.e., not a generalist species), and has a core range within the EGCPJV). Scores are calculated via an average weighting process that assigns weight to priority species in the following plans and lists:

- 20% to PIF Landbird Conservation Plan (Rosenberg et al. 2016);
- 2.5% to the EGCPJV Implementation Plan (IP) 2008 (EGCPJV 2008);
- 5% each to PIF's Avian Conservation Assessment Database (ACAD; Panjabi et al. 2019) Area Importance (AI) and Regional Concern (RC);
- 10% each to State Wildlife Action Plans from Alabama (AL; ADCNR et al. 2015), Florida (FL; FFWCC 2012), Kentucky (KY; Kentucky's Comprehensive Wildlife Conservation Strategy 2013), Louisiana (LA; Holcomb et al. 2015), Mississippi (MS, Mississippi Museum of Natural Science 2015), and Tennessee (TN; Tennessee SWAP Team 2015);
- 2.5% to USFWS Birds of Management Concern and Focal Species (FWS BMC; USFWS 2011);
- 1.9% each to Atlantic Coast JV (ACJV; unpubl. report) and Lower Mississippi Valley JV Landbird Plan (LMVJV; Twedt et al. 1999); and
- 0.4% each to Gulf Coast JV (GCJV; Gulf Coast JV Landbird Conservation Plan (Vermillion et al. 2012), Central Hardwoods JV (CHJV; Jones-Farrand et al. 2009, Bonnet et al. 2011, 2013), and Appalachian Mountains JV (AMJV; unpubl. report).

The table below (Table A.1) includes binary values, with "1" indicating a species' inclusion in a plan or list, and a "0" indicating that a species is not included.

Table A.1. List of landbird species eligible for priority species designation in the East Gulf Coastal Plain.

| Species | Score | PIF | EGCPJV IP 2008 | ACAD | | State Wildlife Action Plans | | | | | | FWS BMC | Joint Venture Plan | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AI | RC | AL | FL | KY | LA | MS | TN | | GCJV | CHJV | ACJV | LMVJV | AMJV |
| **Bachman's Sparrow** | 0.977 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| **Cerulean Warbler** | 0.950 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Henslow's Sparrow** | 0.927 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| **Wood Thrush** | 0.921 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| **Prothonotary Warbler** | 0.896 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| **Red-cockaded Woodpecker** | 0.877 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| **Kentucky Warbler** | 0.871 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| **Northern Bobwhite** | 0.85 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Loggerhead Shrike** | 0.85 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Short-eared Owl | 0.848 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| **Red-headed Woodpecker** | 0.821 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| **Prairie Warbler** | 0.821 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| **Rusty Blackbird** | 0.819 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| **Chuck-will's-widow** | 0.817 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| **Grasshopper Sparrow** | 0.752 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| **Swainson's Warbler** | 0.750 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Worm-eating Warbler** | 0.671 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| LeConte's Sparrow | 0.648 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| **American Woodcock** | 0.648 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| Golden-winged Warbler | 0.633 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| **Swallow-tailed Kite** | 0.592 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |

| Species | Score | PIF | EGCPJV IP 2008 | ACAD | | State Wildlife Action Plans | | | | | | FWS BMC | Joint Venture Plan | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AI | RC | AL | FL | KY | LA | MS | TN | | GCJV | CHJV | ACJV | LMVJV | AMJV |
| **American Kestrel (SE)** | 0.575 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Chimney Swift | 0.573 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| Peregrine Falcon | 0.548 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| **Louisiana Waterthrush** | 0.548 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| **Eastern Whip-poor-will** | 0.533 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| Canada Warbler | 0.529 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| **Painted Bunting** | 0.517 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| Bank Swallow | 0.500 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| BeWick's Wren | 0.483 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| Brown-headed Nuthatch | 0.452 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| Sedge Wren | 0.448 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| Bobolink | 0.444 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Greater-Prairie-Chicken | 0.429 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| **Field Sparrow** | 0.421 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |
| Barn Owl | 0.419 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| Common Nighthawk | 0.400 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Least Flycatcher | 0.400 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Common Ground Dove | 0.394 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| **Eastern Meadowlark** | 0.377 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| Mississippi Kite | 0.363 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |
| Bell's Vireo | 0.348 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 |
| **Yellow-billed Cuckoo** | 0.342 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| Blue-winged Warbler | 0.333 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |

| Species | Score | PIF | EGCPJV IP 2008 | ACAD | | State Wildlife Action Plans | | | | | | FWS BMC | Joint Venture Plan | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AI | RC | AL | FL | KY | LA | MS | TN | | GCJV | CHJV | ACJV | LMVJV | AMJV |
| Olive-sided Flycatcher | 0.329 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| Northern Harrier | 0.323 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| Brewer's Blackbird | 0.300 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Black-throated Green Warbler | 0.294 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Yellow-throated Warbler | 0.292 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| Common Grackle | 0.269 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Dickcissel | 0.244 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Willow Flycatcher | 0.229 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| Sharp-shinned Hawk | 0.225 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Lark Sparrow | 0.208 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Ruffed Grouse | 0.208 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| Blackburnian Warbler | 0.204 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Northern Flicker | 0.202 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| Brown Creeper | 0.200 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Common Raven | 0.200 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| White-breasted Nuthatch | 0.200 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| White-tailed Kite | 0.200 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Broad-winged Hawk | 0.179 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Orchard Oriole | 0.167 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| Burrowing Owl | 0.144 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Hooded Warbler | 0.142 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| Yellow-throated Vireo | 0.142 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| Golden Eagle | 0.129 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Northern Saw-whet Owl | 0.129 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |

