Cathleen Beaudoin Jonas, PG

Principal Hydrogeologist

HSW Engineering, Inc.

Education

- MS, Hydrogeology, University of South Florida
- BS, Geology, Beloit College
- Internship, Oak Ridge National Laboratory
- Independent Study Abroad – University of Glasgow, Scotland

Fields of Specialization

- Geology/Hydrogeology/Hydrology
- Water Resource Studies and Development
- Groundwater Flow/Mass Transport Modeling
- Water Supply and Environmental Permitting
- Well Design and Installation
- Expert Testimony

Years of Experience

30

Licensure

Professional Geologist, Florida

Certificates of Training

Tampa Bay Water – Time Series Workshops for continuing training in statistical techniques (2004)

Professional Affiliations

Florida Association of Professional Geologist
Tampa Bay Association of Environmental Professionals
American Institute of Professional Geologists

Summary of Experience

Ms. Jonas has been working on water resources and water supply projects in Florida since 1989. She is skilled in managing both small and large multi-task, multi-disciplinary projects. Ms. Jonas is experienced in interacting with regulatory staff for permitting and compliance projects.

Ms. Jonas has developed, modified and calibrated numerical groundwater flow models to use in groundwater flow studies for wellfield impacts, remediation programs, mine cut dewatering evaluations, and to assist in acquiring water use permits. She has used groundwater particle-tracking programs to determine optimal locations for recovery wells as part of a remedial action program. Her experience includes both local and regional-scale models. Ms. Jonas has recently managed several projects using the variable density model SEAWAT to evaluate the potential for saltwater intrusion and for brackish water supply development. Ms. Jonas also manages water resource studies and has recently managed a project to determine the potential impacts of a rock mine in a coastal environment and the potential for a proposed landfill to impact groundwater quality. She is currently part of a team investigating the potential for recharging reclaimed water into the upper Floridan aquifer and using separate shallower recovery wells to increase the permit capacity of potable water. She has been involved in the peer review of groundwater models for three water management districts.

She has managed integrated surface and groundwater modeling projects and has used the integrated model ISGW to study wellfield impacts on surface water flows and levels. Ms. Jonas has been involved in a number of projects where methodologies were developed to relate wetland and surficial aquifer water levels in order to evaluate impacts from groundwater pumpage on lake and wetland water levels. Several projects involved the development of water budget spreadsheet models for augmented and non-augmented lakes or wetlands.

Ms. Jonas has supervised the installation and testing of large municipal supply wells and associated networks of monitor wells. She has conducted and analyzed data from numerous aquifer performance tests. Ms. Jonas has evaluated borehole geophysical logs to determine hydrogeologic units and structure. She is experienced in preparing geologic maps and cross sections. Ms. Jonas has provided expert testimony in geology, hydrogeology and groundwater modeling.

Project Experience

- For the St. Johns River Water Management District, conducted peer reviews of the revision and expansion of the Northeast Florida Regional Groundwater Flow (NEF) Model and for the Palm Coast and Flagler County (PCF) Groundwater Flow Model. Evaluated the design, revision, calibration, and documentation of each model. Provided recommendations for improvements in future versions of the models.

- As a subcontractor, provided third-party review to the SWFWMD for the groundwater modeling aspects for the City of Punta Gorda Shell Creek RO Wellfield. Provided comments on the relevant aspects of the groundwater modeling using the District's DWRM3 model for feasibility of the RO wellfield, permitting and APT analysis, addressing the assumptions, methodology, modeling and schedule, and/or operations and maintenance for the proposed RO wellfield.

- Provided hydrologic expertise and expert testimony as part of an expert team retained to challenge the permitting of a proposed Class I landfill in a hydrologically and geologically sensitive area in central FL. Analyzed data from hundreds of boreholes and results of geophysical analyses to construct a conceptual model of the large karst features and groundwater flow at the site. The team successfully demonstrated the potential impacts on sensitive water resources, leading to a Notice of Intent to Deny by the regulatory agency. Ms. Jonas provided deposition, hearing and rebuttal testimony in DOAH proceedings after the applicant challenged the permit denial by the FL DEP.

- Ms. Jonas provided expert testimony services to a central Florida County Utility challenging requested quantities on a Water Use Permit application for a competing water source. She evaluated the use of groundwater as a primary augmentation source to a canal used in a large agricultural operation.

