

Lower Savannah River Environmental Restoration Study

by
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Introduction

Congress has authorized several projects along the Lower Savannah River, including the existing navigation project that was authorized by the Rivers and Harbors Act of March 3, 1881. This paper (excerpts are taken from a reconnaissance report) reviews the problems and opportunities of the Lower Savannah River basin and makes recommendations for environmental restoration.

Background

The Savannah River forms the boundary between the States of Georgia and South Carolina. The authorized navigation project for the Savannah River between Augusta and Savannah, GA, provides for a navigation channel 9 ft deep and 90 ft wide from the upper end of Savannah Harbor to the head of navigation at Augusta just above the 13th Street bridge, a distance of 180.85 miles. This navigation project is known as the Savannah River Below Augusta Project. The overall Lower Savannah River Environmental Restoration study is concentrating on the Lower Savannah River, which includes the Savannah River and surrounding wetlands from the vicinity of Augusta, GA, to the upper end of the Savannah Harbor. However, we anticipate that this will be the first of several projects that will be generated from the Lower Savannah River study. This particular study concentrates on the area surrounding cutoff bend No. 3 (Hickory Bend) and cutoff bend No. 4 (Flat Ditch Point), located at river miles 40.9 and 41.3, respectively.

The Lower Savannah River Basin provides a home for at least nine threatened and endangered species. Equally important, there are at least 10 candidate species in this area. Candidate species are those currently being reviewed for possible addition to the Endangered and Threatened Species List under the Endangered Species Act of 1973, as amended. Restoration of fish and wildlife habitat by improving flow through the wetlands improves water quality and fish and wildlife habitation. Thus, it could be possible to prevent some of the candidate species from becoming threatened or even endangered species.

Study Purpose and Scope

As stated above, excerpts of this paper were taken from a reconnaissance report. The reconnaissance report is conducted as part of the two-phase process, the reconnaissance phase and the feasibility phase. The reconnaissance phase investigates the problem(s) and studies potential solutions that appear to be economically feasible and environmentally acceptable.

The feasibility phase concentrates on those activities such as modeling, surveys, and detailed evaluations that will be conducted. At the time this paper is being written, we are currently in the midst of the feasibility phase. Modeling used in this feasibility phase includes both environmental and hydraulic modeling.

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The study purpose is to determine if any modifications should be made to the cutoffs and other structures constructed as part of the Savannah River Below Augusta Project in order to environmentally restore the Lower Savannah River and surrounding wetlands and enhance fish and wildlife habitat and water quality. The reconnaissance phase included (a) formulating and evaluating alternatives to determine if restoration measures could be accomplished by increasing flow throughout some of the cutoff bends and oxbows; (b) evaluating various related problems and defining potential solutions; (c) determining if there is a Federal interest in the implementation of solutions; and, (d) determining whether the planning should proceed into the next planning phase (feasibility phase).

Along the Lower Savannah River, there are 40 cutoff bends and oxbows. Of these 40, this study originally selected 12 for analysis, which were refined down to 2, cutoff bend No. 3 (Hickory Bend) and cutoff bend No. 4 (Flat Ditch Point), as mentioned above.

The Savannah National Wildlife Refuge, which is in the lower portion of the study area, includes over 26,000 acres of hardwood swamp, freshwater marsh, impoundments, and estuarine marsh. All of this area benefits by improving flow through cutoff bends No. 3 and No. 4 because this water ultimately filters down into the refuge and provides important habitat for wintering waterfowl, wading birds, and endangered species. Development and recent weather patterns have impacted the refuge through reduced runoff and lower water levels. If such conditions occur during critical nesting or spawning times, some species may be severely impacted.

Problem Identification

Objectives

In response to the Congressional resolution authorizing the reconnaissance study, the objectives of this study focused on restoring the environment of the Lower Savannah River

and the surrounding wetlands and improving fish and wildlife habitat.

The following objectives were developed for this study:

- a. Restoration of spawning habitat for important fisheries.
- b. Restoration of flow to freshwater wetlands.
- c. Restoration of overall environmental quality of the Lower Savannah River, while maintaining navigability.

Problems and Opportunities

Water resources-related problems were identified, and several visits were made to the study area to survey the navigation project and discuss any problems and concerns that the resource agencies may have. As a result of these efforts, the following specific problems and opportunities were identified:

- a. Habitat degradation.
- b. Water quality.
- c. Flow regime.
- d. Access.

Feasibility Phase Models

The habitat evaluation model being used for the Lower Savannah River project is a modified version of the U.S. Fish and Wildlife Service's Habitat Evaluation Procedure (HEP). The modified version being utilized is focused on the warmwater aquatic community. The parameters that are being studied include dissolved oxygen, pH, temperature, percent cover, percent pools, and water velocity. The model approach is community based instead of the traditional HEP model species-based approach.

Outcome of the model is a value known as Habitat Units (HU). The habitat units that can be achieved through the various project

alternatives will be compared with the price of the different alternatives to get an HU per dollar spent ratio much like a traditional cost/benefit ratio. No money terms will be used in the HU values, only benefits to the environment. This model allows decision makers to identify the project alternative that maximizes environmental benefits for the dollars spent.