| Species | Score | PIF | EGCPJV IP 2008 | ACAD | | State Wildlife Action Plans | | | | | | FWS BMC | Joint Venture Plan | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AI | RC | AL | FL | KY | LA | MS | TN | | GCJV | CHJV | ACJV | LMVJV | AMJV |
| Yellow-breasted Chat | 0.127 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| Black-capped Chickadee | 0.125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Vesper Sparrow | 0.125 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Snail Kite | 0.125 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| White-crowned Pigeon | 0.125 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Yellow-bellied Sapsucker | 0.125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Purple Martin | 0.123 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| American Redstart | 0.119 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Black-throated Blue Warbler | 0.119 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| Scarlet Tanager | 0.104 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Alder Flycatcher | 0.100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Barn Swallow | 0.100 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastern Screech Owl | 0.100 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hairy Woodpecker | 0.100 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Long-eared Owl | 0.100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Merlin | 0.100 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Red-breasted Nuthatch | 0.100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rose-breasted Grosbeak | 0.100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Savannah Sparrow | 0.100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Warbling Vireo | 0.100 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Winter Wren | 0.100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Eastern Wood-peewee** | 0.096 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| **Eastern Towhee** | 0.077 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| **Eastern Kingbird** | 0.073 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| Acadian Flycatcher | 0.067 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |

| Species | Score | PIF | EGCPJV IP 2008 | ACAD | | State Wildlife Action Plans | | | | | | FWS BMC | Joint Venture Plan | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | AI | RC | AL | FL | KY | LA | MS | TN | | GCJV | CHJV | ACJV | LMVJV | AMJV |
| Summer Tanager | 0.063 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| Brown Thrasher | 0.052 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| Mourning Dove | 0.044 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| White-eyed Vireo | 0.042 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| Northern Parula | 0.042 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| **Indigo Bunting** | 0.042 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| Red-shouldered Hawk | 0.038 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Red-bellied Woodpecker | 0.038 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Black Vulture | 0.038 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Black-and-white Warbler | 0.029 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Blue-gray Gnatcatcher | 0.023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| White-throated Sparrow | 0.023 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Pine Warbler | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Cooper's Hawk | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Carolina Chickadee | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Baltimore Oriole | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Ruby-throated Hummingbird | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Northern Mockingbird | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Carolina Wren | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Barred Owl | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Northern Cardinal | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Pileated Woodpecker | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Wild Turkey | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

# Appendix B

## Population Estimates of Priority Landbird Species

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Table B.1. Population estimates of priority landbird species in the EGCPJV. Note that population estimates listed below are exact numbers, calculated across the entirety of BCR 27, BCR 29, and the EGCP geography based on the proportion of each BCR within the JV boundary. Population estimates have been rounded in the Landbird Plan. Please see Table 6 in the Landbird Plan for more detail.

| POPULATION ESTIMATES FOR PRIORITY LANDBIRD SPECIES | | | |
|---|---|---|---|
| | BCR 27 | BCR 29 | EGCPJV |
| American Kestrel (SE) | 920 | 7,360 | 700 |
| American Woodcock | Not applicable[1] | | |
| Bachman's Sparrow | 111,639 | 1,190 | 56,329 |
| Cerulean Warbler | 2,544 | 10,123 | 1,680 |
| Chuck-will's-widow | 2,093,610 | 278,160 | 1,196,732 |
| Eastern Kingbird | 2,579,200 | 520,000 | 1,201,204 |
| Eastern Meadowlark | 928,700 | 740,000 | 439,698 |
| Eastern Towhee | 11,750,800 | 3,190,000 | 6,368,276 |
| Eastern Whip-poor-will[2] | 261,180 | 238,680 | --- |
| Eastern Wood-Peewee | 793,000 | --- | 389,266 |
| Field Sparrow | 695,640 | 601,710 | 435,495 |
| Grasshopper Sparrow | 129,200 | 496,400 | 110,894 |
| Henslow's Sparrow | 2,009 | 492 | 59 |
| Indigo Bunting | 12,885,600 | 5,678,400 | 6,456,514 |
| Kentucky Warbler | 468,780 | 85,800 | 252,053 |
| Loggerhead Shrike | 245,700 | 18,200 | 138,246 |
| Louisiana Waterthrush | 53,505 | 33,570 | 25,033 |
| Northern Bobwhite | 543,460 | 80,620 | 273,511 |
| Painted Bunting | 244,500 | --- | 99,738 |
| Prairie Warbler | 1,128,240 | 622,080 | 618,107 |
| Prothonotary Warbler | 1,053,990 | 21,000 | 424,778 |
| Red-cockaded Woodpecker | 9,909 | 156 | 6,150 |
| Red-headed Woodpecker | 343,260 | 42,480 | 136,530 |
| Rusty Blackbird | Not applicable[1] | | |
| Swainson's Warbler | 73,760 | 2,400 | 53,087 |
| Swallow-tailed Kite | 8,450 | --- | 5,085 |
| Wood Thrush | 1,854,000 | 1,185,600 | 1,096,986 |
| Worm-eating Warbler | 42,978 | 42,900 | 35,310 |
| Yellow-billed Cuckoo | 1,656,960 | 396,480 | 780,533 |
| [1] Population estimates were not available from Breeding Bird Survey<br>[2] GAP does not have species distribution data available for Eastern whip-poor-will | | | |

