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U.S. Department of Transportation  
 Federal Highway Administration

## PROJECT SUMMARY

Report No. FHWA-SC-17-05  
 July 2017

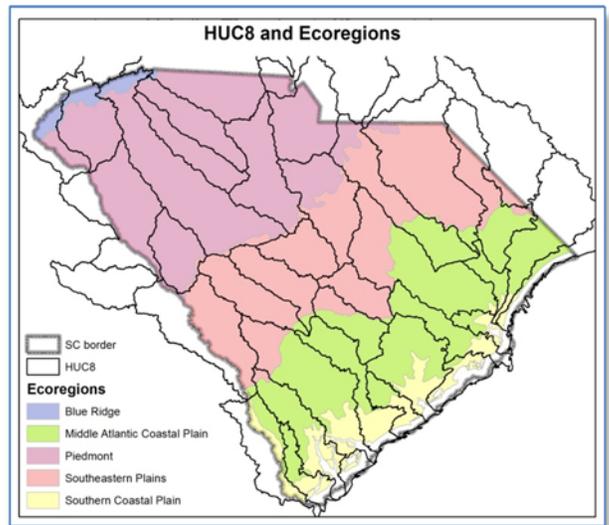
# GEOSPATIAL WETLANDS IMPACTS AND MITIGATION FORECASTING MODELS

The South Carolina Department of Transportation (SCDOT) develops near (3-5 years) and long (15-20 years) range plans for road widening, alignment, bridge replacement, and new road construction. Each road/bridge project may impact wetlands or streams typically through (but not limited to) placement of fill, clearing of vegetation, installation of pipes or culverts, or excavation of the wetland/stream feature. Most wetlands and streams are protected in the United States under Federal regulations (i.e., Clean Water Act). Enforcement of this protection is through the U.S. Army Corp of Engineers (USACE) and Environmental Protection Agency (EPA).



SCDOT road widening project

Destruction of wetlands or impacts of wetlands/streams is permitted by the USACE for road/bridge projects if the transportation project is the least environmentally damaging of all options for construction, and if compensatory mitigation for impacts are greater than or equal to the associated impacts. Compensatory mitigation activities can be in the form of creation, restoration or enhancement, or preservation of a wetland/stream. There is a “credit” amount applied to each compensatory activity which is typically derived from the area of the feature, the quality of the feature, and the timing of the compensatory actions. These credits can then be utilized to offset impacts to wetlands/streams at a prescribed ratio dependent upon the impacted feature.

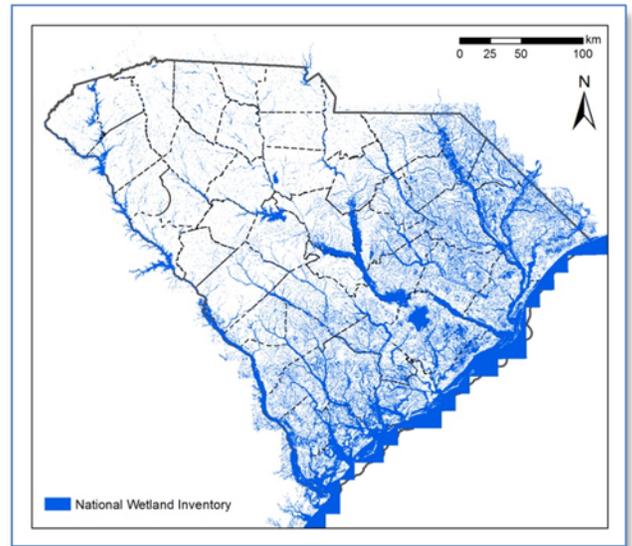


HUC-8 watersheds and level 3 ecoregions

Construction of transportation projects cannot begin until the wetland/stream impacts are known, compensatory mitigation is sufficient and obtained, and activities are approved by the USACE. These linked actions can result in a very long delay (often years or even cancelling of projects) in a transportation project until the SCDOT has an approved plan for wetland-stream compensatory mitigation. To reduce the risk of delays and better anticipate the need for compensatory mitigation can only be anticipated based on the prediction of future impacts within a watershed-ecoregion. Thus, mitigation forecasting models include large geographic scale dimensions with impacts at the site scale (i.e., road/bridge location), and mitigation actions at the mesoscale (i.e., watershed-ecoregion) with a very large geographic scope (i.e., the entire state of South Carolina).

This wetlands mitigation related project was initiated to assist the SCDOT plan for future environmental wetlands mitigation activities. A geodatabase representing the likelihood of wetlands (i.e., a wetlands likelihood layer) in South Carolina was developed after an evaluation of both digital and analog sources of wetlands data and proxies for wetlands. Data accuracy of spatial/attribute wetlands data (i.e., the jurisdictional wetland determination) from already permitted transportation projects, the National Wetlands Inventory (NWI), and (SSURGO)-based wetlands data were evaluated. A high spatial resolution database from LiDAR-derived elevation and products, hydrography, culverts, parcel-level zoning/use, and historical maps/imagery was used to model the likelihood of wetlands and streams for the state of South Carolina. The accuracy of the final wetlands likelihood layer was 83%, a dramatic improvement from the commonly used National Wetlands Inventory data at 51% accuracy.

A GIS-based road widening and bridge replacement tools were developed to model the existing and new wetland/stream impacts from the wetlands likelihood layer for each of the more than 300 future transportation projects with likely unavoidable impacts.



National Wetlands Inventory

Aggregate impacts of wetlands and streams were summarized at the watershed-ecoregion scale for prediction of future mitigation needs.

A set of recommendations to the wetlands and stream impact forecasting were made, including: 1) incorporating other indicators of wetlands, such as historic maps, aerial photography, parcel data, 2) maintaining an evolving wetlands likelihood layer; and 3) maintaining SCDOT project layers. An online website ([www.wetmit.org](http://www.wetmit.org)) describing the research with online impact mitigation tools was created.



Online website ([www.wetmit.org](http://www.wetmit.org))

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