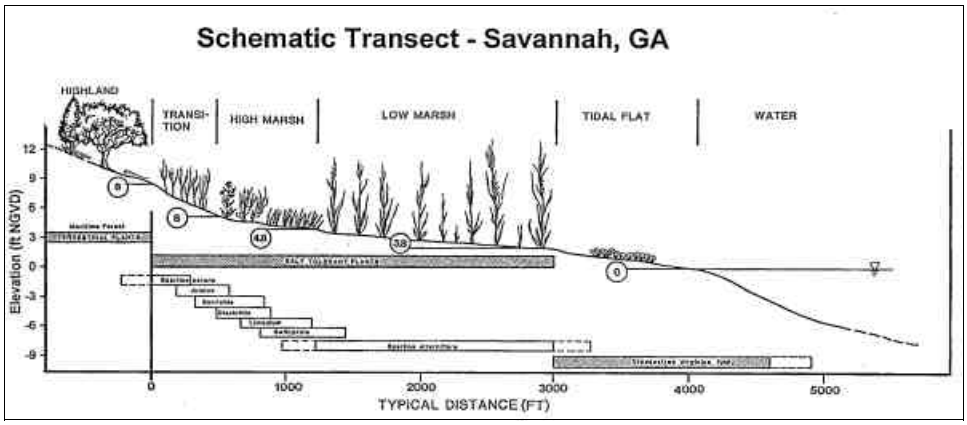
Salt-Marsh Restoration Design
Savannah, Georgia



CSE was retained to model flow in an altered salt marsh near Savannah, Georgia. Previous industrial operations had altered drainage and filled tidal wetlands, rendering them nonfunctional. To meet state mitigation requirements resulting from other activities, the owner was ordered to restore 9.88 acres of previously filled marsh to its natural condition. The site chosen for the restoration did not share a border with the Savannah River but received water through a network of man-made ditches and culverts, significantly complicating the hydraulics of the marsh/river system.

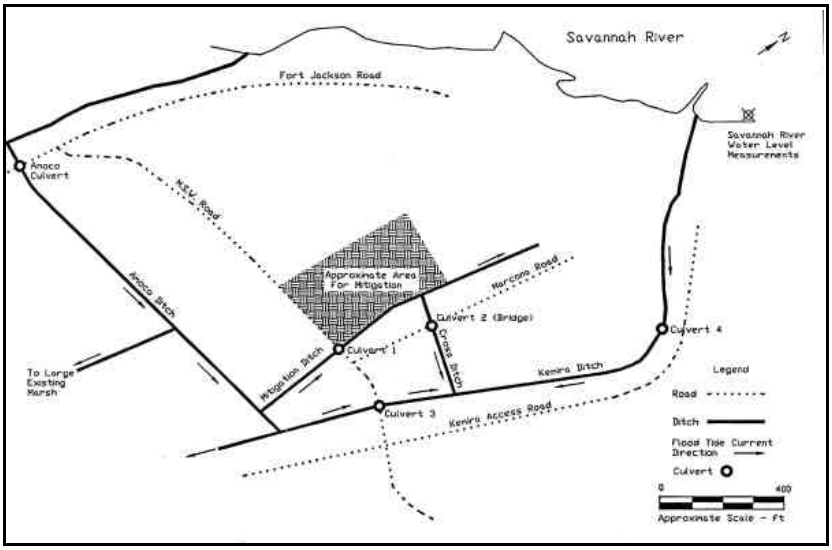
CSE scientists established design criteria for the mitigation using hydraulic modeling and site-specific monitoring of existing flows. These studies established the critical tidal flooding duration* necessary for propagation of local low marsh, the primary design parameter used to specify the elevation of the mitigation site. Low marsh was found to exist within a range of flooding duration of 4.5 percent to 20.4 percent. [*Flooding duration is the percentage of time that an area is inundated by tidal waters.]

Given the complexity of the ditch network connecting the mitigation site with the Savannah River and the natural variability of the tide, it was necessary to utilize a sophisticated numerical model, **MIKE II**, to assist in the design of the mitigation site and connecting ditches. The model was tested and calibrated, demonstrating its validity by reproducing existing conditions, then used to simulate a number of alternative designs and their effect on flooding at the mitigation site.

It was found that the existing ditches could not supply enough tidal flow to sustain a low marsh at the mitigation site. However, improvements to the ditches had the effect of marginally improving the flow in the whole system of ditches and wetlands, rather than significantly improving flows to the mitigation site alone.

CSE's recommended design called for improvements to flow-control structures and drainage ditches in conjunction with isolation of the mitigation site from the remainder of the ditch and wetlands system. The recommended design specified precise excavation depths in the mitigation site to leave substrate at the optimum low marsh elevation and accomplished the following:

- Created the correct hydraulic regime for low marsh at the mitigation site.
- Reduced costs by minimizing required excavation and avoiding temporary removal of roads to upgrade culverts.
- Did not adversely impact existing wetlands.
- Was relatively insensitive to future changes in the ditch and wetlands system.



Relevant Areas:

Tidal hydraulics	Wetlands surveys
Hydrodynamic modeling	Mitigation planning
Salt-marsh restoration	MIKE 11 modeling

Client:

Kemron Environmental Services
Atlanta, Georgia