TABS-2 is a two-dimensional numerical model that can be used to predict hydraulic behavior and sediment transport in a riverine environment. The model uses existing topographic and hydrographic contours and surface roughness characteristics to approximate specific conditions. Upstream and downstream boundary conditions are used to calibrate the model for a range of flows. After the existing conditions are modeled and calibrated, modifications to the waterway can be modeled to determine the hydraulic response. TABS-2 will graphically illustrate velocities, direction of flow, and water surface profiles. Knowledge of material types and velocities can be used to predict sediment transport.

Formulation of Alternatives

Types of Improvement Alternatives

After identifying the two cutoff bends for detailed investigations, to be proposed, actions were suggested for each cutoff bend. Complete closure and partial closure of cuts No. 3 and No. 4 will be studied.

Alternatives to Improve Water Quality and Habitat Degradation

Full restoration of all navigational cuts was not considered for several reasons: (a) the impact such restoration would have on navigation; (b) the cost associated with full restoration is high; and (c) full restoration may actually result in a loss of habitat for fisheries. Many of the oxbows provide significant benthic habitat for fish species. Full restoration would, in some cases, result in a negative impact to these resources by creating

additional mainstream habitat at the expense of still-water habitat.

Cut No. 3 has been proposed for closure in an attempt to improve water quality in Bear Creek and, therefore, in Abercorn Creek, where the city of Savannah's water intake facility is located. Additionally, Bear Creek flows through significant palustrine forested wetlands. Increased flow to this creek would result in hydrologic improvements to this wetland system.

Likewise, closure of Cut No. 4 would result in increased contact between the river and associated wetlands. As this cut is quite long and has significant sedimentation problems, closure was determined to be the best option.

Method of Total Closure

Two methods of total closure were analyzed. The first involved total closure of an existing cut by use of a permanent diversion structure accompanied by dredging a pilot channel. There would be no impact on navigation with this method of closure.

The second method involved total closure of the existing cut by use of a diversion structure only; no dredging of a pilot channel would be performed. This option would take additional time, but would result in the least amount of potential environmental damage resulting from dredging and disposal. Also, as the cut would not be completely closed off from the reopened channel, additional oxbow habitat would be created to replace that which is lost during cut closure. However, if this second method of closure is used, deauthorization or modification/relocation of the authorized navigation channel would be reviewed in the feasibility phase.

Alternatives to Improve Flow Regime

This study did not examine means to improve the overall flow regime of the Savannah River. Instead, it examined improving the local flow regime in the vicinity of each

site by diverting flow through the cutoff bends. Altering the current flow regime has many potential benefits for fish and wildlife and for recreation in the lower river. However, these factors must be balanced with upstream needs and are beyond the scope of this report, which includes only restoration of flow throughout the Lower Savannah River.

Findings and Conclusions

Based on the results of the reconnaissance study, the following findings and conclusions were developed.

- When navigation cuts were constructed, a large segment of the river (approximately 13 percent) was removed from contact with the main river channel, especially during low flow.
- The cutoff bends have accumulated large amounts of organic materials, leading to reduced dissolved oxygen levels during low flow and warmwater conditions.
- The accumulation of organic materials negatively impacts fish recruitment and available habitat.
- Impacts to Bear Creek, Mill Creek, and associated wetlands have occurred because of construction of navigation cuts and maintenance of the main river channel. Flow to Bear Creek has been impacted by construction of cut No. 3. Mill Creek has been impacted by the construction of cut No. 4 and by blockage from sediments.
- All of the above factors reduce the duration and depth of flooding in the upper portion of the Savannah National Wildlife Refuge and privately owned wetlands. Therefore, flushing of detritus and nutrients from these wetlands is reduced.
- There appears to be feasible alternatives to restore the environment.
- There is a Federal interest in restoring fish and wildlife habitats that existed in the cutoff bends of the Lower Savannah River and surrounding wetlands before

they were cut off by the Federal Navigation Project and in enhancing the water quality. Therefore, the reconnaissance phase was certified, and the Savannah District has forged ahead into the feasibility phase.

Bibliography

- Cowardin, L. M. et al. (1979). "Classification of wetlands and deepwater habitats of the United States," Office of Biological Services, Fish and Wildlife Service, U.S. Department of the Interior.
- Georgia Freshwater Wetlands and Heritage Inventory. (1989). Georgia Department of Natural Resources, Social Circle, GA.
- Office of Technology Assessment. (1979). "Technologies to maintain biological diversity."
- Petts, G. E. (1984). *Impounded rivers: Perspectives for ecological management*. John Wiley and Sons, New York.
- Schmitt, D. N., and Hornsby, J. H. (1985). A Fisheries Survey of the Savannah River, Georgia Department of Natural Resources, Game and Fish Division.
- South Carolina Division of Research and Statistical Services. (1991). South Carolina Statistical Abstract, Columbia, SC.
- South Carolina Heritage Trust. (1991). South Carolina Wildlife and Marine Resources Department, Columbia, SC.
- U.S. Department of Agriculture. (1985). "Net economic value of cold and warm water fishing in Idaho."
- U.S. Department of Interior. (1991). "Reconnaissance planning aid report on Lower Savannah River basin study," U.S. Fish and Wildlife Service, Charleston District.
- Wharton, C. (1978). "The natural environment of Georgia. Department of Natural Resources," Environmental Protection Division, Georgia Geological Survey Bulletin 114.