

## **ENVIRONMENTAL FLOWS AND LEVELS: DETERMINING IMPACT THRESHOLDS AND ALLOWABLE CHANGE**

***Andrew B. Sutherland***

St. Johns River Water Management District, Palatka, FL, USA

Florida water management districts are required to establish environmental flows and levels, to define minimum hydrologic regimes that protect priority water bodies from significant harm due to water withdrawals. Many approaches have been developed in Florida and elsewhere with the goal of balancing the water supply needs of humans with water supplies needed to protect aquatic ecosystems. Environmental flows and levels are developed for many reasons, including the protection of biodiversity and ecosystem services, as well as the maintenance of recreational values and other human beneficial uses. A challenging part of establishing environmental flows and levels involves determining appropriate metrics and impact thresholds that are both protective and scientifically defensible. Uncertainty in impact analyses may be due to environmental (hydrological and ecological) variability, data availability, the ability to simulate a reference condition or other long-term hydrological patterns, among others. In an effort to establish science-based impact thresholds, the St. Johns River Water Management District (SJRWMD) has developed a quantitative approach for estimating allowable change to ecologically critical hydrological events. This data-driven method helps to determine allowable change to water level or flow regimes through a comparison of hydrological signatures that exist across similar water body types. These signatures define a natural range of flooding or drying frequencies for key ecological events (elevation and duration combinations), providing a quantitative method for determining a minimum hydrologic regime necessary to maintain natural wetland communities and other key ecological features. In the SJRWMD these critical features are typically organic soils, wetland plant communities or key indicator species, but could include any features that are a function system hydrology. Species-specific signatures typically exhibit a smaller range of flooding or drying frequencies, when compared to community boundaries or other features. Evaluation of sources of variability and ways to reduce uncertainty and improve this approach are ongoing.

**PRESENTER BIO:** Dr. Sutherland has worked in the St. Johns River Water Management District's Minimum Flows and Levels program for 8 years. He has 23 years of experience in the study of freshwater ecosystem ecology, fish ecology and macroinvertebrate ecology.