# DETERMINING FLOW-RESISTANCE COEFFICIENTS IN THE FLORIDA EVERGLADES

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**ABSTRACT:** Flume measurements were made at the U.S. Geological Survey Hydraulics Laboratory at Stennis Space Center, Mississippi, and field measurements were conducted in Shark River and Taylor Sloughs in the Everglades National Park in south Florida to obtain information on the relation between flow and vegetation characteristics. The measurements were part of a study to develop methods for representing flow resistance due to vegetation types typically found in the Everglades. This information is needed to improve surface-water models that are used to evaluate restoration and management alternatives for the south Florida ecosystem. Hydraulic and vegetation measurements were made in an artificial sawgrass ecosystem in the flume to determine the effects of flow depth, flow velocity, and vegetation characteristics on flow resistance. Flow depth, mean flow velocity, and water-surface slope were determined to evaluate flow resistance for each flume experiment. Vegetation was sampled to determine biomass per unit area, number of stems and leaves per unit area, and leaf and stem width as a function of distance from the bed. In the field, approximately 75 hydraulic and vegetation measurements were made in plant communities through which significant surface-water flows were observed. An acoustic Doppler velocity meter was used to measure flow velocities that are commonly less than 1 centimeter per second. Vertically averaged flow velocities were determined from velocity profiles obtained at 5-centimeter vertical increments. A unique pipe manometer was developed and used to determine local water-surface slopes on the order of 1 centimeter per kilometer. Both flume and field results show an inverse relation between resistance coefficients and flow velocity for velocity values typical of Everglades flows.

**KEYWORDS:** flow resistance, vegetative resistance, roughness coefficients, Florida Everglades, velocity profile, water-surface slope, sawgrass

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