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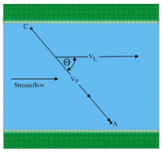
FRESHWATER TO AND FROM NATIVE AMERICAN LANDS

TYPICAL ACOUSTIC VELOCITY METER SITE

ACOUSTIC TECHNIQUES FOR FLOW MEASUREMENT

Standard methods for measuring and monitoring streamflow in South Florida are inappropriate due to backwater conditions, slow flowing canals, and the presence of submerged aquatic plants. Acoustic Velocity Meters (AVM) have been used successfully as an index to monitor mean velocities on a real time basis using permanently mounted, horizontally opposed, submerged acoustic transducer.



Downstream traveltime (t_{CA}): $t_{CA} = \frac{B}{V_S + V_P}$

Upstream traveltime (t_{AC}): $t_{AC} = \frac{B}{V_S - V_P}$

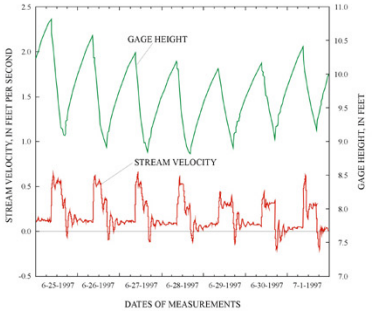
Solving for path velocity: $V_P = \frac{B}{2}\left[\frac{1}{t_{CA}} - \frac{1}{t_{AC}}\right]$

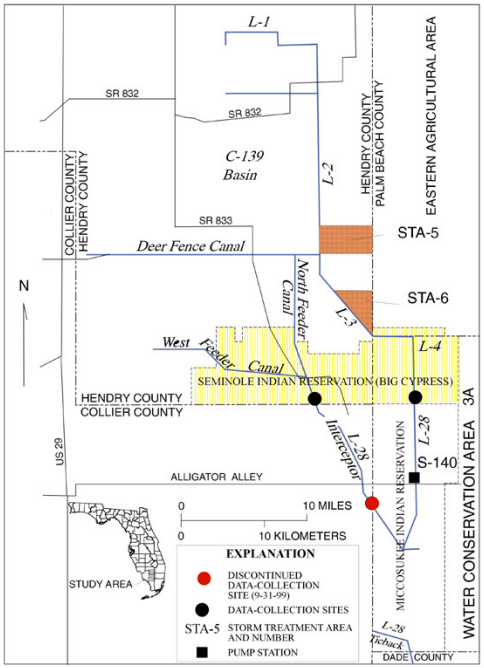
Solving for line velocity $V_L = \frac{V_P}{\cos\Theta}$

B=Length of path (AtoC)

V_S=Velocity of sound in water

L-28 CANAL ABOVE S-140 NEAR CLEWISTON (STATION 261543080495000)





INTERNAL SURFACE WATER FLOWS FL96-620

BACKGROUND

Surface-water flows in a direction south of Lake Okeechobee have been regulated by an extensive canal network, begun in the 1940's, to provide for drainage, flood control, saltwater intrusion control, agricultural requirements, and various environmental needs. Much of the development and subsequent monitoring of canal and river discharge south of Lake Okeechobee has traditionally emphasized the eastern coastal areas of Florida. Recently, more emphasis has been placed on providing a more accurate water budget for internal canal flows.

PROBLEM

As part of the South Florida Ecosystem Restoration Program, the U.S. Army Corps of Engineers and the South Florida Water Management District (SFWMD) propose modified water deliveries to Indian Tribal lands, Big Cypress National Preserve, and other noncoastal areas of south Florida. The proposed modified water deliveries are designed to provide flood protection and water-delivery benefits to agricultural lands as well as partial restoration of historic ecosystem conditions within both Seminole and Miccosukee Tribal lands. The effects that these proposed modified water-delivery changes will have on Indian Tribal lands can only be determined if internal flows and associated water quality are accurately known. The Everglades Construction Project, which developed as a result of the South Florida Ecosystem Restoration Program, required diversion of the C139 Basin surface water to storm treatment area 5 and will cause a change in the volume and quality of the water subject to Tribal entitlement.

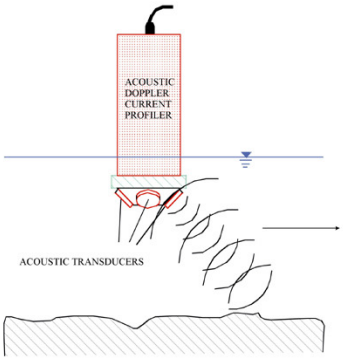
PROJECT GOAL

The objective of this project is to evaluate approaches for quantifying freshwater flows to and from Native American lands and to provide various hydrologic data to support other Federal and State hydrologic investigations. The implementation and development of strategically locating streamflow and water-quality gaging sites will provide information for determining future surface-water flow requirements. Subsequent studies based on accurate flow calibrations generated by these sites will be used for computation of nutrient loadings in the canal system. Providing continuous-flow data at selected impact points for internal basins will complement the eastern flow canal discharge network and allow for surface-water releases that are more accurately timed. The accounting of all significant hydrologic inflows and outflows to the Everglades ecosystem of the south Florida mainland is a key element of the South Florida Ecosystem Program.

TYPICAL ADCP MEASUREMENT

ACOUSTIC TECHNIQUES FOR FLOW MEASUREMENT

Acoustic Doppler Current Profilers (ADCP), used to measure water velocities in three dimensions, are implemented to calibrate the AVMs by accurately streamgaging very non-standard vertical velocity streamflow distributions. Field measurements made by ADCPs will be used to develop these relationships at the continuous recording AVM sites.



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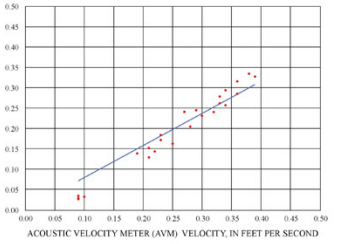

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