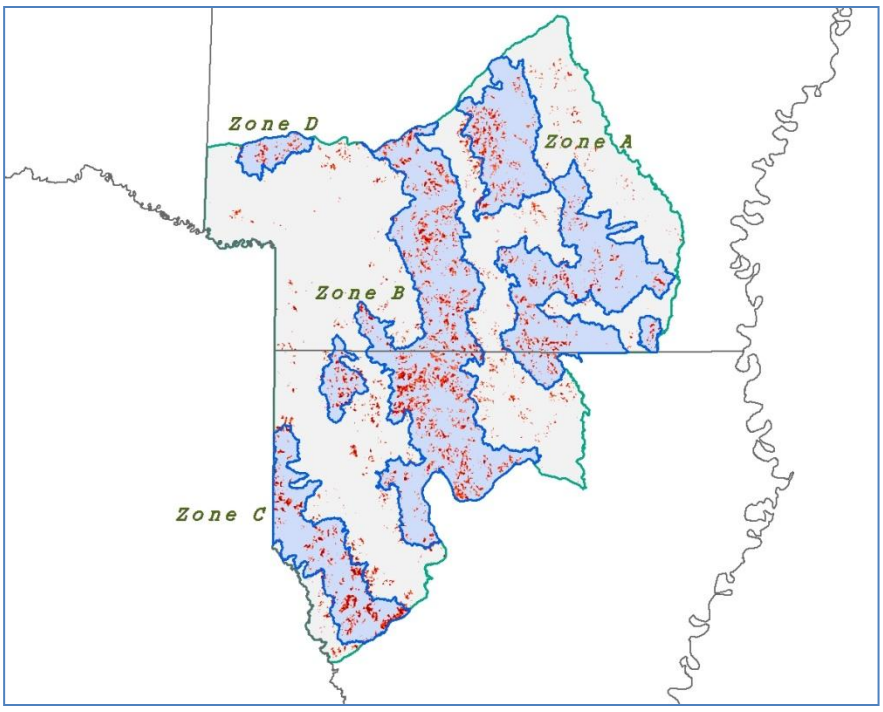
Arkansas/Louisiana West Gulf Coastal Plain Conservation Delivery Network
Conservation Delivery Strategy
&
Delivery Prioritization Tool
for
Upland Landscapes

The Arkansas/Louisiana (AR/LA) West Gulf Coastal Plain (WGCP) Conservation Delivery Network (CDN) was formed in February 2015. The AR/LA WGCP CDN is a partnership of government and private organizations whose conservation delivery activities have a significant impact on the AR/LA WGCP CDN geography. The AR/LA WGCP CDN is chartered by the Lower Mississippi Valley Joint Venture (LMVJV) (www.lmvjv.com), and the primary objectives of the CDN are to:

1. Facilitate effective communication, coordination, and collaboration among the full spectrum of conservation organizations working to positively impact the landscape for wildlife populations within the CDN geography, and
2. Facilitate more effective coordination between the biological planning/conservation design functions of the CDN partnership and the priorities of CDN partner staff responsible for conservation delivery.

To accomplish these objectives, a CDN Delivery Prioritization Working Group was formed to draft a set of geographic and functional priorities based on the collective resource issues of CDN members. The CDN Delivery Prioritization Working Group was established to support the CDN in identifying conservation delivery priorities through (1) the development of a Delivery Priority Tool (DPT) which identifies priority focus areas; (2) identifying important and appropriate conservation actions for these focus areas, and (3) assist the CDN in identifying potential collaborative projects within the focus areas.

Working in partnership with the LMVJV GIS Analyst, the Working Group developed a preliminary Conservation Delivery Priority Tool (DPT) that spatially identifies landscapes within



the AR/LA CDN geography that represent the highest conservation priorities. This preliminary tool, coupled with some adjustments based on the expertise of the Working Group, produced the initial strategic planning map shown above. The rest of this document will detail the process of preliminary Decision Support Tool (DST) development, anticipated refinements, and a plan for future efforts.

