

# HSW Minimum Flows and Levels Experience

The State of Florida Minimum Flows and Levels (MFLs) Program is based on Chapter 373.042, *Florida Statutes*, which requires that either a Water Management District (WMD) or the Florida Department of Environmental Protection (FDEP) establish minimum flows for surface watercourses and minimum levels for groundwaters and surface waters. The statutory description of a minimum flow is "the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area" (Ch. 373.042 (1)(a), FS). The statutory description of a minimum level, as applies to Florida's surface water bodies, is "the level of surface water at which further withdrawals would be significantly harmful to the water resources of the area" (Ch. 373.042 (1)(b), FS). The statute provides guidance to the WMDs and FDEP on how to establish MFLs using the "best information available."

HSW is involved in all aspects of the MFLs development process and currently provides expertise to three water management districts (Southwest, St. Johns, and Suwannee). Our work ranges from basic statistical data analyses to peer review of proposed MFLs. The following project descriptions demonstrate the range of our on-going work efforts.

## Analysis of Hydrologic Data to Support Minimum Flows for Rivers

Southwest Florida Water Management District  
West-Central Florida  
2002-Present

### Short Project Description:

The project objective is to assist the SWFWMD with the analysis of hydrologic data associated with rivers in west-central Florida for the purpose of setting minimum flows for these water bodies. While establishing minimum flows is technically and administratively complex, the scope of this project is focused on using defensible statistical procedures to help interpret the historical data record. Dr. Watson has implemented a variety of modeling and statistical procedures under the scope of work to meet a variety of objectives related to establishing MFLs:

- Determine if stream flow is changing over time
  - Perform hydrograph analysis, single and double mass analysis, regression, and Mann-Kendall tests.
- Determine frequency and duration of inundation
  - Generate duration of inundation curves.
- Develop synthetic hydrograph for short-term gage using relationship between short-and long-term gage

data - Use a systematic sampling procedure to limit serial correlation effects and a piecewise polynomial regression procedure (programmed in SPSS) to identify association between short and long term gage data. Generate duration of inundation curves from synthetic hydrograph data.

- Calculate residence and flushing times for estuarine portions of rivers. Dr. Watson has co-authored two estuarine mixing models (MERT and MMRT).
- Develop statistical models depicting association between river geometry, flow, tidal, influx, and salinity.
- Estimate flow in ungaged portions of rivers using statistical associations.
- Perform a literature review of the effect of dissolved oxygen on benthic organisms.

## Minimum Flows and Levels: Water Resource and Human-use Values Assessment

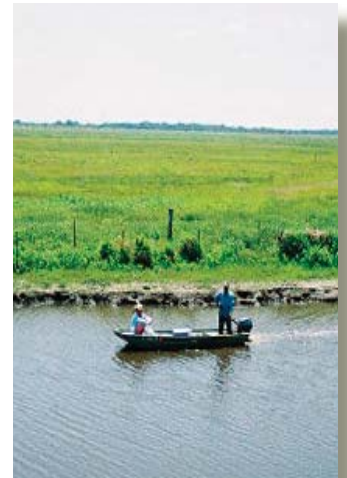
St. Johns River Water Management District  
Brevard and Orange Counties  
2003-2004

### Short Project Description:

The project includes various engineering and environmental sciences tasks to evaluate the potential impacts of minimum flows and levels (MFLs) hydrologic regime to the water resource and human-use values associated with the St. Johns River between SR 46 and SR 520, Brevard and Orange counties.

The project involves assessing if proposed MFLs are protective of ten water resource values in that section of river.

A frequency analysis approach was used by Dr. Watson along with a watershed (HSPF) and river (HEC-RAS) model results. This project requires expertise in surface water hydrology, ecology, and statistics. Expert testimony is expected.



## Technical Peer Review for MFLs

Suwannee River Water Management District  
2004-Ongoing

### Short Project Description:

HSW was retained by the SRWMD to provide peer review of proposed MFLs. HSW has completed the Madison Blue Springs peer review and is scheduled to review the Lower Suwannee River MFLs in January 2005. Dr. Watson is charged with evaluating the hydrologic portions of the MFLs documents, including statistical and modeling procedures and results. Dr. Emery is charged with evaluating the ecologic portions of the MFLs documents, serving as the facilitator for the District and presenting to the Board.



## Minimum Flows and Levels Rules

Hillsborough County

### Short Project Description:

Dr. Emery has been one of Hillsborough County's prime representatives to the various committees developed by the SWFWMD to develop methodologies and actual flows and levels in various lotic and lentic water bodies. Dr. Emery spent several years working with the District technical experts and others on the different methods for evaluating Category I, II, and III lakes, evaluating cypress wetlands, springs, and stream flows. This is an ongoing project, with emphasis on springs and river MFLs development in 2003.

## Spring Flow Limitations on a Water Use Permit Issue

Hillsborough County

### Short Project Description:

Dr. Emery was one of Hillsborough County's technical experts in a legal matter between a major regional

water supply authority and the County regarding impacts from a newly permitted wellfield on the flow from Lithia and Buckhorn Springs. Dr. Emery helped develop the methodology used to assign a minimum flow/level below which wellfield pumping would have to be reduced or eliminated.

## Spring Flow Limitations on a Water Use Permit Issue

Hillsborough County

### Short Project Description:

Dr. Emery was one of Hillsborough County's technical experts in deliberations on how much water was to be allowed to be diverted from Sulfur Springs to augment the base of the Hillsborough River Dam with a minimum flow. This was a highly controversial matter, in as much as the City of Tampa relies heavily upon the river for its potable water supplies, and given the importance of the springs to the ecology of the lower river.

## Development of Hydrobiological Monitoring Programs for Tampa Bay and Major Rivers in the Area

Hillsborough County

### Short Project Description:

Dr. Emery was one of two principal developers of Hillsborough County's Independent Monitoring Program, designed to detect impacts from water supply projects on Tampa Bay and its major rivers and spring systems. Subsequently, Dr. Emery has assisted the local regulatory agency Environmental Protection Commission in subsequent biological and water quality sampling, using our fully equipped sampling vessel. Dr. Emery was a member of the Technical Advisory Group that helped develop the Hydrobiological Monitoring Program for Tampa Bay Water. Dr. Emery continues to examine data collected from these monitoring efforts on behalf of Hillsborough County.

*Dr. Ken Watson and Dr. Scott Emery lead the efforts at HSW in the development of minimum flows and levels. If you would like additional information, please contact them by phone at 813-968-7722 or by e-mail at [kwatson@hsweng.com](mailto:kwatson@hsweng.com).*