

Hydrology - USGS/SCWRC Report 2

A Reconnaissance of the Santee River Estuary, South Carolina

By
T. Ray Cummings
1970

ABSTRACT

The chemical and physical characteristics of water of the Santee River estuary have been related to tidal conditions and fresh-water inflow, and the suitability of water for use at different locations has been considered. Data obtained during the investigation provide a basis for evaluating some of the effects of a proposed diversion of water from Lake Moultrie to the Santee River.

Under normal conditions, releases of water from Lake Marion to the Santee River estuary are 500 to 600 cfs (cubic feet per second). On several days during April and May 1969, however, flood releases exceeded 40,000 cfs. An estimated 85 percent of the fresh-water inflow moves to the Atlantic Ocean through the North Santee River, because of a channel constriction in the upper reaches of the South Santee River.

A tidal discharge measurement made at mile 5.9 on the North Santee River showed a maximum flow of 18,500 cfs on the ebb tide, and a maximum flow of 18,500 cfs on the flood tide. Maximum average velocity of the water mass was 1.8 fps (feet per second) on the ebb tide, and 1.5 fps on the flood tide. At mile 7.0 on the South Santee River, a tidal discharge measurement showed a maximum flow of 14,500 cfs on the flood tide; on the ebb tide the maximum flow was estimated to be 15,800 cfs. Maximum average velocities of the water mass of the South Santee River were slightly less than on the North Santee River.

Below mile 15, the North Santee River has an estimated volume of 7.8×10^8 cu ft (cubic feet) at mean high tide, and an estimated volume of 5.3×10^8 cu ft at mean low tide. Below mile 15 on the South Santee River, the estimated volumes of water are 6.7×10^8 cu ft at mean high tide and 3.9×10^8 cubic feet at mean low tide.

At high tide, the maximum specific conductance of water at mile 5.0 on both the North and South Santee Rivers was 40,000 to 50,000 micromhos. At low tide at the same locations, the maximum specific conductance was 20,000 to 30,000 micromhos. At mile 12 on both the North and South Santee Rivers, maximum specific conductance values were 10,000 to 20,000 micromhos at high tide and 100 to 200 micromhos at low tide. Although the maximum specific conductance values of the North and South Santee Rivers are within the same range at a given mile point, under average inflow and tidal conditions water of the South Santee River has a slightly greater salinity than water at the same location on the North Santee River.

Under flood conditions in April and May 1969, the Santee River estuary changed from a partially mixed to a highly stratified estuary. As floodwaters flushed salt water seaward, fresh-water was observed below mile 5.0 on both the North and South Santee Rivers.

Dissolved oxygen measurements, temperature measurements, and chemical analyses of water indicate that the quality of the water and the variations in quality are due to natural processes; only the occurrence of detergents and pesticides indicate cultural activity.

Water of the North and South Santee Rivers at mile 14 and above is of excellent quality for most domestic, industrial, and agricultural uses, and for the propagation of aquatic life. Below mile 14, water is suitable for many uses, but the suitability of the water must be evaluated with knowledge of the intended use.

Copies of this report are available in the SCDNR's Columbia office.