# Appendix C

## Density Estimates of Priority Landbirds with PIF Designations

Table C.1. Densities, given in birds/ac, used to calculate habitat objectives for 18 Partners in Flight species included in continental concern groups. Densities are based on a literature review of published density estimates for BCR 27 and neighboring BCRs in the Eastern U.S. For species assigned to more than one primary habitat type, the Landbird Working Group specified densities for each habitat type if published density estimates varied by habitat types. In addition, more than one density is given if land cover and land use show significant variation within a single habitat type (e.g., prairie and agriculture within Eastern Interior Grasslands).

| DENSITIES FOR PRIORITY LANDBIRD SPECIES IN A PIF CONTINENTAL CONCERN GROUP | | | |
|---|---|---|---|
| | Density Range used for EGCPJV Objectives (birds/ac) | Densities for BCR 27 (n = publications) (birds/ac) | Densities for Neighboring BCRs (n = publications) (birds/ac) |
| American Woodcock | Not applicable: Population and habitat objectives defined by conservation plan (Kelley et al. 2008) | | |
| Bachman's Sparrow | 0.162-0.243 | 0.174-0.851 (7) | 0.049-0.097 (1) |
| Cerulean Warbler<br>  All Habitat Types | 0.101-0.364 | Not available | 0.031-0.365 (6) |
| Chuck-will's-widow | Insufficient data: Habitat objectives were not calculated | | |
| Eastern Meadowlark[1]<br>  All Habitat Types<br>  Prairie<br>  Agriculture | <br><br>0.081-0.304<br>0.040-0.202 | 0.101-0.207 (2) | 0.016-0.324 (20) |
| Eastern Whip-poor-will | 0.097 | 0.003-0.097 (3) | 0.002-0.050 (3) |
| Field Sparrow[1]<br>  All Habitat Types<br>  Prairie<br>  Agriculture | <br><br>0.101-0.405<br>0.028-0.081 | 0.028-0.196 (2) | 0.002-1.737 (11) |
| Grasshopper Sparrow[1]<br>  All Habitat Types<br>  Prairie<br>  Agriculture | <br><br>0.081-0.405<br>0.081-0.202 | 0-0.207 (2) | 0.008-0.608 (36) |
| Henslow's Sparrow[1]<br>  All habitat types | 0.243-0.405 | 0.243-1.54 (3) | 0-5.589 (18) |
| Kentucky Warbler[1]<br>  All habitat types | 0.024-0.283 | 0.025 (1) | 0.016-1.215 (17) |

| | Density Range used for EGCPJV Objectives (birds/ac) | Densities for BCR 27 (n = publications) (birds/ac) | Densities for Neighboring BCRs (n = publications) (birds/ac) |
|---|---|---|---|
| Loggerhead Shrike[1] <br>   All habitat types | 0.040-0.243 | 0.006-0.275 (2) | 0.049-0.006 (1) |
| Northern Bobwhite[1] <br>   All Habitat Types <br>   Prairie <br>   Agriculture <br>   Pine Woodland | 0.081-0.283 <br> 0.040-0.202 <br> 0.202-0.364 | 0.009-0.051 (4) | 0.0004-0.304 (30) |
| Prairie Warbler <br>   All Habitat Types <br>   Climax Shrub-Scrub <br>   Regenerating Pine | 1.214-1.619 <br> 0.040-0.202 | 0.203-2.029 (3) | 0.0004-4.257 (20) |
| Prothonotary Warbler | 0.202-0.647 | Not available | 0.190-0.652 (4) |
| Red-cockaded Woodpecker | Not applicable: Population and habitat objectives defined by recovery plan (USFWS 2003) | | |
| Red-headed Woodpecker | 0.040-0.324 | 0.041 (1) | 0.012-0.608 (7) |
| Rusty Blackbird | Insufficient data: Habitat objectives were not calculated | | |
| Wood Thrush | 0.040-0.405 | Not available | 0.002-0.506 (9) |
| Yellow-billed Cuckoo <br>   All Habitat Types <br>   Forested Wetlands <br>   Upland Hardwoods | 0.121-0.283 <br> 0.040 | 0.051 (1) | 0.024-0.741 (5) |

[1] Most studies of grassland birds provide density estimates for two or more land uses or management types (e.g., hay fields, improved pasture, fields enrolled in Conservation Reserve Program, row crop fields with and without borders, prairie managed with burning or grazing). As such, densities (in the second column) used to calculate habitat objectives for prairie and agricultural land use often originate from the same set of published papers.

# Appendix D

## Habitat Objectives by Habitat Type and State-by-BCR Areas

**Eastern Interior Grasslands**

Table D.1. 10-year habitat objectives (ac) given by population objective and species density scenarios for achieving PIF population goals (Rosenberg et al. 2016) in the East Gulf Coastal Plain for priority species associated with Eastern Interior Grasslands. The target representative species (i.e., the priority species which demands the greatest area) are Eastern Meadowlark (for prairie) and Field Sparrow (for improved agriculture). Please see Table 7 in the Landbird Plan for more detail.

| | | SPECIES DENSITY | |
| --- | --- | --- | --- |
| | | Lower | Upper |
| POPULATION OBJECTIVE | Lower | 554,919 (prairie) 9,959,636 (improved ag) | 147,978 (prairie) 3,485,873 (improved ag) |
| | Upper | 702,897 (prairie) 12,615,539 (improved ag) | 187,439 (prairie) 4,415,439 (improved ag) |

Table D.2. 10-year habitat objectives (ac) given by population objective and species density scenarios for achieving PIF population goals (Rosenberg et al. 2016) for each State-by-BCR area in the EGCPJV for priority species associated with Eastern Interior Grasslands. The target representative species (i.e., the priority species which demands the greatest area) are Eastern Meadowlark (for prairie) and Field Sparrow (for improved agriculture). Please see Table 8 in the Landbird Plan for more detail.

