

Establishment of Instream Flows in North Florida - Part II

by:

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Courtesy of Suwannee River Water Management District (SRWMD)

This is a Part II article after “*Establishment of Instream Flows in North Florida*” in 2003 (<http://www.awra.org/committees/techcom/watershed/pdfs/0103WU.pdf>).

As more demand is placed on the Nation’s water resources, the need for increased protection for ecologically sensitive areas has grown. With an ever increasing population in the State of Florida, the demand for water has been extended to areas outside of traditional population centers. In 1972, Florida adopted a regulated riparian system and established the Florida Water Resources Act, whose goals included managing water and related land resources; promoting the conservation, development, and proper use of surface and groundwater; and preserving natural resources, fish, and wildlife. The State of Florida mandated that the Water Management Districts (WMDs) develop regulations to protect water resources and ecologically sensitive areas from significant harm by adopting Minimum Flows and Levels (MFLs) while planning for adequate water supplies. MFLs identify a limit on water withdrawals which may be permitted within a context of protecting non-consumptive water use activities, including water necessary for navigation and recreation, wildlife habitat, and other natural resources. When applied to riverine systems, MFLs are Florida’s version of in-stream flow protection.

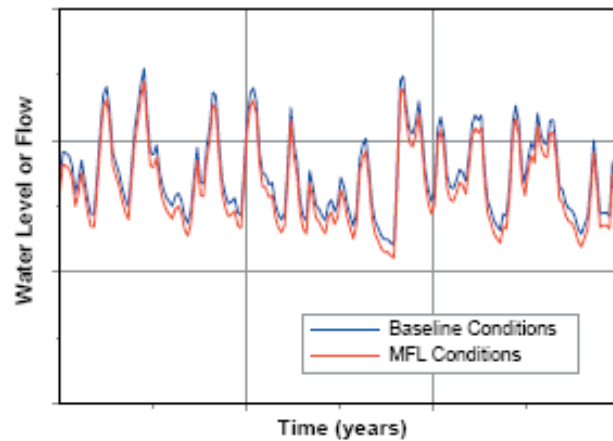
The Suwannee River is the second largest discharging river in Florida, structurally unregulated, and the major freshwater source to the Suwannee Estuary, an estuary of national significance. The river flows approximately 240 miles from its headwaters in the Okefenokee Swamp to the Gulf of Mexico, receiving groundwater contribution from the Floridan aquifer system as well as runoff from major tributaries, such as the Alapaha, Withlacoochee, and Santa Fe Rivers, in the 9,640 square mile drainage. The Suwannee River system crosses various physiographic regions with multiple tributaries and the basin possesses a high ecological diversity. The lower Suwannee River is primarily a gaining reach (receiving inflow from groundwater) and for all practical purposes does not receive direct surface water runoff. Crane (1986) reported that five first-magnitude springs and twenty two second-magnitude springs discharge into the lower Suwannee River basin. However spring discharge varies with river level; therefore the river can be gaining water from or losing water to adjacent springs. This results in a strong surface water-groundwater interaction which is difficult to quantify due to the complexities of spring systems. Salinity levels in the estuary have been classified as intermediate with moderate variance, with neither saltwater nor freshwater dominance. Freshwater inflow was identified as a dominant factor influencing salinity variability while meteorological events are important episodic influences (Orlando and others, 1993). Salinity levels in the upper estuary seem to be affected primarily by hurricanes and storms, as well as extreme low flows during droughts (Mattson and Krummrich, 1995; Tillis, 2000).

Suwannee River Water Management District (SRWMD) is applying a synergistic view for prescribing and maintaining instream flows. In 1994, the SRWMD began environmental and hydrologic studies to establish MFLs for the lower Suwannee River and create a water allocation method that₂preserves the prescribed instream flows

while meeting water resources demands. The SRWMD reviews available data for a river or river reach and may perform additional ecological studies to identify one or more specific flow measures that are important for establishing instream flow requirements, typically at a long term gaging station, within a flow duration curve framework to protect natural resources. These flows are then shifted by a specified percentage or magnitude to create a “control point” discharge typically at the same exceedence probability associated with the original flow. These control points are then used to shift the entire flow regime.

