

MISSISSIPPI ALLUVIAL VALLEY Forest Breeding Landbird Planning Summary

Bottomland hardwood forest historically dominated the Mississippi Alluvial Valley (MAV), but by the early 1990's less than 25% of the MAV remained forested. Because most of the priority and other important breeding bird species within this region are dependent on forested wetlands, these habitats are of greatest conservation concern to the Lower Mississippi Valley Joint Venture partnership. Accordingly, with roots in the 1999 Landbird Conservation Plan for the MAV originally developed in collaboration with Partners in Flight, the LMVJV has developed a suite of planning and design tools to facilitate focused, effective approaches to breeding landbird conservation in the MAV. These tools include:

- quantitative population and habitat objectives,
- forest protection priorities,
- forest restoration priorities,
- descriptions of desired forest conditions (stand scale and landscape scale) for wildlife.



Table 1. Priority species that warrant management concern and/or are of importance to the partnership for forest management. These species were derived from Twedt and Mini (2021) and other partner input.

Common Name	% Population ^a	ACAD RCS-b ^b	Population Goal	Additional Habitat Needed (ha)	Trend ^c
Insufficient Habitat ^d					
Prothonotary Warbler	32.1	17	3,999,000	958,299	-
Northern Parula	2.9	16	3,160,600	566,835	-
Red-shouldered Hawk	3.1	12	145,560	103,242	-/+
Yellow-throated Warbler	1.1	12	33,330	701,649	+
Sufficient Habitat if Managed Optimally ^e					
Cerulean Warbler	0.3	14	10,100	none	-
Wood Thrush	0.9	14	69,990	none	-
Habitat Assumed Sufficient - Attention Warranted ^f					
Yellow-billed Cuckoo	5.4	15	1,344,810	none	-
White-eyed Vireo	3.0	15	2,586,730	none	-
Swainsons' Warbler	11.2	17	85,860	none	-/+
Kentucky Warbler	1.5	13	87,400	none	-/+
Ruby-throated Hummingbird	1.9	13	1,309,130	none	-/+
Hooded Warbler	1.7	12	476,370	none	-/+
Pileated Woodpecker	1.7	12	161,820	none	-/+
Swallow-tailed Kite	0.5	13	1,790	none	+

^a Percent of global population found in MAV Bird Conservation Region

^b Avian Conservation Assessment Database **Regional Concern Score for Breeding** (see pif.birdconservancy.org/ACAD/)

^c "+" = positive trend; "+/-" = confidence interval overlaps 0; "-" = negative trend

^d Species within major categories are prioritized with those exhibiting negative population trends first, and positive trends last; within-trend groupings are ordered by Regional Conservation Score

^e Optimal management assumed to be attained through application of the LMVJV's Desired Forest Conditions for Wildlife principles (see lmvjv.org/desired-forest-conditions)

^f Species characterized by one or more of the following: ACAD score ≥ 12 ; 2016 PIF priority for JV; USFWS Birds of Conservation Concern (2008); population trend non-positive.

Population & Habitat Objectives

Effective biological planning relies upon [population objectives which are translated into habitat objectives](#). In the MAV, population objectives were derived by estimating current populations of forest-dwelling birds using detections during 10 years of North American Breeding Bird Surveys (BBS). Each species' estimated population and historical (1966–2015) change in relative abundance, as assessed from BBS data, was used to establish these regional population goals. Variance in historical BBS trends was used to estimate the minimum forest area required to sustain at least 25 breeding pairs, which was combined with predicted probability of occupancy to identify sustainable forested habitat. Published empirical density estimates for 54 species, as affected by forest management, were used to estimate the proportion of the population objective that could be supported within sustainable forest patches.

Four species of note with populations below target levels are estimated to have habitat sufficient to support population goals, if optimal management of existing forest habitat is implemented (Table 2; see Desired Forest Conditions for Wildlife below). The amount of existing forest habitat (regardless of management) is incapable of supporting target population levels for several additional species (Table 3). As a result, we estimate that an **additional 1.73 million acres of sustainable forest habitat is necessary to support the population goals for all forest-dependent bird species within the MAV.**

Table 2. Notable species with habitat sufficient to support population goals given optimal management of forest habitat within the Mississippi Alluvial Valley Bird Conservation Region

Common Name	% Population ^a	ACAD RCS-b ^b	Population Goal	Population Supported by Optimally Managed Forest	Trend ^c
Brown Thrasher ^{1,2}	1.47	14	529,250	865,775	-
Wood Thrush	0.89	14	69,990	215,289	-
Cerulean Warbler	0.33	14	10,100	24,963	-
Eastern Towhee ¹	1.67	12	353,030	837,257	-/+

^a Percent of global population found in MAV Bird Conservation Region; ^b Avian Conservation Assessment Database Regional Concern Score for Breeding (see <http://pif.birdconservancy.org/ACAD/>; Panjabi et al., 2020); ^c + = positive trend; -/+ = confidence interval overlaps 0.