- Provided expert testimony services on hydrogeology and groundwater modeling during the arbitration of a water use permit for a municipal wellfield in central Florida. She also provided technical advice to legal counsel during negotiation meetings that led to a settlement.

- Task leader for expanding the East Central Florida Transient (ECFTX) Groundwater model for use as the primary analytical tool used to quantify effects of and allocate groundwater withdrawals in the Central Florida Water Management Initiative (CFWI). Provided SWFWMD with MODFLW-NWT files for ECFTX. Tasks included expanding the model grid including implementing model layer thicknesses, prepopulating the grid with appropriate aquifer parameters, identifying other data for inclusion in the model, and compiling calibration target information for groundwater levels.

- Currently project manager for efforts on the Tampa Augmentation Project (TAP) funded jointly by the City of Tampa and SWFWMD providing hydrogeologic services on a multi-disciplinary project investigating two alternatives for the feasibility of recharging and recovering reclaimed water in the Floridan Aquifer system. The first alternative evaluated the potential use of rapid infiltration basins (RIBs) to recharge the aquifer and surface water flow. Assisted in the hydrogeologic field investigation design and used the results to manage the construction of a groundwater model to simulate proposed RIBs. For the second alternative, she coordinated geologic core drilling and testing activities that provided vertical permeability, water level and water quality data to improve the hydrogeologic conceptualization of the area and managed the development and analysis of a SEAWAT variable-density groundwater model to evaluate the recharge and recovery concept and aid in the assessment of the project's feasibility.

- For the St. Johns River Water Management District, conducted peer reviews of the revision and expansion of the Northeast Florida Regional Groundwater Flow (NEF) Model and for the Palm Coast and Flagler County (PCF) Groundwater Flow Model. Evaluated the design, revision, calibration, and documentation of each model. Provided recommendations for improvements in future versions of the models.

Ken Watson, PhD, PH

President / Principal Hydrologist

HSW Engineering, Inc.

Education

- PhD, Soil Physics, University of Kentucky
- Research Associate, United States Dept. Of Agriculture, Beltsville, Maryland
- MS, Soil Physics, University of Kentucky
- BS, Soil Science, University of Florida
- Post-Doctoral Research Associate, Oak Ridge National Laboratories Environmental Sciences Division
- Courtesy Professor, University of South Florida, Geology Department, 2005-Present

Fields of Specialization

- Minimum Flows and Levels
  - SJRWMD (Peer review and MLF development)
  - SWFWMD (technical studies (modeling, statistics, wetlands) and Peer review)
  - SRWMD (MFL development and Peer review)
  - NWFWMD (technical assistance – modeling, planning)
- Expert Witness in Groundwater Modeling and Applied Mathematics
- Investigation of Groundwater, Surface Water, Soil and Sediment and Contamination
- Human Health and Ecological Risk Assessments
- Modeling:
  - Hydrologic and solute transport modeling in porous and fractured media (analytical and numerical – MODFLOW, MT3D)
  - Hydrologic (BASINS, IHACRES), hydraulic (HEC-RAS) and hydrodynamic modeling (EFDC) of surface waters
  - Instream Physical Habitat (SEFA)
  - Mixing zone modeling
  - Statistics and stochastic modeling
- Groundwater and Surface Water Hydrology
- Saturated and Unsaturated Hydraulic Conductivity Determinations
- Water Use/Consumptive Use Permitting
- Surface Water Quality and Permitting
- Total Maximum Daily Loads
- Water Conservation and Best Management Practices in Agriculture
- Wetland Investigations

Summary of Professional Experience

Dr. Ken Watson is a recognized expert in numerical and statistical modeling, and quantitative hydrology. As a Principal Hydrologist at HSW (1988 to present), he manages projects related to internal and external training, water resources investigations, surface water modeling studies, groundwater studies, hydrologic and solute transport modeling projects, internal and external training in water resources, and human health and ecological risk assessments. He is also involved in specific investigations dealing with establishing minimum flows and levels in water bodies in west-central Florida for the Southwest, St. Johns River, Suwannee River and Northwest

Years of Experience

35

Licensure

Certified and Registered Professional Hydrologist - Groundwater, 2000

Continuing Education

University of South Florida:
- Hydrology of Islands/Coasts, 1988
- Florida and Island Hydrology, 1990
- Analytical and Semi-Analytical Models, 1992
- Mathematics of Flow News and Analytic Elements, 1994
Risk Assessment (American Petroleum Institute)
Risk Analysis Stochastic Methods (Monte Carlo) in Risk Analysis
Visual ModFlow
HSPF Modeling using BASINS
Vapor Intrusion 2012
Hydric Soils 2012
Advanced SEFA Modeling

