Arkansas Multi-Agency Wetland Planning Team
Standard GIS Methodology for Wetland Analysis

The Arkansas Multi-Agency Wetland Planning Team (MAWPT) applies a GIS-based raster calculator analysis to prioritize sites based on objectives identified by the MAWPT planning team for individual Wetland Planning Areas (WPAs). After identifying a set of objectives, the team draws from spatial datasets assembled for each WPA to develop quantitative factors that will represent each objective in the GIS model. In this way, MAWPT identifies priority sites for wetland restoration and protection that meet the specific needs of individual WPAs. Because MAWPT's approach has low technical requirements, involving ArcGIS-based raster-stacking methods that are widely accessible, it is particularly transferable to programs that are early in the process of establishing a prioritization approach.

OVERVIEW

Lead developer(s): The Multi-Agency Wetland Planning Team (MAWPT) is composed of the Arkansas Natural Heritage Commission, Arkansas Natural Resources Commission, Arkansas Forestry Commission, Cooperative Extension Service–University of Arkansas, Arkansas Department of Environmental Quality, and the Arkansas Game and Fish Commission.[1]

Year developed: 1997.[2]

Geographic area: The state of Arkansas, with individual analyses at the scale of the Arkansas Wetland Planning Area (WPA) (Fig. 1). WPAs roughly follow watershed boundaries but are also influenced by ecoregional boundaries.[2]

Resource types: Wetlands.[1]

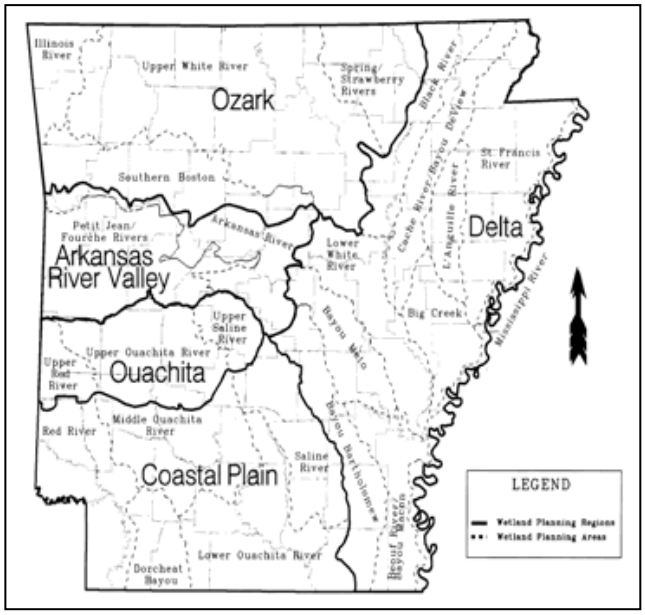

Figure 1. The MAWPT GIS tool prioritizes wetland restoration and protection sites within Wetland Planning Areas (WPAs), delineated with dotted lines, above. Used with permission from Arkansas MAWPT.

Restoration/conservation: Identifies priorities for restoration (reestablishment), restoration (rehabilitation), enhancement, preservation/protection, and acquisition without preservation/protection.[2]

Stakeholders: Federal, state, and municipal decision makers; NGOs.[2]

Current status: MAWPT wetland prioritization maps are currently used by a variety of federal agencies, state agencies, and nonprofit organizations to guide selection of restoration or protection projects.[2]

Updated: 5/8/2012

PRIORITIZATION ANALYSIS

Determination of prioritization objectives: The MAWPT begins by assembling watershed-scale geographic datasets that will form the basis of its decision-making. These generally include nationally- or regionally-available GIS data sources that capture basic wetland characteristics (i.e., soils, vegetation, and hydrology) as well as wetland spatial characteristics (Table 1). However, in WPAs where more specific GIS data relevant to wetland prioritization are available (e.g., hydrogeomorphic (HGM) subclass maps), the MAWPT integrates these sources into its prioritization mapping efforts. Based on an evaluation of these datasets, the team identifies prioritization objectives for meeting specific needs within each WPA. For example, the team may identify restoration of riparian corridors as a priority for addressing sedimentation issues.[1]

Determination of input factors/weightings: After identifying a set of objectives, the team draws from the spatial datasets assembled for the WPA to develop quantitative factors that will represent each objective in the GIS model. For example, if the team identifies water quality as a prioritization objective, it may use a map of riparian corridors developed for the WPA to design an input layer that rates areas ($30m^2$ pixels) adjacent to a riparian corridor higher as potential sites for wetland protection or restoration. MAWPT employs the expertise of state wetland planners to determine whether priorities identified by the GIS tool meet WPA needs. If not, the team may reformulate WPA objectives or factors and rerun the prioritization analysis.[1]