| | POPULATION OBJECTIVE-BY-SPECIES DENSITY SCENARIOS | | | |
| --- | --- | --- | --- | --- |
| | Low Pop. Obj. at Low Density | Low Pop. Obj. at High Density | High Pop. Obj. at Low Density | High Pop. Obj. at High Density |
| Alabama | | | | |
| BCR 27 | 149,551 (prairie) 2,684,122 (ag) | 39,880 (prairie) 939,443 (ag) | 189,431 (prairie) 3,399,888 (ag) | 50,515 (prairie) 1,189,961 (ag) |
| BCR 29 | 11,487 (prairie) 206,164 (ag) | 3,063 (prairie) 72,158 (ag) | 14,550 (prairie) 261,142 (ag) | 3,880 (prairie) 91,400(ag) |
| Florida | 62,040 (prairie) 1,113,487 (ag) | 16,544(prairie) 389,721 (ag) | 78,584 (prairie) 1,410,417 (ag) | 20,956 (prairie) 493,646 (ag) |
| Kentucky | 9,767 (prairie) 175,290 (ag) | 2,604 (prairie) 61,351 (ag) | 12,371 (prairie) 222,033 (ag) | 3,299 (prairie) 77,712 (ag) |
| Louisiana | 19,644 (prairie) 352,571 (ag) | 5,238 (prairie) 123,400 (ag) | 24,883 (prairie) 446,590 (ag) | 6,635 (prairie) 156,307 (ag) |
| Mississippi | 254,708 (prairie) 4,571,473 (ag) | 67,922 (prairie) 1,600,016 (ag) | 322,630 (prairie) 5,790,532 (ag) | 86,035 (prairie) 2,026,686 (ag) |
| Tennessee | 47,723 (prairie) 856,529 (ag) | 12,726 (prairie) 299,785 (ag) | 60,449 (prairie) 1,084,936 (ag) | 16,120 (prairie) 379,728 (ag) |

Table D.3. 10-year habitat objectives (ac) given by population objective and species density scenarios for achieving PIF population goals (Rosenberg et al. 2016) in the East Gulf Coastal Plain for priority species associated with Eastern Shrub-Scrub. The target representative species (i.e., the priority species which demands the greatest area) is Prairie Warbler.

| | | SPECIES DENSITY | |
| --- | --- | --- | --- |
| | | Lower | Upper |
| POPULATION OBJECTIVE | Lower | 120,527 | 90,395 |
| | Upper | 151,432 | 113,574 |

Table D.4. 10-year habitat objectives (ac) given by population objective and species density scenarios for achieving PIF population goals (Rosenberg et al. 2016) for each State-by-BCR area in the East Gulf Coastal Plain for priority species associated with Eastern Shrub-Scrub. The target representative species (i.e., the priority species which demands the greatest area) is Prairie Warbler.

| | POPULATION OBJECTIVE-BY-SPECIES DENSITY SCENARIOS | | | |
| --- | --- | --- | --- | --- |
| | Low Pop. Obj. at Low Density | Low Pop. Obj. at High Density | High Pop. Obj. at Low Density | High Pop. Obj. at High Density |
| Alabama | | | | |
| BCR 27 | 45,065 | 33,799 | 56,620 | 42,465 |
| BCR 29 | 4,689 | 3,516 | 5,891 | 4,418 |
| Florida | 20,080 | 15,060 | 25,228 | 18,921 |
| Kentucky | 72 | 54 | 91 | 68 |
| Louisiana | 4,737 | 3,553 | 5,951 | 4,463 |
| Mississippi | 41,992 | 31,494 | 52,759 | 39,569 |
| Tennessee | 3,893 | 2,920 | 4,891 | 3,668 |

Table D.5. 10-year habitat objectives (ac) given by population objective and species density scenarios for achieving PIF population goals (Rosenberg et al. 2016) in the East Gulf Coastal Plain for priority species associated with Freshwater Forested Wetlands. The target representative species (i.e., the priority species which demands the greatest area) is American Woodcock. American Woodcock has a single population objective, rather than a range, as established by its Conservation Plan (Kelley et al. 2008). Please see Table 11 in the Landbird Plan for more detail.

| | | SPECIES DENSITY | |
| | | Lower | Upper |
|---|---|---|---|
| POPULATION OBJECTIVE | Lower | 2,718,155 | 1,359,078 |
| | Upper | 2,718,155 | 1,359,078 |

Table D.6. 10-year habitat objectives (ac) given by population objective and species density scenarios for achieving PIF population goals (Rosenberg et al. 2016) for each State-by-BCR area in the East Gulf Coastal Plain for priority species associated with Freshwater Forested Wetlands. The target representative species (i.e., the priority species which demands the greatest area) is American Woodcock. American Woodcock has a single population objective, rather than a range, as established by its Conservation Plan (Kelley et al. 2008). Please see Table 12 in the Landbird Plan for more detail.

| | POPULATION OBJECTIVE-BY-SPECIES DENSITY SCENARIOS | | | |
| | Low Pop. Obj. at Low Density | Low Pop. Obj. at High Density | High Pop. Obj. at Low Density | High Pop. Obj. at High Density |
|---|---|---|---|---|
| Alabama | | | | |
| BCR 27 | 819,524 | 409,762 | 819,524 | 409,762 |
| BCR 29 | 43,490 | 21,745 | 43,490 | 21,745 |
| Florida | 266,923 | 133,461 | 266,923 | 133,461 |
| Kentucky | 63,061 | 31,531 | 63,061 | 31,531 |
| Louisiana | 122,861 | 61,430 | 122,861 | 61,430 |
| Mississippi | 1,103,843 | 551,921 | 1,103,843 | 551,921 |
| Tennessee | 298,182 | 149,091 | 298,182 | 149,091 |