Professional Affiliations

American Institute of Hydrology
National Groundwater Association
American Water Resources Association
Florida Association of Environmental Soil Scientists

Florida Water Management Districts. Dr. Watson is continually called upon to provide quantitative expertise with respect to groundwater, surface water and unsaturated zone hydrology, the transport of contaminants in surface and-subsurface waters, and has qualified as an expert in administrative hearings in the fields of groundwater modeling and applied mathematics. As president of HSW, he is in charge of corporate technical development.

After receiving his Ph.D., Dr. Watson held a Research Associate position (1983 – 1986) with Oak Ridge National Laboratories (ORNL). Under sponsorship of the Office of Health and Environmental Research and the University of Tennessee, Dr. Watson participated in some of the nation's earliest studies of the transport rates of trace contaminants from shallow land waste disposal sites, biodegradation of TCE, solidification techniques, geostatistics and various review committees dealing with hazardous waste disposal.

As a recognized expert in his field, Dr. Watson is regularly called upon to perform peer reviews of work performed by others, participate in Red Team reviews of proposals and important published reports and documents, and serve as an Expert Witness.

Project Experience – Water Resources / MFLs

- Evaluated Water Resource Values for MFLs developed by the SJRWMD using extreme value frequency analysis techniques for sections of the St Johns and Ocklawaha Rivers.
- Managed and member of a peer review panel that evaluated MFLs in the Suwannee River Water Management District, including the appropriate use of statistical, hydrologic, hydraulic, and hydrodynamic models (e.g., hspf (BASINS), and HEC-RAS). The surface water bodies evaluated include Madison Blue Springs, Lower Suwannee River, Manatee Springs, Fanning Springs, Alapaha, Wacasassa, and Upper Santa Fe Rivers.
- Assisted with Developing MFLs for the SRWMD for the Aucilla River and currently for the Upper Suwannee, Alapaha, and Withlacoochee Rivers.
- Assisted the SWFWMD on over twenty-five related projects for over ten rivers or river sections, including hydrologic, hydraulic, residence time, and statistical modeling and model review, and peer review.
- Assisted the NWFWMD in preparing a work plan for the Development of Minimum Flows and Levels for Jackson Blue Springs and in evaluating a HEC-RAS model for Spring Creek.
- Developed IHACRES model for the Lower Santa Fe River in support of MFLs.
- Developed hydrodynamic model for the Homosassa River using EFDC in support of MFLs.
- Performed a detailed drainage and hydraulic conveyance model of Tampa Electric's Big Bend plant using SWMM.
- Project officer and lead modeler for water resource evaluation of the Belleair Wellfield. Developed a pumping optimization model and performed trend analysis and water level and water quality data.
- Served as project officer and lead modeler for modeling of selecting hydrogeologic settings in Pinellas County, Florida for locating of a brackish-water reverse osmosis water treatment facility.
- Developed water balance model for Lake Dan, located in the Eldridge Wilde Well field in west-central Florida for Tampa Bay Water.
- Compared various modeling strategies for determining solute travel times to water supply wells.
- Developed stochastic modeling techniques for water flow and solute transport problems.
- Applied complex numerical transport models to numerous hazardous waste areas.
- Investigated modeling techniques for biodegradation of TCE while at Oak Ridge National Laboratories.
- Investigated potential salt-water encroachment in the Northwest Hillsborough County area and developed a conceptual model of the transition zone in that region of the county.

Phillip R. Davis

Principal Hydrologist

HSW Engineering, Inc.

Education

- M.S., Soils, Water and Engineering, Groundwater Hydrology Major, University of Arizona.
- BS, Agricultural Engineering, University of Arizona

Years of Experience

40

Fields of Specialization

- Hydrogeology/Hydrology
- Water Resource Studies and Development
- Groundwater Flow/Mass Transport Modeling
- Water Supply and Environmental Permitting
- Source Water Protection
- Alternative Water Supply
- Aquifer test design, implementation and analysis
- Peer Review
- Expert Testimony

Professional Affiliations

Florida Ground Water Association

Summary of Experience

Mr. Davis has more than 40 years experience investigating and solving groundwater problems related to numerical models, water supply development and groundwater contamination.

