# Abstracts of Four Conservation Planning and Decision Support Models Used to Develop the AR MAV CDN Delivery Prioritization Tool

## SITE SUITABILITY MODELING FOR THE RESTORATION OF FORESTED WETLANDS IN THE MISSISSIPPI ALLUVIAL VALLEY

(wetland_restoration_suitability model)

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**Model Summary**

Ducks Unlimited, Inc. (DU), as one of the primary delivery agents of the USDA Natural Resource Conservation Service's Wetland Reserve Program in the MAV, has constructed a reforestation priority model for identifying optimal sites for restoration of forested wetlands in the region. The model harnesses the functionality of ERDAS Imagine's Expert Classifier to construct a logical decision tree that considers weighted confidence values in pixel classification, thereby permitting more sophisticated analysis than afforded by traditional modeling methods. The output of the restoration priority model represents the culmination of three years of data development projects by DU with assistance from regional conservation partners. The model facilitates intelligent analysis of multiple, regional datasets critical to determining site suitability in the MAV, including: a Soil Moisture Index (DU), Natural Flood Frequency (DU), a 1973-2001 Forest Loss dataset (DU), Sinks/Depressional Areas (DU derived from USGS National Elevation Dataset (NED)), and graduated stream buffers by stream order (DU derived from USGS/USEPA National Hydrography Dataset). The output of the restoration priority model will assist with directing the future reforestation efforts of multiple parties to the most appropriate locations throughout the MAV.

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## FINAL REPORT
## GIS-BASED NATURAL RESOURCE ANALYSES FOR THE ARKANSAS DELTA WETLAND PLANNING REGIONS

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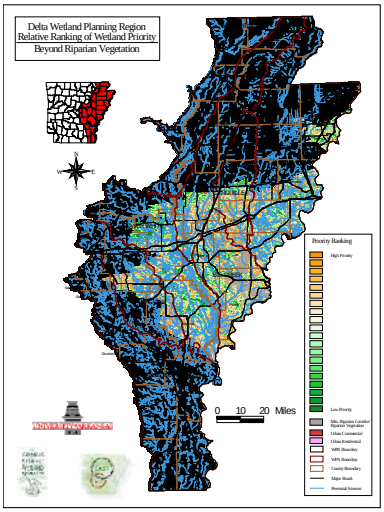
(MAWPT_cost_surface_analyis model)

**Report Summary**

This project involves combining all of the previous Wetland Planning Area (WPA) inventories and vegetation maps, culminating in the relative ranking of wetland priority within the entire Delta. The prioritization map shows the relative priority of land within all of the Arkansas Delta Wetland Planning Region (WPR), providing the basis for more localized evaluation by the Multi-Agency Wetland Planning Team (MAWPT). The identification, quantification, and analysis of wetland resources at the watershed level allows wetland specialists to evaluate and prioritize existing wetlands for protection, and to find wetland areas that need restoration as outlined in the Arkansas Wetland Strategy, March 1997. The combination of all the Wetland Planning Area data into a single format will help wetland specialists identify unique wetland habitats along watershed boundaries, which were not well documented in previous studies. Wetlands in proximity to water bodies and larger contiguous areas of wetlands are the highest priorities in the model, allowing the interaction of water and contiguous wetlands between watersheds to be identified when the entire Delta WPR is analyzed. The model also provides higher priority to preservation of existing wetlands than



restoration of land that is no longer in its original wetland state. This analysis will provide wetland specialists and land managers the opportunity to make recommendations based on the entire delta region, not just the individual wetland planning areas.

Existing wetlands were analyzed beyond the riparian corridor based on the proximity to water and combinations of wetland characteristics at each grid cell location. The final result of the analysis consists of a "cost surface" map layer, illustrating the relative ranking of wetland priority. A cost surface reflects the accumulated "cost" of moving across a landscape. In this instance, the "cost" is a weighting that reflects whether a particular grid cell is most likely wetlands (low-cost) or non-wetlands (high-cost) within the Delta WPR. The cost surface map is based on the distance from the Start grid (minimum riparian corridor/hydrophytic vegetation in contact with riparian corridor), as well as wetland characteristics, such as hydric soils, potential farmed wetlands, hydrophytic vegetation, seed areas, and hydrography within ½ mile of the Start grid. The combination of these map layers determine the wetland values at each grid cell represented in the Cost Weights grid. The following sections further describe each component of the cost surface and how it was developed.