Table D.7. 10-year habitat objective (ac) for Pine-Dominated Woodlands & Savannas. The target representative species (i.e., the priority species which demands the greatest area) is Red-cockaded Woodpecker. Red-cockaded Woodpecker has a single population objective, rather than a range, and a prescribed density target as established by the Recovery Plan (USFWS 2003). Please see Table 14 in the Landbird Plan for more detail.

| | SPECIES DENSITY |
|---|---|
| POPULATION OBJECTIVE | 610,003 |

Table D.8. 10-year habitat objective (ac) for each State-by-BCR area in the East Gulf Coastal Plain for priority species associated with Pine-Dominated Woodlands & Savannas. The target representative species (i.e., the priority species which demands the greatest area) is Red-cockaded Woodpecker. Red-cockaded Woodpecker has a single population objective, rather than a range, and a prescribed density target as established by the Recovery Plan (USFWS 2003). Please see Table 15 in the Landbird Plan for more detail.

| | POPULATION OBJECTIVE-BY-SPECIES DENSITY SCENARIOS<br>Based on JV-wide population objective and target density<br>(USFWS 2003) |
|---|---|
| Alabama | |
| BCR 27 | 226,128 |
| BCR 29 | 4,453 |
| Florida | 128,406 |
| Kentucky | 0 |
| Louisiana | 41,968 |
| Mississippi | 207,645 |
| Tennessee | 1,403 |

Table D.9. 10-year habitat objectives (ac) given by population objective and species density scenarios for achieving PIF population goals (Rosenberg et al. 2016) in the East Gulf Coastal Plain for priority species associated with Upland Hardwood & Pine-Hardwood Woodlands & Forests. The target representative species (i.e., the priority species which demands the greatest area) is Yellow-billed Cuckoo. Yellow-billed Cuckoo has a single value for species density, rather than a range of density estimates. Please see Table 17 in the Landbird Plan for more detail.

| | | SPECIES DENSITY |
|---|---|---|
| | | Single density estimate of 0.1 birds/ha |
| POPULATION OBJECTIVE | Lower | 10,910,648 |
| | Upper | 13,820,154 |

Table D.10. 10-year habitat objectives (ac) given by population objective and species density scenarios for achieving PIF population goals (Rosenberg et al. 2016) for each State-by-BCR area in the East Gulf Coastal Plain for priority species associated with Upland Hardwood & Pine-Hardwood Woodlands & Forests. The target representative species (i.e., the priority species which demands the greatest area) is Yellow-billed Cuckoo. Please see Table 18 in the Landbird Plan for more detail.

| | POPULATION OBJECTIVE-BY-SPECIES DENSITY SCENARIOS | |
|---|---|---|
| | Low Pop. Obj. | High Pop. Obj. |
| Alabama | | |
| BCR 27 | 3,839,457 | 4,863,312 |
| BCR 29 | 593,539 | 751,816 |
| Florida | 159,295 | 201,774 |
| Kentucky | 270,584 | 342,740 |
| Louisiana | 130,928 | 165,842 |
| Mississippi | 4,545,376 | 5,757,476 |
| Tennessee | 1,371,468 | 1,737,193 |

# Appendix E
## Methodology: Condition Indices Associated with the GCPO LCC Blueprint

The LWG assessed current habitat availability, total current and restorable habitat, and management options associated with site quality and landscape intactness using Terrestrial Broadly Defined Habitat Condition Index scores for the Middle Southeast. These spatially-explicit condition indices can be described as follows:

> This set of spatial data products refines and improves the Conservation Blueprint 1.0 product developed by the Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative. The principal improvement is the elimination of spatially contradictory information about the distribution of habitat for targeted wildlife species across the landscape. Each of the ecological assessments for terrestrial broadly defined habitats was reproduced using a single integrated map based on ecological systems and measurable landscape attributes. For each terrestrial broadly defined habitat, an independent assessment was produced using two large landscape targets, two measures of habitat condition, and two measures of potential to generate a condition index score, standardized to range from 0 – 14 across all habitat types. Each individual habitat assessment data layer includes a bar code descriptor field that explains which measures contributed to the index for each cell in the grid. These individual condition index layers were combined into a unified assessment of all habitat types in a single map. A simple analysis of potential corridors linking core areas of highest quality habitat was produced by identifying core areas, splitting core areas into classes based on size, creating cost distance surface grids for each class, and linking each individual patch in each class to its least cost "nearest" neighbor from each of the other three classes. The Condition Index scores have been incorporated into a 2019 project developing draft Conservation Opportunity Areas for the state of Arkansas. Products from this project have potential to be a key input into the next iteration of the Southeastern Conservation Adaptation Strategy (SECAS) regional assessment of lands and waters having high conservation value (Gray and Jones-Farrand 2019).

The condition indices are grounded in several input data layers including:
- LANDFIRE Biophysical Settings, which describes the vegetative communities expected to occupy the landscape if human influence were removed,
- LANDFIRE Existing Vegetation Type, which describes current land cover conditions,
- basal area inventories from the USFS Forest Inventory & Analysis (FIA) program,
- percent canopy cover derived from satellite imagery processed for National Land Cover Database 2011 (Yang et al. 2018), and
- known prairie patches, obtained from state agencies.