In managing water resource development and assessment projects, Mr. Davis focuses on a regional approach, using models to understand and evaluate groundwater resources. He has provided technical support in the acquisition of consumptive water use permits for public water supply, agriculture and mining. From 1988 to 1992, Mr. Davis directed the development of an integrated hydrologic model funded by the Florida Institute of Phosphate Research to assess the hydrology of reclaimed mined lands. From 1992 to 2002, Mr. Davis directed SDI's development and application of the ISGW integrated hydrologic model, which couples surface water (HSPF) and groundwater flow models (MODFLOW) to solve complex issues where the interaction between surface water and groundwater is important. Since 2002, Mr. Davis has directed the application and review of integrated hydrologic models using publicly available models for various water supply and water resource protection projects.

Mr. Davis also provides technical expertise to clients and lawyers in dealing with regulatory agencies and in litigation and hearings. He has lectured at seminars and short-courses on various groundwater and modeling topics, and has conducted workshops on protocol and analysis procedures for aquifer step drawdown tests (APTs) of production wells. He has written numerous technical reports and publications and has served on the editorial board of the *Journal of Ground Water*.

Mr. Davis has worked for several major consulting companies specializing in groundwater investigations, water resource engineering and environmental engineering. In addition, he worked for the University of Arizona for nearly five years conducting groundwater research investigations and developing specialized computer applications software. For several years beginning in 1979, Mr. Davis worked under the guidance of Mr. Thomas A. Prickett and Mr. William C. Walton. Mr. Prickett was the senior author of widely-accepted groundwater flow and mass transport codes. Mr. Walton is widely published in the field of groundwater

hydrology and is considered by many to be the foremost expert in the U.S. on analytical models and vertical leakage in complex hydrogeologic regimes.

Project Experience

- Provided senior technical input for expanding the East Central Florida Transient (ECFTX) Groundwater model for use as the primary analytical tool used to quantify effects of and allocate groundwater withdrawals in the Central Florida Water Management Initiative (CFWI). The Project Team provided SWFWMD with MODFLW-NWT files for ECFTX. Tasks included expanding the model grid including implementing model layer thicknesses, prepopulating the grid with appropriate aquifer parameters, identifying other data for inclusion in the model, and compiling calibration target information for groundwater levels.

- Project director for efforts on the Tampa Augmentation Project (TAP) funded jointly by the City of Tampa and SWFWMD providing hydrogeologic services on a multi-disciplinary project investigating two alternatives for the feasibility of recharging and recovering reclaimed water in the Floridan Aquifer system. The first alternative evaluated the potential use of rapid infiltration basins (RIBs) to recharge the aquifer and surface water flow. Assisted in the hydrogeologic field investigation design and used the results to manage the construction of a groundwater model to simulate proposed RIBs. For the second alternative, he assisted in coordinating geologic core drilling and testing activities that provided vertical permeability, water level and water quality data to improve the hydrogeologic conceptualization of the area and managed the development and analysis of a SEAWAT variable-density groundwater model to evaluate the recharge and recovery concept and aid in the assessment of the project's feasibility.

- For the St. Johns River Water Management District, participated in the peer reviews of the revision and expansion of the Northeast Florida Regional Groundwater Flow (NEF) Model and for the Palm Coast and Flagler County (PCF) Groundwater Flow Model. Evaluated the design, revision, calibration, and documentation of each model. Provided recommendations for improvements in future versions of the models.

- Provided peer review for the expansion and recalibration of a groundwater model of the proposed Polk County Southeast Wellfield as an Alternative Water Supply using Lower Floridan Aquifer groundwater. Reviewed model construction, parameters, water budgets, aquifer tests, and simulated groundwater impacts and assisted in the development and support of additional information being provided to the regulatory agencies for the water use permit.

- Managed the hydrogeologic portion of a feasibility project to develop a sustainable brackish groundwater resource in the City of Clearwater. Responsibilities include the design and implementation of a drilling and testing program, which included 3 test production wells and 10 monitor wells. Three 7-day aquifer performance tests were conducted and analyzed using a groundwater model.

- Provided hydrogeologic design services to the Southwest Florida Water Management District for an exploratory drilling and test program of the Lower Floridan Aquifer (LFA) system in Polk County. Participated in well and test design, bid document review, data review of water levels, water quality, packer testing, core samples and geophysical logging for a 3,000 foot corehole.