Approach

The Working Group's first priority was developing an approach for upland habitat emphasizing open pine conservation with an approach for bottomland habitat to be developed subsequently. Through assessing and evaluating available priority maps and models, the Working Group agreed that utilizing the most spatially-explicit information available would provide the primary framework for targeting conservation delivery upon which the accumulation of new information and management priorities could be developed. This approach allows the CDN to capitalize on existing conservation planning models to, in essence, "prioritize the priorities". Conservation priorities for the CDN are based on the goals and objectives of the collective priorities of CDN partner organizations individually and those set collectively through the LMVJV. Encouraging CDN partners the opportunity to work cooperatively in areas where their organization's conservation priorities and objectives overlap existing conservation priority layers (i.e., areas that a specific agency, conservation organization, or landowner have already indicated they prefer to work) should help improve their likelihood of adoption and utilization for resource conservation issues.

The CDN Delivery Strategy employs methodology that is scientifically justifiable and demonstrates concerted thought and planning. The working group composed of Don Bragg (USFS), Kate Hasapes (LDWF), Bill Holimon (ANHC), Roger Mangham (TNC AR), Steve Nipper (NRCS LA), Jason Nolde (USFS), Latimore Smith (TNC LA), Mike Stroeh (USFWS), Jeff Taverner (AGFC), and Dan Weber (TNC LA) was charged by the CDN Steering Committee to accomplish the following tasks:

1. Solicit from CDN partner organizations any available priority maps and models that spatially define and identify various organizational resource conservation priorities;
2. Utilize the most spatially explicit information available to identify priority focus areas within the CDN geography;
3. Utilizing as many spatially explicit priorities as possible, develop a GIS-based DPT;
4. Draft a list of important Conservation Actions for each focus area;
5. Draft a CDN Delivery Priority Strategy document that describes the Working Group's DPT development process.

The Working Group ultimately settled on two spatially-explicit conservation Decision Support Models (DSMs; see images for each on following pages) to provide a preliminary DPT. These include the Open Pine Landbird DSM (Appendix A; LMVJV WGCPO Landbird Working Group 2011) and the Eastern Wild Turkey DSM (Appendix B; Goetz and Porter 2007). Both of these models were developed by the LMVJV Partnership, and both were designed to protect and/or restore habitat and habitat functions to the landscape of the WGCP area of Arkansas and Louisiana. While these DSMs utilize some similar data and there is overlap in application, each model was designed for unique purposes and has distinct output products. Further, the methods and design of these DSMs are fully documented and more repeatable than simply having experts subjectively identify polygons on a map.

We sought to combine these two DSMs in order to incorporate multiple priorities for uplands in the WGCP and by doing so, invoke the priorities for more, varied partners within the CDN, and, therefore, encourage greater collaboration. In order to merge these models so that each was weighted equally, they were resampled so that each ranked their priorities 0-100. Once merged, a focal mean neighborhood analysis using ArcMap Spatial Analyst was conducted on the output; the Focal Neighborhood tool performs a neighborhood operation that computes an output raster where the value for each output cell is a function of the values of all the input cells that are in a specified neighborhood around that location. The function performed on the input is a statistic, and we chose to use the mean statistic for that neighborhood. The logic here is that conservation actions do not occur on a hectare by hectare basis (which approximates the area covered by a priority pixel of either DSM input), but on larger project areas, such as would be represented better by 10, 50 and 100 hectare neighborhoods.

This interim output provided us with a CDN geography of prioritized neighborhoods for upland habitats. We deemed the upper 50 percent of these priorities as our priority upland habitats and will promote these areas as our highest priority conservation action potential areas for the partnership. From the charge given our group from the CDN Steering Committee to develop a group of Focus Areas based upon these priorities that emerged, we further narrowed our conservation targets and used only the top 25 percentile of those high priorities when defining our Focal Area boundaries. In order to provide sound justification for the delineation of these boundaries, we decided as a group to let watershed boundaries define our Focus Areas.

Focus areas were defined by combining high priority areas from the combined DSMs with focal areas determined by watershed boundaries. Watershed Boundary Dataset Hydrologic Units that are developed by USGS and NRCS define the drainage basins in a nested arrangement for the entire US. The newest and most detailed watershed boundaries available are Hydrologic Unit Code 12 (i.e. HUC-12s) -- they describe the drainages of 2nd and 3rd order streams. By using HUC 12s as our Focus Area boundaries, we provide an accepted and justifiable definition to our Focus Areas. These were then further modified based on the knowledge of actual on-the-ground conditions and priorities of CDN partners.