The LWG used condition index scores of 0-14 in the application of habitat objectives for the JV and each State-by-BCR area. Scores greater than 0 designate total current and restorable habitat. These scores were used to apportion habitat objectives based on the proportion of habitat restorability residing in a State-by-BCR area relative to the restorability of the entire EGCP. Assessments of current habitat, from which habitat deficits were calculated, were tailored to each habitat type. For Eastern Interior Grasslands, prairie was defined as Grassland Condition Index scores of nine and greater, and improved agriculture was defined as scores of 3-8. For Freshwater Forested Wetlands, the LWG defined current habitat as having moderate or high site quality within fragmented or intact landscapes (Forested Wetlands Condition Index scores of 7, 8, 10, 11, 13, and 14). The same was applied to Upland Hardwood & Pine-Hardwood Woodlands & Forests using Mixed Forests, Upland Hardwood Forests, and Upland Hardwood Woodlands Condition Indices. Pine-Dominated Woodlands & Savannas were defined differently because the representative target species, the Red-cockaded Woodpecker, inhabits a more niche set of conditions. In this case, only high site quality in intact landscapes (score of 14) from Longleaf Pine Flatwoods, Longleaf Pine Woodlands, and Shortleaf-Loblolly Woodland Condition Indices defined current habitat availability. Because the Pine-Dominated

habitat type includes priority species that inhabit a wider range of conditions than Red-cockaded Woodpecker, additional estimations of current habitat availability were included in Table 13 (Chapter 4).

The technical report describing detailed methodology and application of condition indices is permanently stored at https://www.sciencebase.gov/catalog/item/5ccb0cfce4b09b8c0b780433.

Table E.1. Area (ac) of Eastern Interior Grassland Condition Index scores for each State-by-BCR area in the East Gulf Coastal Plain.

| EASTERN INTERIOR GRASSLAND CONDITION INDEX | | | | | | | |
|---|---|---|---|---|---|---|---|
| Score | AL-27 | AL-29 | FL-27 | KY-27 | LA-27 | MS-27 | TN-27 |
| 1 | 195,087 | 0 | 4,043 | 4,040 | 442 | 584,821 | 33,816 |
| 2 | 642 | 0 | 771 | 0 | 0 | 52,198 | 0 |
| 3 | 1,292,006 | 144,991 | 225,370 | 147,242 | 160,907 | 2,094,450 | 613,945 |
| 4 | 447,534 | 8,997 | 34,602 | 343 | 52,762 | 411,333 | 48,769 |
| 5 | 32,929 | 0 | 3,395 | 0 | 2,449 | 18,360 | 227 |
| 6 | 525,587 | 54,961 | 127,133 | 30,332 | 114,358 | 1,192,684 | 177,241 |
| 7 | 227,132 | 5,661 | 34,476 | 287 | 32,297 | 259,342 | 17,359 |
| 8 | 22,642 | 0 | 4,050 | 0 | 3,882 | 15,815 | 124 |
| 9 | 36,982 | 0 | 16,922 | 52 | 47 | 77,136 | 667 |
| 10 | 8,298 | 0 | 6,672 | 0 | 37 | 10,349 | 119 |
| 11 | 430 | 0 | 521 | 0 | 0 | 163 | 0 |
| 12 | 5,315 | 0 | 7,057 | 2 | 0 | 40,570 | 40 |
| 13 | 2,016 | 0 | 4,166 | 0 | 0 | 6,069 | 5 |
| 14 | 262 | 0 | 363 | 0 | 0 | 49 | 0 |
| Total | 2,796,863 | 214,611 | 469,542 | 182,299 | 367,181 | 4,763,339 | 892,311 |

Table E.2. Area (ac) of Forested Wetland Condition Index scores for each State-by-BCR area in the East Gulf Coastal Plain.

| FORESTED WETLAND CONDITION INDEX | | | | | | | |
|---|---|---|---|---|---|---|---|
| Score | AL-27 | AL-29 | FL-27 | KY-27 | LA-27 | MS-27 | TN-27 |
| 1 | 225,543 | 6,407 | 18,360 | 189,085 | 7,855 | 871,732 | 581,964 |
| 2 | 2,380,133 | 216,911 | 775,280 | 141,529 | 74,574 | 3,136,313 | 808,827 |
| 3 | 242,459 | 3,316 | 51,956 | 19,499 | 79,775 | 342,053 | 123,108 |
| 4 | 218,389 | 3,509 | 37,718 | 11,468 | 54,427 | 291,875 | 96,077 |
| 5 | 16,969 | 235 | 5,024 | 1,448 | 4,537 | 21,978 | 9,472 |
| 6 | 36,132 | 3,996 | 9,205 | 0 | 10,289 | 72,113 | 561 |
| 7 | 37,693 | 4,552 | 5,093 | 0 | 7,890 | 78,060 | 593 |
| 8 | 2,795 | 240 | 741 | 0 | 899 | 6,244 | 72 |
| 9 | 202,443 | 1,082 | 117,748 | 15,372 | 98,988 | 312,664 | 75,416 |
| 10 | 205,974 | 1,421 | 90,391 | 9,583 | 75,693 | 310,445 | 94,827 |
| 11 | 15,078 | 64 | 9,840 | 1,371 | 5,389 | 19,635 | 9,887 |
| 12 | 681,402 | 11,354 | 325,815 | 378 | 178,897 | 625,087 | 13,764 |
| 13 | 742,681 | 13,875 | 183,819 | 106 | 147,497 | 678,953 | 23,033 |
| 14 | 47,736 | 563 | 16,346 | 12 | 11,523 | 43,313 | 2,068 |
| Total | 5,055,427 | 267,526 | 1,647,335 | 389,853 | 758,234 | 6,810,466 | 1,839,667 |

