SUMMARY

The demand for freshwater in Horry and Georgetown Counties in northeastern South Carolina has been increasing steadily and is expected to continue to increase as population growth and development continues. In general, most water-supply development has been from ground water. In some parts of the Myrtle Beach area, ground-water levels in production wells have been lowered to depths greater than 150 feet below sea level. As part of an investigation to find alternative sources of freshwater, the Atlantic Intracoastal Waterway (AICW) in the vicinity of Myrtle Beach was evaluated as a potential water supply of 45 ft^3/s at mile 363.3. Freshwater entering the AICW from the major tributaries is adequate for drinking water purposes.

The AICW is a tidal-affected waterway excavated to a minimum of 12 feet below low tide. Stage recorders were used to monitor water levels in the AICW at four locations, and the location of the saltwater-freshwater interface was determined periodically during the 1982-86 period of record. A one-dimensional unsteady-flow model was used to simulate the daily discharge for the 1982-86 water years to aid in evaluating the use of the AICW as a freshwater supply in the Myrtle Beach area.

A linear least-squares regression equation was developed to relate the running 7-day average discharge in the AICW to the summed running 7-day average discharges of the major tributary streams using data for the period 1982-85. The regression equation was verified using 1986 data. The concurrent streamflow record of the tributary streams and the relation of 7-day average of the summed flows of the tributary streams to the 7-day average flows of the AICW were used to simulate the climatic year minimum 7-day average flows of the AICW for the climatic-year period 1954-86. The 1954-1986 minimum flows were then used to develop a 7-day low-flow frequency curve for the AICW. The estimate of $_7Q_{10}$ in the AICW is 192 ft^3/s.

Seven-day average flows of the AICW were also simulated for each day of the 1954-86 period of record using the same methods as above. A flow-duration hydrograph of these simulated discharges indicated that periods of lower water supply can be expected in some years during the months of August through October.

A relation of the mile position of the saltwater-freshwater interface to specific conductances of water recorded in the AICW at Vereen's Marina (02110730) was established. The relation was applied to maximum daily specific conductances recorded in the AICW at Vereen's Marina to simulate the daily maximum position of the interface for the 1982-86 period of record. The 7-day average maximum mile position of the interface was then related to the 7-day average discharges using the 1982-85 data and verified using 1986 data. Also, the position of the daily maximum intrusion of the saltwater-freshwater interface during the 7-day averaging period was related to the 7-day average maximum mile position of the interface. The last two relations show that the maximum daily position of the interface would be at mile 356.3 for the $7Q_{10}$ discharge. If a constant discharge of 45 ft^3/s is withdrawn from the AICW during the period the $7Q_{10}$ is experienced, the relations show that the maximum daily location of the saltwater-freshwater interface would move upstream to mile 357.0. Thus, the investigation of the AICW in the vicinity of Myrtle Beach indicates that the AICW can provide a significant supply of freshwater at the proposed withdrawal at mile 363.3.