¹ Positive association with edge; ² Positive association with urban.

Table 3. Notable species that need additional forest habitat to support their current population goals

Common Name	% Population	ACAD RCS-b	Population Goal	Additional Habitat Need	Trend
Prothonotary Warbler	32.09	17	3,999,000	958,299	-
Northern Parula	2.85	16	3,160,600	566,835	-
Red-shouldered Hawk	3.10	12	145,560	687,676	-/+
Yellow-throated Warbler	1.12	12	33,330	701,649	+
Hairy Woodpecker	0.26	10	123,170	267,915	-
Wild Turkey	0.17	10	2,530	498,311	-/+
Warbling Vireo	0.12	10	58,630	702,783	-/+



Photos by page, top to bottom: p1. **Prothonotary Warbler**-James Kawlewski/USFWS p2. **Yellow-billed Cuckoo**-Melissa McMasters; **Swallow-tailed Kite**-ryanacandee; **Cerulean Warbler**-Bruce Beehler p3. **Cypress swamp**-Calmuziclover; **Cypress**-Keith McKnight p.4. **Cottonwoods**-KG Elliott; **Wild turkey**-Stephen Rahn; **Louisiana bottomland hardwood forest**-Keith McKnight; **Swainson's Warbler**-Bruce Beehler p. 5. **Atchafalaya bottomlands**-Yvonne Allen p.6. **Pileated Woodpecker**; **Northern Parula**; **White-eyed Vireo**; **Ruby-throated Hummingbird**-Rick from Alabama; **Hooded Warbler**. (All other photos by Alan Schmierer.)

Reforestation & Protection Priorities

Forest Breeding Bird Decision Support Models

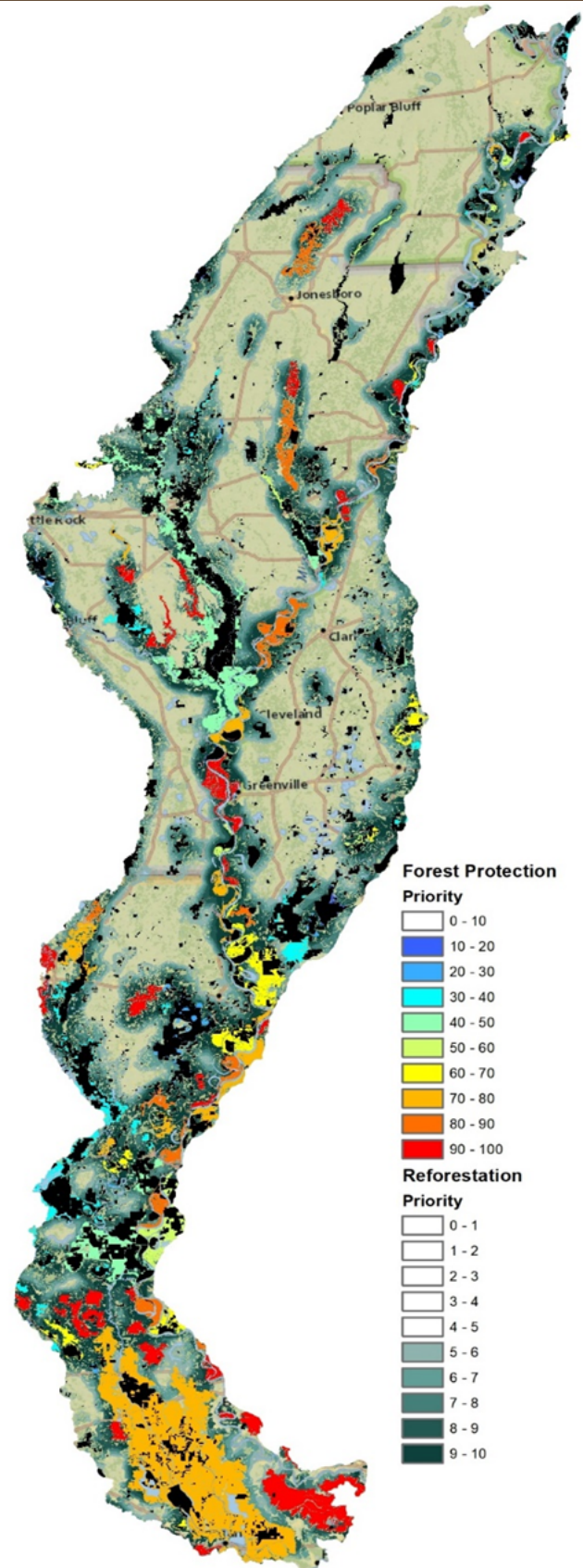
The landscape context of forest habitat is critical to [successful recruitment in many species of forest breeding birds](#) (Twedt & Mini 2021). Forest patches of sufficient size allowing for minimum viable populations and buffering against surrounding hostile habitats are particularly important in the MAV. We developed two models – one which promotes reforestation and one which promotes protection of existing forest to benefit forest-breeding birds.