Table E.3. Area (ac) of Longleaf Pine Flatwoods Condition Index scores for each State-by-BCR area in the East Gulf Coastal Plain.

| LONGLEAF PINE FLATWOODS CONDITION INDEX | | | | | | | |
|---|---|---|---|---|---|---|---|
| Score | AL-27 | AL-29 | FL-27 | KY-27 | LA-27 | MS-27 | TN-27 |
| 1 | 19,526 | 0 | 22,936 | 0 | 20,673 | 7,623 | 0 |
| 2 | 115,351 | 0 | 451,330 | 0 | 46,401 | 35,027 | 0 |
| 3 | 106 | 0 | 1,539 | 0 | 726 | 82 | 0 |
| 4 | 882 | 0 | 6,778 | 0 | 3,183 | 976 | 0 |
| 5 | 455 | 0 | 3,682 | 0 | 1,700 | 588 | 0 |
| 6 | 413 | 0 | 7,818 | 0 | 2,600 | 346 | 0 |
| 7 | 1,918 | 0 | 44,007 | 0 | 11,510 | 4,957 | 0 |
| 8 | 633 | 0 | 15,965 | 0 | 3,709 | 2,002 | 0 |
| 9 | 0 | 0 | 7 | 0 | 5 | 0 | 0 |
| 10 | 22 | 0 | 20 | 0 | 52 | 210 | 0 |
| 11 | 10 | 0 | 0 | 0 | 2 | 163 | 0 |
| 12 | 161 | 0 | 12,938 | 0 | 870 | 200 | 0 |
| 13 | 1,858 | 0 | 110,725 | 0 | 4,240 | 2,686 | 0 |
| 14 | 546 | 0 | 18,081 | 0 | 1,228 | 862 | 0 |
| Total | 141,880 | 0 | 695,828 | 0 | 96,900 | 55,722 | 0 |

Table E.4. Area (ac) of Longleaf Pine Woodland Condition Index scores for each State-by-BCR area in the East Gulf Coastal Plain.

| LONGLEAF PINE WOODLAND CONDITION INDEX | | | | | | |
|---|---|---|---|---|---|---|
| Score | AL-27 | AL-29 | FL-27 | KY-27 | LA-27 | MS-27 | TN-27 |
| 1 | 1,683,388 | 74,245 | 229,835 | 0 | 183,611 | 726,602 | 2 |
| 2 | 1,671,124 | 10,719 | 1,335,929 | 0 | 340,740 | 1,246,422 | 2 |
| 3 | 44,232 | 2,901 | 1,310 | 0 | 5,310 | 57,170 | 47 |
| 4 | 202,159 | 4,858 | 8,105 | 0 | 33,362 | 187,128 | 277 |
| 5 | 83,887 | 526 | 3,884 | 0 | 14,535 | 43,752 | 27 |
| 6 | 51,581 | 600 | 7,846 | 0 | 16,951 | 119,742 | 37 |
| 7 | 273,659 | 1,045 | 54,546 | 0 | 94,691 | 497,262 | 119 |
| 8 | 111,222 | 138 | 36,794 | 0 | 33,688 | 174,501 | 40 |
| 9 | 1,930 | 126 | 40 | 0 | 215 | 3,484 | 0 |
| 10 | 9,205 | 185 | 423 | 0 | 1,485 | 12,513 | 0 |
| 11 | 2,271 | 17 | 22 | 0 | 450 | 1,974 | 0 |
| 12 | 45,638 | 22 | 16,709 | 0 | 13,714 | 124,020 | 69 |
| 13 | 399,883 | 30 | 225,268 | 0 | 63,980 | 445,491 | 151 |
| 14 | 164,379 | 0 | 268,635 | 0 | 26,077 | 130,590 | 52 |
| Total | 4,744,557 | 95,415 | 2,189,345 | 0 | 828,810 | 3,770,652 | 823 |

Table E.5. Area (ac) of Shortleaf-Loblolly Woodland Condition Index scores for each State-by-BCR area in the East Gulf Coastal Plain.

| SHORTLEAF-LOBLOLLY WOODLAND CONDITION INDEX | | | | | | |
|---|---|---|---|---|---|---|
| Score | AL-27 | AL-29 | FL-27 | KY-27 | LA-27 | MS-27 | TN-27 |
| 1 | 3,015 | 0 | 0 | 0 | 0 | 133 | 37 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 7,569 | 558 | 0 | 2 | 499 | 51,185 | 2,155 |
| 4 | 66,118 | 2,493 | 0 | 12 | 2,263 | 306,596 | 17,537 |
| 5 | 34,773 | 509 | 0 | 12 | 1,465 | 76,516 | 6,252 |
| 6 | 4,119 | 89 | 0 | 0 | 1,599 | 39,221 | 415 |
| 7 | 30,105 | 423 | 0 | 0 | 6,010 | 175,277 | 2,674 |
| 8 | 11,881 | 173 | 0 | 0 | 2,318 | 29,793 | 981 |
| 9 | 432 | 15 | 0 | 0 | 10 | 2,113 | 109 |
| 10 | 3,289 | 37 | 0 | 0 | 40 | 11,137 | 462 |
| 11 | 1,455 | 5 | 0 | 0 | 5 | 2,634 | 171 |
| 12 | 2,422 | 0 | 0 | 0 | 494 | 32,917 | 5 |
| 13 | 25,425 | 5 | 0 | 0 | 2,323 | 100,792 | 52 |
| 14 | 3,736 | 0 | 0 | 0 | 722 | 11,268 | 10 |
| Total | 194,338 | 4,307 | 0 | 27 | 17,747 | 839,581 | 30,858 |