Input data QA/QC: Data layers assembled for the analysis (Table 1) are groundtruthed based on local knowledge, windshield surveys, and field visits. Layers evaluated for QA/QC generally include NRCS soils data, GAP analysis data, NHD data and other available hydrologic data. Groundtruthing of inputs is generally initiated when obvious discrepancies exist in the initial maps.[3]

Landscape prioritization tool(s):

Standard GIS methodology for wetland analysis: The MAWPT's wetland prioritization tool relies on a raster calculator approach in ArcGIS to combine data layers representing prioritization objectives (see above) to determine areas that represent wetland restoration or protection priorities. Data factors selected by the MAWPT are overlaid to create wetland inventory maps that rank areas for wetland protection or restoration. This process may, for example, prioritize wetland restoration and protection opportunities in the forested (riparian) corridor along the main streams of the watershed to address water quality or habitat objectives. In addition, the MAWPT may also seek to prioritize habitat connectivity along riparian corridors by promoting "large, connected block[s] of bottomland habitat that [are] of high value to species population viability."[1]

Prioritization objectives assessed:[4]

- Water quality
- Habitat quality
- Watershed-specific objectives

Table 1. An example of factors, and associated data sources, that the MAWPT might assemble to support its GIS model for prioritizing aquatic resource restoration and preservation.[5]

Factor(s)	Data source(s)
Wetlands in riparian corridor	NHD
Hydric or nonhydric soils	NRCS county soils data
Presence or absence of native vegetation	Satellite derived vegetation and land cover maps (Arkansas Gap Analysis Project (30m resolution))
Location in a floodplain	Corps of Engineers or other maps of floodplain boundaries
Larger isolated fragments	NWI; NRCS potential farmed wetland map
Proximity to public lands	Public lands (including private lands with public easements/agreements
Isolated wetlands close to the corridor	NWI; NRCS potential farmed wetland map
Wetlands along tributaries of the mainstem	NHD
Cleared wetlands between forest blocks	NWI; NRCS potential farmed wetland map
Sites near functional wetland	NWI; NRCS potential farmed wetland map

NHD = National Hydrography Dataset; NWI = National Wetlands Inventory; NRCS = Natural Resource Conservation Service.

Refinement of landscape priorities: MAWPT notes that their prioritization tool is "just a guide" and that after identifying mapped priority sites, restoration and protection practitioners should take appropriate steps to determine if an individual site is appropriate.[1]

Prioritization products: Maps resulting from the MAWPT prioritization efforts are available in reports produced for each WPA. An example of a priorities map, for the Big Creek WPA, is provided in Figure 2, below:

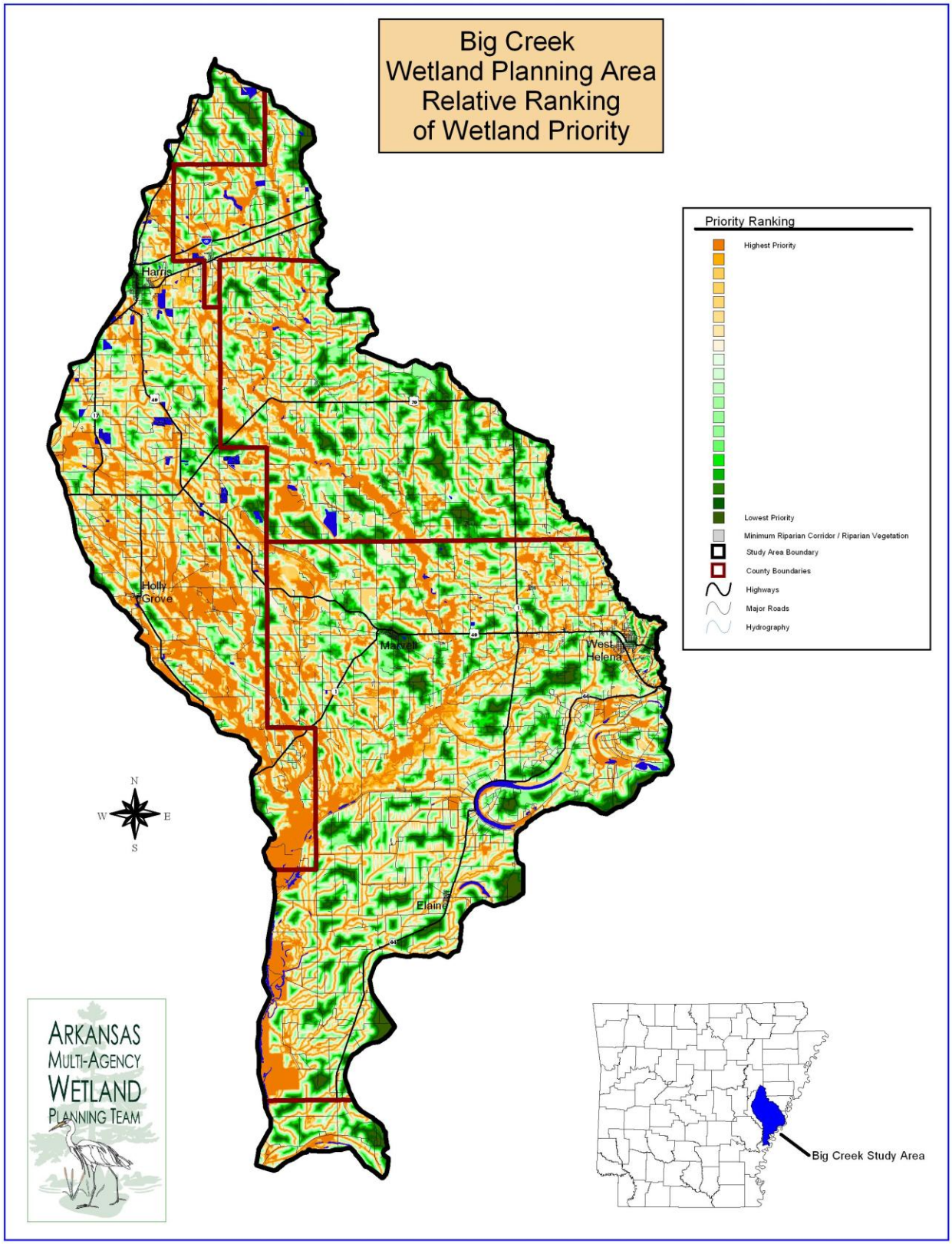

Figure 2. Output map identifying priorities for wetland restoration and protection for the Big Creek WPA. Orange areas indicate high priority areas and green areas indicate low priority areas. Used with permission from Arkansas MAWPT.

Updated: 5/8/2012

IMPLEMENTATION

Regulatory/non-regulatory programs:

- Section 404 compensatory mitigation: The MAWPT's prioritization tool is commonly used for the purposes of wetland compensatory mitigation (CWA §404) by the Arkansas State Highway and Transportation Department and the Arkansas Natural Resources Commission, which runs the State Wetland Mitigation Banking Program.[2]
- The MAWPT Standard GIS Methodology was previously used by the NRCS WRP to award extra points to wetland restoration and protection projects located in prioritized areas. However, this incentive is no longer offered.
- Municipal-level wetlands restoration: The MAWPT coordinates its prioritization work with municipalities to provide city-level wetlands information.[2]
- Non-profit wetland restoration programs, such as The Nature Conservancy and Joint Venture Conservation Delivery Network, use MAWPT's priorities to identify potential conservation investments.[2]
- The Arkansas Natural Heritage program commonly uses wetland prioritization maps to select preservation sites.[2]
- The Arkansas Department of Environmental Quality uses the tool to identify riparian restoration or protection opportunities that can address sedimentation water quality impairments.[2]
- The state's wetland and riparian zones tax credit program could be used to prioritize wetland restoration and protection in priority areas.[2]

Transferability:

- The MAWPT tool is easily adopted, involving simple raster-stacking in ArcGIS. For this reason, it would be particularly transferable to other states that lack experience with aquatic resource prioritization and are still in the process of establishing an approach.[2]

Data gaps:

- Hydrology data: While hydrology data have been improved in some parts of the state by obtaining LiDAR data to map 2- and 5-year floodplains, LiDAR and associated hydrology data are still lacking in other areas.[2]
- Wetland subclass mapping: The state is conducting wetland subclass mapping in the Delta (complete) and the Coastal Plain ecoregions, which has revealed gaps in geomorphology data.[2]

Barriers:

- Limited staff time and funding are barriers to further development of the tool.[2]

Future goals:

- Now that the MAWPT has generated wetland mapping products, including restoration and protection prioritization maps and wetland subclass maps for some parts of the state, it is focusing on educating the public and partner organizations and agencies on its products. For instance, the MAWPT regularly attends meetings of the Southeastern

Association of Fish and Wildlife Agencies to perform outreach regarding its mapping efforts.[2]

[1] The Multi-Agency Wetland Planning Team. The Standard GIS Methodology for Wetland Analysis. Accessible from: www.mawpt.org/pdfs/Standard_Methodology_of_Analysis.pdf.
[2] Interview on 7/28/2011 with Jennifer Sheehan, Arkansas Multi-Agency Wetland Planning Team Coordination Office.
[3] Email correspondence received on 10/13/2011 from Jennifer Sheehan, Arkansas Multi-Agency Wetland Planning Team Coordination Office.
[4] These are only examples of prioritization objectives derived from MAWPT's "Standard GIS Methodology for Wetland Analysis" and are not exhaustive. For each WPA it analyzes, the MAWPT planning team identifies WPA-specific prioritization objectives.
[5] "However, because the data vary in quality over the state and because other data are available in certain areas, an analysis of a particular WPA may not use all of these, or may include others." The MAWPT assembles datasets unique to each WPA for which it completes a prioritization analysis.