A Cost Weights grid was created by combining various grids that reflected wetland characteristics. In the Cost Weights grid each grid cell was assigned a numerical value, depicting certain wetland characteristics or conditions. These characteristics and their unique combinations were based on "seed areas", potential farmed wetlands, hydric soils, hydrophytic vegetation (GAP), and hydrography within ½ mile of the Start grid. Seed Areas are defined as hydric soils in contact with large areas of hydrophytic vegetation (the method for determining seed areas is explained below). Seed areas are the start point for all cost surface determinations; the closer a wetland is to the seed area the lower the cost weight value assigned to that wetland. Lower cost weight values indicate that the grid cell has fewer impedances or limitations, and higher cost weight values indicate that the grid cell has more impedances or limitations. In general, lower cost weights correspond to higher priority wetlands, while higher cost weights correspond to lower priority wetlands. The Cost Weights grid is an important part of the calculation of the relative ranking of wetland priority map. The following sections list the five component grids that were necessary to develop the Cost Weights grid and how each grid was created (GAP Hydrophytic Vegetation, Potential Farmed Wetlands, and Hydric Soils were already developed, but had to be further reclassified; all "no data" values were set equal to 0)

The *CombineGrid* statement in the map calculator was run to find unique combinations of all possible categories in the 5 component grids listed above. Cost weights were manually assigned in the attribute table of the newly combined Cost Weights grid in a new field and are listed on the next page. The order in which the weights were assigned is important and corresponds to the order of the combinations listed as follows. The first combination of seed areas and hydric soils was queried from the Cost Weights grid and assigned a value of 0. Then, the remaining non-assigned records in the weights field were queried and the next combination was queried by "selecting from set" of non-assigned records. The rest of the combinations were assigned weight values in this manner, so that each query was a selection from only those records that did not yet contain a weight value.

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LAND PROTECTION PRIORITY MODEL

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(easement_priority_model)

**Model Summary**

The purpose for this product is to prioritize the Mississippi Alluvial Valley for restoration of land through conservation easements. Level 1: Existing forest blocks over 150 acres that are frequently flooded, and within FBCA, and within 10 miles of existing publicly managed habitats or existing forest blocks over 10,000 acres that are frequently flooded. Level 2: Existing forest blocks over 150 acres that are frequently flooded or existing forest blocks over 10,000 acres Level 3: All existing forest blocks over 150 acres in size, all WRP easements. Public Lands were excluded and all WRP Easements were classified as priority 3 because they already contained some protection. WRP Easements were forced into priority 3 State WMA were excluded from the model NWR were excluded from the model USFWS Partners Projects were not excluded nor forced into a particular class DU Conservation Easements that were closed were excluded and those that are pending were not excluded from the model DU Partners Projects were not excluded from the model.

FOREST BREEDING BIRD RESTORATION
DECISION SUPPORT MODEL

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(Forest_bird_restoration_DSM)

**Model Summary**

Historic forest cover in the Mississippi Alluvial Valley has been reduced by >75%. Remaining forests are fragmented, hydrologically altered, and heavily influenced by human activities. Because well drained forests were easily cleared, most remaining large forest fragments are wet forest types. Because forest fragmentation and altered hydrology have negatively affected forest bird populations, we developed a spatially explicit decision support model for bird conservation.

This model establishes priority areas for forest restoration that de-fragment the existing bottomland hardwood forests. Our primary objective was to increase the number of forest patches that harbored >2000 ha of interior area (core) that is at least 1 km from a hostile edge. We also sought to increase the number of forest cores that were >5000 ha and to add additional forest core to larger contiguous forest areas. Forest restoration was targeted to achieve at least 60% forest cover within local (10 km) landscapes. Finally, within priorities that defragment forest cover, we emphasized restoration of high-site (well drained) bottomland hardwood forests.

The Lower Mississippi Valley Joint Venture has established a restoration objective of 800,000 ha of bottomland forest by 2020. If linked to our forest restoration priorities, this objective could be achieved by reforesting <10% of restorable lands. The resultant area of forest core would exceed the habitat objectives described in the Partner-in-Flight Bird Conservation Plan and would be equivalent to the area of forest core present in the early 1950s. Targeting reforestation based on this decision support model would result in >8 times more forest core than would result from reforestation of randomly located fields.