- Project director for a project to provide hydrogeologic services for the design, construction and permitting of a new brackish water wellfield to provide 8.0 million gallons per day raw source water for a new reverse osmosis plant at the City of Clearwater's Reservoir 2 Facility. Services provided include design and implementation of a corehole drilling and testing program for wellfield and production and monitor well design, environmental site assessment, well construction and testing, variable-density groundwater flow modeling using SEAWAT, and Water Use Permit (WUP) support.

Dean Mades, PE, D.WRE

Principal Engineer and Hydrologist

HSW Engineering, Inc.

Education

- Graduate Studies, Civil Engineering, University of Illinois
- MS, Civil Engineering, University of Illinois
- BS, Civil Engineering, Bradley University

Licensure

Professional Engineer, Florida – 48742

Diplomate, Water Resources Engineer

Professional Affiliations

American Society of Civil Engineers

Fields of Specialization

- Water Resources Assessment Supportive of MFLs and Regulatory Programs
- Surface- and Ground-Water Hydrology, Hydraulics, Computer Modeling
- Hydrologic and Water-Quality Monitoring, Data Evaluation, and Statistical Modeling
- Permitting (Environmental Resource / Mitigation Bank, Water Use, Dredge & Fill, NPDES)
- Expert Testimony and Environmental Rule Development

Summary of Professional Expereince

Mr. Mades is an accomplished hydrologist with 30+ years of experience evaluating surface- and groundwater hydrology and quality throughout the United States, including nearly 10 years with the U.S. Geological Survey. He has managed and currently provides quality-assurance reviews on a variety of projects including hydrologic and hydraulic modeling, environmental/water use/wastewater/stormwater permitting, site development, drainage engineering, forensic assessments, ecohydrology, and groundwater remediation. His ecohydrology work involves multi-discipline, scientific assessments to determine regulatory minimum flows and levels assessments for rivers, estuaries, springs, and lakes. He is well versed in the application of hydro-ecological modeling using software such as PHABSIM and SEFA, empirical estuary flushing models, and numerical modeling codes for the analysis of watershed and stream hydraulics (HEC-HMS, HEC-RAS, HSPF, SWMM), receiving water quality (WQRRS, QUAL-2E and CE-QUAL-W2), groundwater (MODFLOW, HST3D, Groundwater Vistas, Visual MODFLOW, InterSat and InterTrans), estuary hydrodynamics and quality (EFDC), and statistical and geostatistical methods using software such as SPSS, SYSTAT/SYGRAPH, Surfer, and GeoKrig.

Project Experience

MFLs / WRVs Assessment and Environmental Criteria Development

- SJRWMD: Peer review of MFLs methodology for sand-hill lakes (Brooklyn and Geneva). Environmental constraint analysis of the upper Suwannee River to support consumptive use permit application reviews. Technical quality-assurance reviews of WRV, hydro-ecology, hydrology, and field assessments supporting MFLs development for lower St. Johns River at Lake Poinsett and lower Ocklawaha River. Prepared an environmental constraint analysis of the upper Suwannee River to facilitate consumptive use permit application reviews.
- SRWMD: Technical quality-assurance (QA) reviews of hydro-ecology, hydrology, WRV, and field assessments supporting MFLs development for the upper Suwannee, Alapaha, Withlacoochee, Aucilla and Wacissa Rivers and Estuary; and priority springs (White Sulphur, Suwannee Springs, Madison Blue, Wacissa Springs Group, Nutall Rise). Assisted with the collation and review of literature and models that would support the MFLs development for four coastal rivers (Aucilla, Wacissa, Econfina, and Steinhatchee). Managed the development of spring-flow ratings for 17 priority, first- and second-magnitude springs based on available groundwater level and river stage data.
- SWFWMD: Technical quality-assurance reviews of statistical evaluations of streamflow hydrology and hydraulics, water quality, and biology in support of establishing MFLs for Brooker and Shell Creeks; Homosassa River and Estuary; and upper Alafia, Anclote, Little Manatee, and lower Manatee Rivers.
- NWFWMD: Technical quality-assurance reviews and development of a work plan for the technical assessment of MFLs for Jackson Blue Spring.