Results

It was quickly apparent to a number of CDN Working Group members that the Open Pine Landbird DSM was not properly classifying large areas of good habitat. A preliminary investigation into this issue during one of the Working Group meetings suggested that some of the inherent design structure of the Open Pine Landbird DSM that immediately excluded secondary floodplains and used overly broad riparian zone classifications likely resulted in this discrepancy. Because these design elements are currently structural, they could not be easily modified to evaluate different circumstances.

To address Working Group member concerns that these flaws may unduly influence the potential Focus Areas to be recommended, we decided to move ahead with the existing DSM with the idea that they would be refined, improved, and updated in the near future to provide (potentially) new Focus Area priorities. In addition, the expert opinions of a number of Working Group members were used to adjust which Focus Areas comprised the preliminary recommendation—this resulted in some HUC-12 watersheds being added, and some being dropped. This approach is consistent with the intentions of the CDN, which is to not present a single, fixed DPT for all future conservation opportunities, but rather to create a dynamic system

that can be adjusted as new or better information becomes available (including that of expert opinion). Current Focus Area priorities can and will be adjusted, if needed, following the update of the Open Pine Landbird DSM.

By combining the Open Pine Landbird DSM, Eastern Wild Turkey DSM, and the HUC 12s, we were able to take advantage of existing science and decision-support capabilities developed by a number of the CDN partners when combined with expert opinion.

Future Opportunities

A high priority in the immediate future must be the adaptation of the Open Pine Landbird DSM to reflect our concerns about the data and design issues. With the inclusion of secondary floodplains more Focus Areas may be highlighted in the DPT.

The preliminary DPT and the resultant Focus Areas not only put critical decision support information into the hands of conservation professionals most aptly capable of best utilizing this information, it also places the AR/LA WGCP CDN partnership in the position of being uniquely qualified when it comes to responding to grant-funding opportunities.

The LMVJV plans to address the methodology deficiencies in the Open Pine Landbird DSM later in 2016, and looks to include the expertise of this Working Group in future model evaluations. Revision of that DSM would provide the potential for a CDN Decision Priority Tool reassessment in perhaps the near future

Important Conservation Priorities

Major threats to the terrestrial ecosystems in the AR/LA WGCP geography are habitat destruction or conversion, habitat fragmentation, alteration of natural fire regimes, non-native invasive plants, and altered composition, structure, and hydrologic regimes (Anderson 2006, Lester et al. 2005). Aquatic systems are threatened by incompatible land use practices leading to sedimentation and runoff. Hence, the protection, restoration, and maintenance of older growth, fire-maintained pine and pine-hardwood woodlands is a high priority for the CDN partnership on both public and private lands in the CDN geography.

Once common, mature pine and pine-oak forests and woodlands with low canopy cover, low basal area, and an open grassy or herbaceous understory are now relatively uncommon in the West Gulf Coastal Plain (WGCP), yet provide important habitat for many rare species and other wildlife (LMVJV WGCPO 2011). With fire suppression and conversion of native pine forest to pine plantations planted at high stem densities that are typically harvested at much younger stand ages, many of the species dependent upon this habitat have markedly declined resulting in conservation of open pine habitat becoming a high priority action for natural resource agencies and organizations in this region. Changes in private ownership patterns also threaten the integrity of forest lands in the WGCP. Large timber companies are divesting their holdings to Timber Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs) whose interest in land and forest health may be secondary to return on investment. Further divestiture of these assets is likely to cause increased fragmentation.

Two general open pine habitats were historically found at large scale in the WGCP: loblolly pine

(*Pinus taeda*)/shortleaf pine (*P. echinata*) woodlands on Pleistocene terraces and shortleaf pine woodlands on the Tertiary hills. Identified by the Arkansas Natural Heritage Commission and The Nature Conservancy of Arkansas as the most endangered forested ecosystem in Arkansas (D. Zollner, personal communication), the loblolly/shortleaf pine woodlands occur on hydroxeric soils with loblolly dominating on more mesic soils and shortleaf dominating on more xeric soils. Shortleaf pine woodlands occur on the well-drained, sandy soils of the rolling Tertiary hills across the WGCP of Arkansas and Louisiana. Both of these extensive systems once supported a large suite of species dependent on open pine habitat, but unfortunately both have converted almost entirely to pine plantations (Anderson 2006, Lester et al. 2005) and the species they supported have thus declined dramatically. If we expect species dependent on open pine habitat to recover and be viable for the long run in the WGCP, then increased collaborative efforts are needed to restore these two open pine woodland types in Arkansas and Louisiana.

