

## Temporal Behavior of Water Resources in the Suwannee Basin Relative to ENSO

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In Florida, water shortages in the southern part of the state have led developers to look towards North Florida for future expansion. This would put additional stress on the water resources of North Florida. In this research, temporal variation of water resources in the Suwannee River Basin (SRB) under various climatic conditions at monthly, seasonal and annual time scales is presented. Monthly water balance (WB) was computed for a period of 30 years by subtracting streamflow, ET and consumptive use from precipitation. Annual average precipitation exceeded streamflow, evapotranspiration and consumptive use by about 700 billion gallons (17% of precipitation). Temporal analyses of water resources under the influence of climate variability showed great variation, which was not previously reported at this detail. During El Niño (La Niña), of the annual total, monthly water balance was greatest (32%) in August (81% in September) and lowest (deficit of 29%) in May (April, deficit of 39%). During El Niño, August (14%) had the greatest precipitation and was lowest (4% of the annual precipitation) in April and May. During La Niña, September (15%) had the greatest precipitation with lowest in November (3%). Seasonally, water balance was greatest in summer season for both, El Niño (66%) and La Niña (155%) where as it was lowest in spring season (-52%) during El Niño and in fall during La Niña (-53%). Precipitation followed a similar trend on a seasonal basis as the water balance.

On an annual basis, one would expect the WB to be small if the lags between precipitation and streamflow were on the order of 1 to 3 months. During most years in the study, the WB was positive and about 20% of the annual precipitation. Some of this positive WB could be excess water that recharges the aquifer and would thus represent available water. However, the 30-year average water volume residual may also be due to uncertainties in data and calculation of WB. Thus, the WB values do not provide estimates of excess water available for additional uses. The results do provide, however, quantitative variation of the major components of the WB at the basin scale at different temporal scales.

This research is the first to provide monthly, seasonal and annual ENSO-based analysis of water availability in the region, and should aid water resource planners and managers in better water resource management in the north Florida region. Additional research may be needed to refine these component estimates for use in water resources management.

**Keywords:** Water resources variability, Suwannee River Basin, climate variability, ENSO

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