Table E.6. Area (ac) of Mixed Forest Condition Index scores for each State-by-BCR area in the East Gulf Coastal Plain.

| Score | AL-27 | AL-29 | FL-27 | KY-27 | LA-27 | MS-27 | TN-27 |
|---|---|---|---|---|---|---|---|
| MIXED FOREST CONDITION INDEX | | | | | | | |
| 1 | 245,726 | 175,284 | 15,355 | 0 | 16,131 | 2,078,492 | 190,239 |
| 2 | 440,119 | 585,019 | 2,938 | 0 | 20,421 | 755,383 | 29,181 |
| 3 | 43,293 | 3,993 | 14,883 | 13,401 | 2,078 | 45,242 | 30,799 |
| 4 | 490,894 | 43,231 | 80,396 | 22,706 | 12,111 | 730,625 | 191,205 |
| 5 | 652,315 | 61,789 | 76,783 | 8,224 | 10,517 | 999,962 | 171,298 |
| 6 | 4,386 | 40 | 47 | 269 | 0 | 1,678 | 282 |
| 7 | 97,987 | 1,685 | 1,144 | 6,044 | 0 | 37,847 | 4,394 |
| 8 | 157,942 | 2,711 | 855 | 1,925 | 0 | 58,796 | 4,500 |
| 9 | 55,940 | 11,199 | 4,848 | 0 | 1,900 | 37,575 | 1,448 |
| 10 | 802,520 | 152,780 | 42,717 | 0 | 17,478 | 664,194 | 20,102 |
| 11 | 1,193,487 | 247,886 | 31,538 | 0 | 19,662 | 876,862 | 24,199 |
| 12 | 12,936 | 395 | 133 | 0 | 0 | 3,474 | 5 |
| 13 | 248,904 | 8,280 | 3,761 | 0 | 0 | 89,383 | 430 |
| 14 | 372,535 | 13,956 | 1,989 | 0 | 0 | 119,735 | 596 |
| Total | 4,818,985 | 1,308,248 | 277,388 | 52,569 | 100,297 | 6,499,247 | 668,676 |

Table E.7. Area (ac) of Upland Hardwood Forest Condition Index scores for each State-by-BCR area in the East Gulf Coastal Plain.

| Score | AL-27 | AL-29 | FL-27 | KY-27 | LA-27 | MS-27 | TN-27 |
|---|---|---|---|---|---|---|---|
| UPLAND HARDWOOD FOREST CONDITION INDEX | | | | | | | |
| 1 | 298,849 | 175 | 29,722 | 2,115 | 67 | 180,513 | 881,169 |
| 2 | 5,135,082 | 21,283 | 89,076 | 0 | 3,210 | 2,405,612 | 809,321 |
| 3 | 7,794 | 6,936 | 8,933 | 101,306 | 519 | 29,386 | 99,774 |
| 4 | 16,640 | 38,964 | 5,807 | 49,080 | 1,258 | 209,585 | 88,963 |
| 5 | 94 | 141 | 0 | 0 | 0 | 94 | 111 |
| 6 | 3,714 | 4,890 | 6,402 | 21,975 | 368 | 20,821 | 104,782 |
| 7 | 15,335 | 38,583 | 10,579 | 28,113 | 9,504 | 224,433 | 194,437 |
| 8 | 161 | 121 | 0 | 62 | 0 | 69 | 269 |
| 9 | 2,202 | 8,310 | 875 | 0 | 59 | 3,291 | 1,161 |
| 10 | 4,732 | 58,643 | 497 | 0 | 267 | 25,773 | 756 |
| 11 | 7 | 101 | 0 | 0 | 0 | 0 | 5 |
| 12 | 13,242 | 26,418 | 4,023 | 0 | 1,349 | 25,585 | 20,483 |
| 13 | 54,613 | 245,711 | 6,116 | 0 | 34,990 | 405,460 | 69,231 |
| 14 | 141 | 497 | 0 | 0 | 0 | 15 | 153 |
| Total | 5,552,605 | 450,774 | 162,029 | 202,651 | 51,591 | 3,530,636 | 2,270,616 |

Table E.8. Area (ac) of Upland Hardwood Woodland Condition Index scores for each State-by-BCR area in the East Gulf Coastal Plain.

| Upland Hardwood Woodland Condition Index | | | | | | | |
|---|---|---|---|---|---|---|---|
| Score | AL-27 | AL-29 | FL-27 | KY-27 | LA-27 | MS-27 | TN-27 |
| 1 | 677,554 | 4,099 | 80,111 | 700,814 | 72,384 | 990,501 | 1,362,349 |
| 2 | 1,407,562 | 338,564 | 41,793 | 0 | 229,237 | 4,563,424 | 161,263 |
| 3 | 64,974 | 321 | 27 | 1,030 | 222 | 55,198 | 91,987 |
| 4 | 13,771 | 44 | 5 | 1,777 | 59 | 7,626 | 38,637 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 150,855 | 116 | 427 | 353 | 1,589 | 130,051 | 200,256 |
| 7 | 20,122 | 20 | 109 | 292 | 106 | 12,560 | 42,030 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 64,680 | 0 | 0 | 0 | 91 | 23,811 | 4,072 |
| 10 | 11,513 | 0 | 0 | 0 | 10 | 3,450 | 860 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 728,755 | 2 | 593 | 0 | 8,070 | 266,209 | 107,384 |
| 13 | 92,158 | 0 | 1,782 | 0 | 484 | 21,236 | 11,955 |
| 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 3,231,943 | 343,167 | 124,847 | 704,267 | 312,254 | 6,074,066 | 2,020,795 |