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Restoration of a Forested Wetland Ecosystem in a Thermally Impacted Stream Corridor (U)

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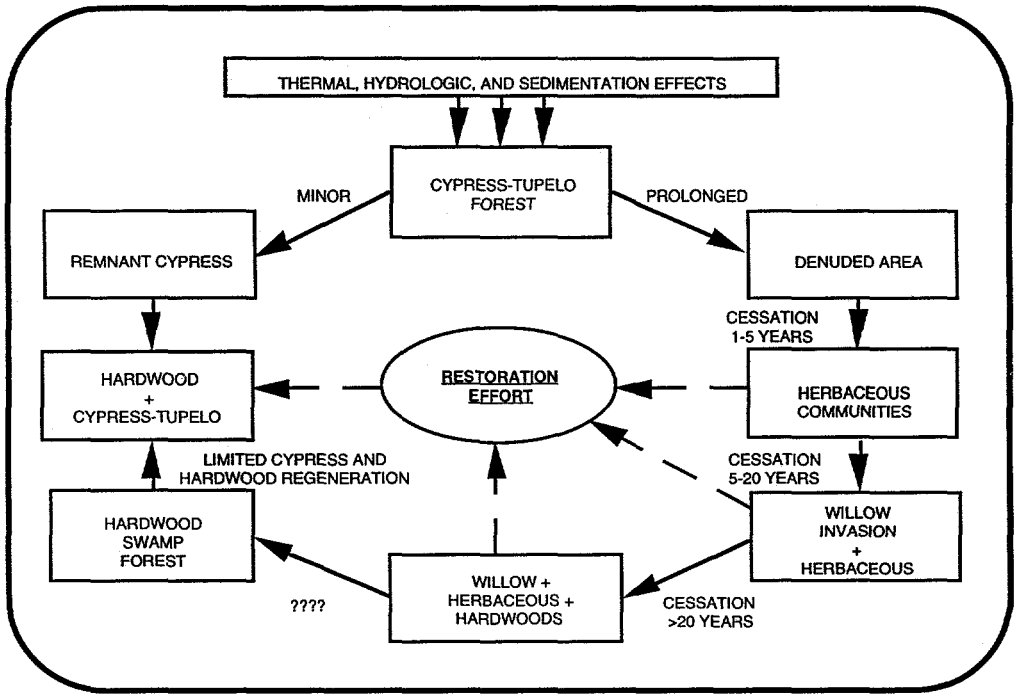
The Savannah River Swamp is a 3020 Ha forested wetland on the floodplain of the Savannah River and is located on the Department of Energy's Savannah River Site (SRS) near Aiken, SC. Historically the swamp consisted of approximately 50% bald cypress-water tupelo stands, 40% mixed bottomland hardwood stands, and 10% shrub, marsh, and open water. Creek corridors were typical of Southeastern bottomland hardwood forests. The hydrology was controlled by flooding of the Savannah River and by flow from four creeks that drain into the swamp prior to flow into the Savannah River. Upstream dams have caused some alteration of the water levels and timing of flooding within the floodplain.

Major impacts to the swamp hydrology occurred with the completion of the production reactors and one coal-fired powerhouse at the SRS in the early 1950's. Water was pumped from the Savannah River, through secondary heat exchangers of the reactors, and discharged into three of the tributary streams that flow into the swamp. Flow in one of the tributaries, Pen Branch, was typically 10-20 cfs prior to reactor pumping and 400 cfs during pumping. This continued from 1954 to 1988 at various levels. The sustained increases in water volume resulted in

overflow of the original stream banks and the creation of additional floodplains. Accompanying this was considerable erosion of the original stream corridor and deposition of a deep silt layer on the newly formed delta. Heated water was discharged directly into Pen Branch and water temperature in the stream often exceeded 50 degrees C. The nearly continuous flooding of the swamp, the thermal load of the water, and the heavy silting resulted in complete mortality of the original vegetation in large areas of the floodplain.



In the years since pumping was reduced, early succession has begun in some affected areas (see figure). Most of this has been herbs, grasses, and shrubs. Areas that have seedlings are generally willow thickets that support a lower diversity of wildlife. No volunteer seedlings of heavy-seeded hardwoods or cypress have been

found in the corridor areas. Research has been ongoing to determine methods to reintroduce tree species characteristic of more mature forested wetlands. The goal of the restoration is to create structural and biological diversity in the forest canopy by establishing a mix of species typically present in riparian and wetland forests of the area. It is anticipated that the successful restoration will require a combination of two approaches. They are the rehabilitation of the Pen Branch corridor and delta by natural succession and the reforestation of the corridor and delta by planting. Areas that are identified to have sufficient natural regeneration of desired species are being allowed to evolve naturally to restored condition. These areas appear to be confined to the lower delta and upper corridor regions. Areas that are not naturally reforesting are being aided by planting seedlings of desired late successional species and densities to speed the mitigation process. Silvicultural site preparation has depended on the successional stage of the planting area. Species selection and compositional mix are being altered based on the current and expected hydrological regimes that the reforestation areas will be experiencing.

The process is expected to be a decade-long project. Success criteria for evaluating the establishment and functionality of the forested wetlands will be established based on the monitoring of the project.