# CULTURAL RESOURCES: BASIN-WIDE IMPACT ASSESSMENT USING PROBABILISTIC MODELING AND G.I.S. TOOLS

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The on-going debates over the allocation of water resources in the Alabama-Coosa-Tallapoosa and Apalachicola-Chattahoochee-Flint River Basins have engendered the development of a programmatic Environmental Impact Statement by the Mobile District, US Army Corps of Engineers. Charged with examining the impacts to cultural resources, Brockington and Associates, in conjunction with the Corps, developed methodologies for using GIS modeling to correlate cultural resource sensitivity areas and hydrologic impact zones. The ultimate goal of the project was to prepare programmatic methods which can be applied in any given portion of the region in anticipation of affecting cultural resources. By understanding the complex relationships between water flow and adverse impacts to both archaeological and historic resources, the Corps would be able to address areas not yet surveyed, to identify potentially significant effects to known resources, and to plan for additional effects in the future.

For the development of a programmatic assessment of impacts to cultural resources, the information provided to the Corps and secondly to Brockington was extremely limited. Using the numeric rates of water flow, we were asked to project what the impacts would be on cultural resources. After initially struggling with what the hydrologic flow rates actually measured, we determined that for such a large region, with hypothetical flow rates and a very short analysis time frame, we could only approach the problem from the perspective of a Geographic Information System. In fact, the scope of the problem and the data involved are clearly tailor-made for a GIS study.

In addition to background examination of the 12,000 or so years of human occupation in the region, and detailed assessment of potential types of impact, a plan was devised to address the hydrologic flow alternatives by means of two GIS models. The first was a probability model of archaeological potential, while the second was a model of areas of potential adverse impact. After the models had been created and implemented in the GIS, it would be possible to cross-reference them and develop an alternatives analysis, with cumulative differences based on a proportional comparison of the hydrologic flow rates for each node in each basin.

The level of detail involved in the study is not very fine-grained. Since we are dealing largely with effects over a three state area and incorporating nearly 50,000 known archaeological sites, any results on a site by site basis would be meaningless. Instead, the regional analysis provides a methodology whereby more fine-grained data can be examined when changes are projected for specific nodes in the basin. In an area anticipated to be affected by proposed changes, patterns of erosion, deposition, and access can be modeled on a much smaller scale to identify: (1) areas still needing survey; (2) resources likely to be adversely affected; (3) resources needing mitigation plans or alternatives; (4) resources likely to be affected with future water flow changes; and (5) adversely affected resources likely to become NRHP-eligible in the future.

## SELECTED REFERENCES

Whitley, T.G., 1998. Section 4.9 - Cultural Resources. In: *Water Allocation Formula for the Apalachicola-Chattahoochee-Flint (ACF) River Basin - Draft Environmental Impact Statement*. U.S. Army Corps of Engineers, Mobile District.

Whitley, T.G., 1998. Appendix G - Cultural Resources Technical Appendix. In: *Water Allocation Formula for the Apalachicola-Chattahoochee-Flint (ACF) River Basin - Draft Environmental Impact Statement*. U.S. Army Corps of Engineers, Mobile District.