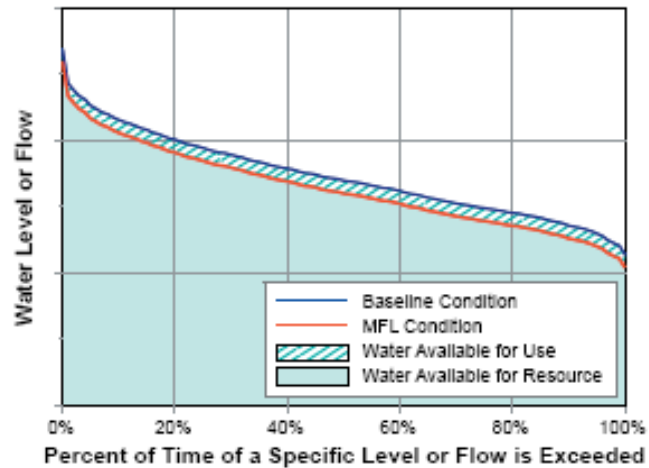
The first MFL was established at the Wilcox gage, a long term USGS gaging station 33 miles upstream of the river mouth. At this location, seasonal flow points were selected for controlling the allowable shift in the river hydrology. A flow specification to control upstream movement of salinity affecting submerged aquatic vegetation (SAV) was developed concurrently with the Fanning and Manatee Springs MFLs because of the integral relationship between the river and the springs. The Suwannee River provides a dilution factor to maintain appropriate salinities in SAV habitat during the spring and summer months, and also provides an increased stage which helps maintain access to thermal zones near spring discharges which impacts manatee refuge during the winter months.

SRWMD MFLs were developed at gaging stations to protect instream flows downstream of a station. MFLs should be established from downstream to upstream with the initial MFL established at the furthest downstream junction as determined from hydrologic data and ecological data. Upstream MFLs are established to assure that all downstream ecological control points are satisfied and additional control points are satisfied in the reach between the upstream and downstream gages. The SRWMD conceptualized a procedure for assuring that this downstream to upstream continuity was maintained (Good and Mattson, 2004). This procedure, called the “*Reach Methodology*”, was further developed and tested by Jacobs and Romesser (2006). Water available at the downstream end of a reach is equal to the available water upstream of the reach plus that added in the reach between gages.



withdrawals must not exceed the total water available; otherwise, significant harm is expected to occur.

As a simple reach example, 80% of the flow at the downstream gage (bottom of reach) comes from above the reach and the remaining 20% was gained within the reach. Therefore, 80% of the water available for withdrawal at the downstream gage would be allocated to upstream users and 20% to the users within the reach. Prior to subsequently allocating water at the upstream gage, both the downstream gage requirements and that derived from ecological criteria at the upstream gage (based on conditions within the reach) are considered and cross-checked.



The upstream gage's final MFL is the more constraining allocation and assures that streamflow necessary to meet MFLs both in the reach and downstream of the reach are sustained. This methodology identifies water available for withdrawal by users within and upstream of the reach and applies a water allocation method in a flow duration framework to an unregulated river while maintaining the prescribed instream flows.

The SRWMD studied several methods for allocating water resources and assessing withdrawal impacts to better develop robust MFLs for the dynamic Suwannee River system. The MFL program provides scientific support for water supply planning and permitting in order to equitably distribute a limited resource between competing stakeholders while protecting natural resources from the significant harm that would result from fresh water shortages. The SRWMD MFL program utilizes a minimum flow regime, as opposed to a single valued MFL, since an important upstream ecological value could be impaired without different regulatory standards than those provided by the downstream control location.

Further Contact Information

For more information on SRWMD's MFL program, see the Suwannee River Water Management District's web site at <http://www.mysuwanneeriver.com> or <http://www.srwmd.state.fl.us>. You may also contact John Good at (386) 362-1001 or JCG@srwmd.org.

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