Groundwater Quantity and Quality Modeling

- Performed QA reviews of groundwater modeling performed using GMS to characterize water table drawdown associated with construction dewatering operations at the Orlando Utility Commission Stanton Energy Center.
- Performed technical quality assurance reviews of conceptual groundwater modeling performed using SEAWAT and linear regression to characterize water table drawdown and potential saltwater intrusion near the Tampa Bay Water Northwest Hillsborough Regional Wellfield.
- Responsible for preparing a MODFLOW evaluations of mining impacts of proposed Infinity Lakes and MCZ Centrum sand mines on wetland hydrology and ground-water levels in the surficial and intermediate aquifer systems.

Surface Water Quantity and Quality Modeling

- Engineer-of-record for rainfall-runoff modeling performed using GSFLOW and HEC-HMS to establish allowable discharges for the design and permitting of the Babcock Ranch Community in Charlotte and Lee Counties.
- Performed technical quality assurance reviews of hydrodynamic modeling performed using EFDC and linear regression to characterize the salinity and thermal regimes of the Homosassa River for MFLs development.
- Managed the hydrology and hydraulic (H&H) modeling performed using HEC-HMS and HEC-RAS for project Q-1049 design of live-fire training ranges for Special Operations Forces at Marine Corps Base Camp Pendleton, California.
- Managed the development of an interactive, water-balance software to implement the Hydrologic Engine in Sarasota County's SIMPLE GIS-integrated, pollutant load calculator that facilitates annual compliance reporting.

Hydro-ecological Modeling, Data Collection and Analysis

- Designed and implemented synoptic flow and bottom-material measurements to provide data for calibrating PHABSIM/SEFA physical habitat models of four sites on the Upper Suwannee River to support MFLs development.
- Provided technical quality-assurance review of synoptic surveys of streamflow performed using an Acoustic Doppler Current Profiler (ADCP) and Acoustic Doppler Velocimeter (ADV) to collect data for calibrating a SEFA habitat simulation model of upper Shell Creek in support of MFLs development by SWFWMD.
- Managed the design, instrumentation, and maintenance of a statewide network of 44 automated water quality samplers and hydrometric monitoring stations located at 13 airports to characterize runoff quantity and quality. Monitoring results supported XPSWMM conceptual rainfall-runoff modeling and rulemaking for a General Permit that facilitates the design and permitting of airside stormwater management systems.
- Managed a $1M/year pilot surface-water study for the USGS National Water Quality Assessment Program and data assessment to describe the occurrence, distribution and trends of surface-water-quality parameters, and association with natural and anthropogenic factors throughout the 12,500 square-mile Upper Illinois River Basin.

Statistical and Geostatistical Modeling

- Evaluated long-term records of daily streamflow to characterize annual exceedance and non-exceedance statistics in support of technical Water Resource Values assessments of MFLs proposed by SJRWMD for the St. Johns River at Lake Poinsett and lower Ocklawaha River.
- Performed technical quality assurance reviews of multiple linear and non-linear regressions calculated using SPSS to characterize watershed yield and relationships between annual rainfall, ET, and runoff for technical assessments of MFLs proposed by SRWMD for the upper Suwannee, Alapaha, Withlacoochee, Aucilla and Wacissa Rivers.
- Performed technical quality assurance reviews of multiple linear and non-linear regressions calculated using SPSS to characterize spring-flow ratings for 17 first and second order springs within the SRWMD jurisdiction.

Expert Testimony and Consultation

- Provided the Baker County Board of County Commissioners expert reviews of water use permit applications and supporting MODFLOW groundwater modeling for two proposed sand mines in north-central Florida.
- Factual and expert testimony provided in Circuit Court regarding a drainage dispute between Saddlebrook Resort and an adjacent property owner in Pasco County.
- Prepared an expert review of SWFWMD's draft assessment of the Lower Peace River / Shell Creek MFLs for the City of Punta Gorda which relies on withdrawals from Shell Creek Reservoir for potable supply.
- Served as the Flow Measurement Expert on the 3-member Lake Michigan Diversion Accounting Technical Committee. The Committee report was part of the USACE's submittal to the U.S. Supreme Court.

Dori Sabeh, PE, GISP

Senior Engineer

HSW Engineering, Inc.