Several important patch communities occur within the pine woodland matrix habitat. For example, saline soil barrens within pine woodlands on Pleistocene terraces support a federally listed threatened plant species and many rare associates (Reid et al. 2010) along with wintering grassland bird species (Holimon et al. 2008). Protecting these patch communities along with the pine woodlands provides opportunities to meet multiple conservation needs.

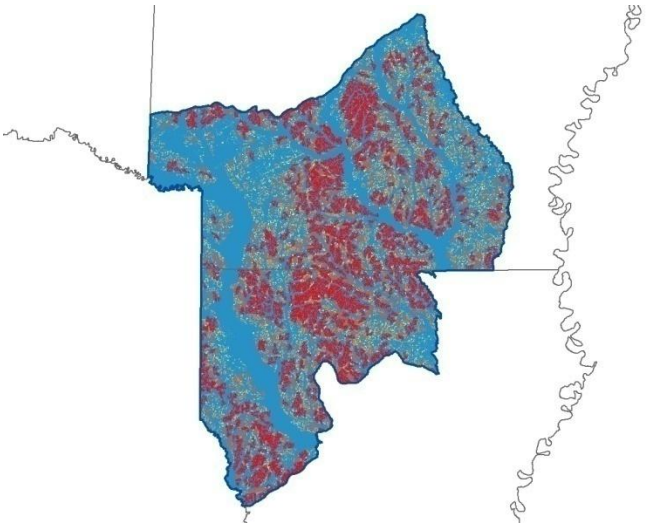
Launched in the spring of 2013, the Shortleaf Pine Initiative (SPI) is a collaborative response to the dramatic decline of shortleaf pine forests and associated habitats that once covered a vast area from eastern Texas to Florida and up the eastern seaboard to New Jersey. The AR/LA WGCP CDN is poised to be an important asset to the SPI in restoring and maintaining historic shortleaf pine ecosystems within the WGCP portion of Arkansas and Louisiana.

Major river corridors within the CDN contain forested wetlands similar in plant species composition to those found to the east in the Mississippi Alluvial Valley. Many of these forested wetlands have been converted to agriculture. Indiscriminate logging and subsequent conversion to pine timber production or pasture threaten remaining forested wetlands. The CDN partnership can recognize and facilitate opportunities for acquisition and conservation easements critical to the protection of these wetland systems, as well as promote sound forest management that increases wildlife habitat quality.

Appendix A: LMVJV Open Pine Landbird DSM

The Open Pine Landbird DSM is designed for landscape scale planning decisions. Habitat types used for this tool are based on 2001 National Land Cover Data (NLCD). The accuracy of the NLCD classification may vary across the West Gulf Coastal Plain and local managers may find erroneous classifications for their particular tract(s) of land. Currently, no other comprehensive data set with greater accuracy exists to replace NLCD for the entire West Gulf Coastal Plain region.

Three umbrella species' habitat requirements were used to develop the minimum patch size for the Open Pine Landbird DSM: red-cockaded woodpecker (*Picoides borealis*), Bachman's sparrow (*Peucaea aestivalis*), and brown-headed nuthatch (*Sitta pusilla*). The DSM used the following minimum viable population (MVP) values for each of the umbrella species:

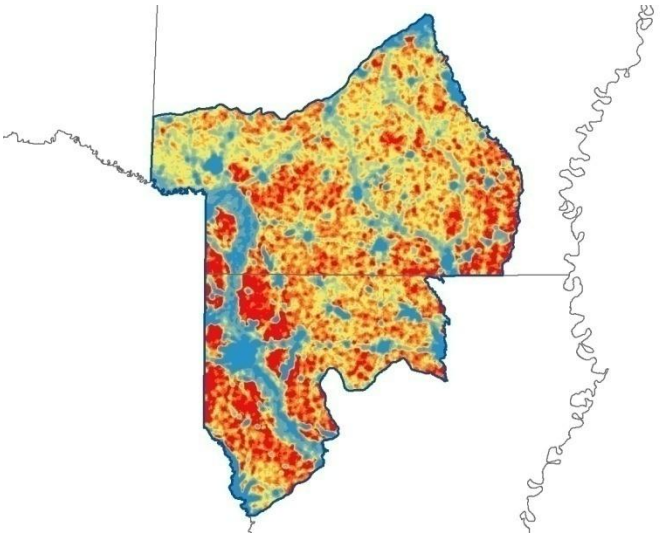


Red-cockaded woodpecker MVP = 20
Bachman's sparrow MVP = 50
Brown-headed nuthatch MVP = 28

This spatial layer is a combination of the individual models for the three umbrella species. The values in this layer range from 0 – 300. A value of 0 in the final model indicates that, according to the model, this area does not have the potential to contribute to a MVP for any of the three umbrella species. A value of 300 in the final model indicates that, according to the model, this area is situated in the landscape in such a way that if it and the surrounding areas are managed as open pine this area could contribute to a MVP for all of the three umbrella species.

