

# Estimates of Spring Flow in Citrus and Hernando Counties, Florida

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The coastal springs in Citrus and Hernando Counties consist of three first order magnitude springs and numerous smaller springs that discharge about 840 million gallons per day from the Upper Floridan aquifer to the Gulf of Mexico. Spring flow is proportional to the water-level altitude in the Upper Floridan aquifer, which in turn is affected primarily by the magnitude and timing of rainfall. Spring flow data are used to provide information about seasonal flow patterns and the spatial distribution of spring flow into the Gulf of Mexico. Continuous spring flow data are required to accurately describe hydrologic trends.

Spring discharge usually cannot be reliably rated by a traditional stage-discharge rating. Instead, the potentiometric level of the Upper Floridan aquifer in wells located near the springs, along with other variables, can be used to estimate instantaneous discharge. Predictive equations to estimate instantaneous spring flow were developed for selected gaging stations at coastal springs in Citrus and Hernando Counties. Regression techniques included ordinary least squares and multiple linear regression techniques. At tidally affected gaging stations, spring flow was inversely related to water-level altitude of the spring pool.

Discharge at selected springs also was estimated based on acoustic velocity measurements downstream of the spring vents. Calibrated equations for index-to-mean velocity relations were developed based on acoustic discharge measurements, acoustic index velocity, and water level.

Acoustic-velocity discharge measurements and well-regression discharge estimates at individual spring sites compared favorably with standard current meter measurements near the spring orifice. Well-regression estimates of discharge compared poorly with other measurements at sites located downstream from the spring, therefore, acoustic velocity sensors are required to accurately estimate spring-flow discharge at the downstream sites.