In our models, we identify ‘core-forest’ as the central area in a forest patch in which birds are not subjected to edge effects, using a 250m buffer to surrounding hostile habitats (e.g., agriculture, developed). The objective of our forest models is to increase or protect the number of forest patches with > 5,000 ac of core-forest. We also prioritized forest with drier hydrologic condition (i.e., less frequently inundated). Because forest patches less prone to frequent flooding have been disproportionately converted to agricultural use, we presume an increased need for conservation–protection and restoration of these forest types, especially for ground and near-ground nesting species.

The figure at right shows higher priority reforestation areas identified within the [Forest Breeding Bird Decision Support Model](#) (LMVJV 2015) and protection priorities specified by the [Forest Conservation-Protection Model](#) (Elliott et al. 2020) for the Mississippi Alluvial Valley.



Mapped Forest Protection and Reforestation Priorities



Desired Forest Conditions for Wildlife

Restoration and protection of sufficient forest acres are key components of bird conservation in the MAV. However, for many species this is not enough. Most priority birds require a particular range of landscape- and site-scale conditions to successfully reproduce. Active forest management plays a significant role in attaining and sustaining many of these conditions (Table 4).

Desired forest conditions for wildlife (DFCWs; LMVJV Forest Resource Conservation Working Group, 2007) were developed to provide a general forest management framework that promotes the development of productive wildlife habitat by diversifying tree species composition, vertical and horizontal structure, tree age, and canopy densities within forest stands. Creating a patchwork of habitats that benefit a wide variety of wildlife species across landscapes is expected to provide habitat that sustains populations of priority birds and other forest-dependent wildlife in concert with sustainable forestry.

Table 4. Desired landscape characteristics for bottomland hardwood forests within the Mississippi Alluvial Valley (LMVJV Forest Resources Conservation Working Group 2007).

Habitat Type	% of Area	Description
Forest Cover	70-100%	Large (>10,000 acre) contiguous forested areas are desired. At any point in time, a minimum 35% and optimum 50% of the forest should meet the desired stand structure conditions (See <i>Management of Bottomland Hardwood Forests</i> , Table 2.)
Actively Managed Forest	70-95%	Forests that are managed via prescribed silvicultural treatments to meet desired stand conditions.
Regenerating Forest	≤ 10%	Forest regeneration on areas > 7 acres (e.g., clearcuts where >80% of overstory has been removed) or forest restoration on agricultural lands (i.e., reforestation). However, achieving increased forest cover via reforestation overrides the 10% limitation.
Shrub/Scrub	≤5%	Thamnic woody vegetation (hydic or mesic) within bottomland forests, including forests in early seral (successional) stages.
Passively Managed Forest	5-30%	Forest areas that are not subjected to silvicultural manipulation (e.g. no-cut, wilderness, set-aside, and natural areas).



Desired Forest Conditions for Wildlife

DFCWs are characterized by landscape scale considerations (Table 4), primary stand scale factors (e.g., canopy cover, midstory, basal area, etc.; Table 5) that managers can manipulate through prescribed treatments, and secondary stand scale factors (e.g., regeneration, cavities, understory cover, etc.; Table 5) that respond indirectly to management. A detailed description of DFCWs can be found at <https://www.lmvjv.org/desired-forest-conditions>.

Key Considerations

- DFCWs are **not intended to be prescriptive**. They provide recommendations to consider when developing forest management plans where wildlife habitat is an important component. Land managers must consider site-dependent conditions and limitations in the context of overall management objectives to determine the most appropriate management actions for achieving landowner objectives, including DFCWs.
- DFCWs are not intended to be met on every acre within a stand or within a landscape at the same instance. Instead, these forest parameters, when measured across the stand, should average to be within desired stand conditions, but with a relatively wide range of variability within the stand. For example, **managing “on thirds”** across the landscape provides a broad array of diversity – 1/3 having grown out of DFCWs with closed canopy, open understory; 1/3 recently disturbed with canopy gaps, a flush of lush vegetation, and habitat metrics generally not within the desired range but poised to grow into that range; and 1/3 having responded to disturbances and within DFCWs.