Appendix B: LMVJV Eastern Wild Turkey Management

The Eastern Wild Turkey DSM created by the LMVJV depicts potential habitat suitability for eastern wild turkeys (*Meleagris gallopavo silvestris*) in the West Gulf Coastal Plain using classified digital land cover maps derived from remotely sensed satellite imagery for assessing habitat suitability for eastern wild turkeys (Meleagris gallopavo silvestris) in the West Gulf Coastal Plain. The WGCPO EWT DSM is an expansion of a model created for the state of Arkansas by Goetz and Porter (2007); the methodology and data used for the statewide assessment were extended to the WGCPO geography and results regarding landscape-scale habitat assessment via satellite imagery are assumed to be similar. The DSM is adapted from habitat variables used for ground-based habitat evaluation to classified land cover and assessed quality of the landscape for turkeys by using 2 approaches: a habitat suitability index (HSI) model and logistic regression model. Digital land cover data were derived from satellite imagery from the MultiResolution Land Characteristics (MRLC) consortium, composition and configuration variables computed with FRAGSTATS (ArcView Patch Analyst). The HSI model incorporated food and cover variables into a geographic information system (GIS; ArcView Spatial Analyst) and evaluated habitat at a pixel resolution of 30 m. We summarized HSI scores at the county level and regressed these against harvest records for wild turkeys. HSI values for the statewide model ranged from 0.52 to 0.79 and explained 32% of the variation in harvest (r^2=0.32, n=68, P$\leq$ 0.05). Models tailored to each of 4 regions showed habitat suitability ranged



from 0.07 to 0.92 and accounted for nearly 70% of the variation in harvest (Ouachita region; adjusted (r^2=0.68, n=13, P≤ 0.05). Logistic regression was used to derive a habitat model by comparing land cover characteristics and harvest. Two variables were identified as most often associated with low harvest of wild turkeys statewide: percentage of land in Row Crops (2 10.08, df 1, P 0.002) and percentage of land in Commercial-Industrial-Transportation (2 8.96, df=1, P=0.028). Findings suggest that NLCD satellite imagery and GIS tools can be used to identify habitat characteristics that allow assessment of the potential of landscapes to support wild turkey harvest. If harvest statistics provide a reasonable surrogate for relative population abundance for wild turkeys, then these models are good indicators of habitat suitability.

Literature Cited

Anderson, J. E. (Editor). 2006. Arkansas wildlife action plan. Arkansas Game and Fish Commission, Little Rock, Arkansas. (Available from: http://www.wildlifearkansas. com/)

Lester, G. D., S. G. Sorensen, P. L. Faulkner, C. S. Reid, and I. E. Maxit. 2005. Louisiana Comprehensive Wildlife Conservation Strategy. Louisiana Department of Wildlife and Fisheries. Baton Rouge. 455 pp.

LMVJV WGCPO Landbird Working Group. 2011. Open pine landbird plan West Gulf Coastal Plain/Ouachitas. LMVJV report, available online at: http://lmvjv.org/library/WGCPO_Landbird_Open_Pine_Plan_Oct_2011.pdf

Goetz, S.L. and W.F. Porter. 2007. Statewide assessment of wild turkey habitat using satellite imagery in Arkansas. Proceedings of the National Wild Turkey Symposium 9:189-198.

Holimon, W.C., C.T. Witsell, W.H. Baltosser, and C.W. Rideout. 2008. Density and habitat associations of Henslow's Sparrows wintering in saline soil barrens in southern Arkansas. Journal of Field Ornithology 79:364–370.

Reid, C. S., Faulkner, P. L., MacRoberts, M. H., MacRoberts, B. R., & Bordelon, M.. (2010). Vascular flora and edaphic characteristics of saline prairies in Louisiana. Journal of the Botanical Research Institute of Texas, 4(1), 357–379.