Table 5. Desired stand characteristics for bottomland hardwood forests within the Mississippi Alluvial Valley (LMVJV Forest Resources Conservation Working Group 2007)

Forest Variables ¹	Desired Stand Structure	Conditions That May Warrant Management
Primary Management Factors		
Overstory Canopy Cover	60-70%	>80%
Midstory Cove	25-40%	<20% or >50%
Basal Area	60-70 ft ² /acre With ≥ 25% in older age classes ²	>90 ft ² /acre or ≥60% in older age classes
Tree Stocking	60-70%	<50% or >90%
Secondary Management Factors		
Dominant Trees ³	>2/acre	<1/acre
Understory Cover	25-40%	<20%
Regeneration ⁴	30-40% of area	<20% of area
Coarse Woody Debris (>10 inch diameter)	≥200 ft ³ /acre	<100 ft ³ /acre
Small Cavities (<10 inch diameter)	>4 visible holes/acre or >4 “snag” stems ≥4 inch dbh or ≥2 stems > 20 inch dbh	<2 visible holes/acre or <2 snags ≥4 inch dbh or <1 stem ≥20 inch dbh
Den Trees/Large Cavities ⁵	1 visible hole/10 acres or ≥2 stems ≥26 inch dbh (≥8 ft ² BA ≥26 inch dbh)	0 visible holes/10 acres or <1 stem ≥26 inch dbh (<4 ft ² BA ≥26 inch dbh)
Standing Dead and/or Stressed Trees ⁵	>6 stems/acre ≥10 inch dbh or ≥2 stems ≥20 inch dbh (>4 ft ² BA ≥10 inch dbh)	<4 stems ≥10 inch dbh/acre or <1 stem ≥20 inch dbh (<2 ft ² BA ≥10 inch dbh)

¹ Promotion of species and structural diversity within stands is the underlying principle of management. Management should promote vines, cane, and Spanish moss within site limitations.

² “Older age class” stems are those approaching biological maturity, (i.e. senescence). We do not advocate aging individual trees but use of species-site-size relationships as a practical surrogate to discern age.

³ Dominants (a.k.a. emergents) should have stronger consideration on more diverse sites, such as ridges and first bottoms.

⁴ Advanced regeneration of shade-intolerant trees is in sufficient numbers (circa 400/acre) to ensure their succession to forest canopy. Areas lacking canopy (i.e. group cuts) should be restricted to <20% of stand area.

⁵ Utilizing BA parameters allows the forest manager to maintain this variable in size classes that are most suitable for the stand instead of using specific size classes noted.

Science Priorities

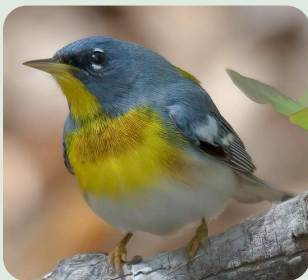
Several uncertainties underlie the models used in our planning. Sound scientific research that improves our population estimates and biological planning, such as density estimates in different forest types, is of high priority. Much of our uncertainty in conservation delivery involves bird response to the structure and composition of the forest. Answers to the following questions could positively impact our partnership’s management decisions.

Table 6. Research and Monitoring Priorities

Category	Question	End-point to measure management performance
Site/area management and habitat quality	How do silvicultural practices affect habitat quality for forest landbirds? What are appropriate silvicultural techniques?	Survival, population size, productivity (breeding), pre-migratory body condition
Site/area characteristics and population demographics	What are the important forest stand characteristics (block shape/size, age, species composition, vertical structure, proximity to other forest blocks, etc.) for maintaining and/or increasing populations of forest landbirds?	Survival, population size, productivity (breeding), pre-migratory body condition
Climatic processes	Will climate-induced changes in vegetation structure and composition affect resources available to forest breeding landbirds?	Invertebrate species richness and abundance, fruiting plant species richness and abundance, body condition at autumn departure, productivity, habitat use

Recommended Conservation Actions at a Glance

- ACHIEVE **OPTIMAL FOREST SPATIAL CONFIGURATION AND STRUCTURE** AS GUIDED BY DESIRED FOREST CONDITIONS FOR WILDLIFE WITHIN ALL FOREST HABITAT
- FACILITATE **LONG-TERM INTEGRITY OF FOREST HABITAT** THROUGH APPROPRIATE MEANS OF PROTECTION, PRIORITIZED AS GUIDED BY THE MAV FOREST CONSERVATION-PROTECTION MODEL
- SEEK TO ESTABLISH A MINIMUM OF **1.73 MILLION ACRES OF ADDITIONAL SUSTAINABLE FOREST** HABITAT, PRIORITIZED AS GUIDED BY THE MAV FOREST BREEDING BIRD DECISION SUPPORT MODEL
- **ADDRESS KEY UNCERTAINTIES** IN MODELS DRIVING OUR UNDERSTANDING OF POPULATION TRENDS AND OCCUPANCY OF HABITATS THROUGH SCIENCE



Lower Mississippi Valley

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