Education

- MS, Civil & Environmental Engineering, University of South Florida
- BS, Civil Engineering – Water and Environment, Saint Joseph University
- Diploma, Graduate Certificate, Geographic Information System, University of South Florida

Fields of Specialization

- Minimum Flows and Levels
- Watershed management master plans
- Hydraulic and hydrologic modeling
- Stormwater infrastructure
- Bridge hydraulics and scour analysis
- Erosion control
- Environmental regulations compliance and permitting
- Dredge and fill
- Water distribution
- Sanitary sewer collection
- Reclaimed water systems
- Trenchless technologies
- Construction services

Summary of Professional Experience

Mr. Sabeh is a Civil and Environmental Professional Engineer with 15 years of progressive experience in various multi-disciplinary projects for both public and private sectors. The depth of his experience encompasses technical direction and decision making on large and complex projects involving many aspects of water resources. He is well versed in hydrologic and hydraulic modeling, stormwater and watershed management master planning, floodplain delineation and mapping. He is also adept at stormwater best management practices and quality improvements, feasibility analysis, drainage design improvements, NPDES, LID designs, and canal dredging.

He brings a wealth of knowledge in watershed management plans. His experience includes comprehensive reviews of relevant data, developing hydrologic and hydraulic models, building geodatabases, floodplain delineation, levels of service determination, alternatives analyses, and developing watershed management plans. Mr. Sabeh's background in Minimum Flows and Levels include hydrologic analyses and conceptual model, statistical analysis, and water resources values assessment.

Years of Experience

15

Licensure

Professional Engineer, FL, GA, AL

Certifications

Geographic Information System Professional (GISP), GIS Certification Institute
Qualified Stormwater Management Inspector, Florida
Erosion, Sedimentation, and Pollution Control, Georgia
Utility Coordination Certification, Florida - Design, Regulation and Agreement; Coordination; and Construction Management Modules

Certificates of Training

ICPR4 Training, 2014
HEC-RAS – River Analysis System, FHWA-NHI, 2011
Stream Stability and Scour at Highway Bridges for Bridge Inspectors, FHWA-NHI, 2009
Low Impact Development Practices for Florida, 2009
Storm Drain Design Seminar, FES/ FDOT, 2006
Specifications Package Preparation for Consultants, FDOT, 2011
Roadside Safety Design Seminar, FES/FDOT, 2008
Utility Coordination Update Training, 2014

Professional Affiliations

Florida Stormwater Association
American Public Works Association
Florida Association of Environmental Professionals
Florida Urban and Regional Information Systems Association

He offers extensive expertise in water resources and environmental applications of geographic information system (GIS), including geostatistical analysis, geo-database development and management, and integrating the GIS databases with stormwater models. He is completely familiar in multiple industry-related software and stormwater models, such as ICPR, SWMM, ArcHydro, GWIS, HECRAS, MODRET, ASAD, AutoCAD/Civil 3D, esri ArcGIS, MicroStation, and programming languages.

Project Experience

- Project Manager for the Withlacoochee River and Alapaha River MFLs support for the Suwannee River Water Management District. Responsibilities included technical analysis of hydro-ecology, hydrology, water resources values, and field assessments supporting MFLs. Developed and calibrated HEC-RAS model for the two rivers in transient state for use in steady state flow reduction scenario analysis.
- Senior Engineer responsible for review of the technical analysis for the development of the upper Suwannee River MFL. Analysis included hydrology, water resources values, habitat analysis/eco-hydrology, floodplain inundation analysis, and MFL determination.
- Senior Engineer responsible for the development of a water balance model for Shell Creek at the Hendrickson Dam in Charlotte County, in support of the Shell Creek MFL update by the Southwest Florida Water Management District. Water balance model accounted for excess irrigation runoff into the creek using salinity data. The result of the analysis was a modified baseline flow for the period of record.
- Project engineer responsible for hydrologic and hydraulic modeling and watershed parameterization for the 34-square-mile Delaney/Archie Creek watershed in east-central Hillsborough County, Florida. Services included comprehensively reviewing relevant data to develop geodatabase for model, developing junction-reach connectivity, verifying storage areas, developing maps, level of service determination, alternative analysis and recommendations, 100-year floodplain delineation, and final report. Model was parameterized, calibrated, and verified with recent storm events. Final report included master plan details and alternative analysis and recommendations. For this project, Mr. Sabeh developed a GIS tool that accesses the model output files and returns shapefiles of pipes with significant hydraulic gradient. The reviewer could then check these areas and determine if the head loss was due to a constriction in the network or something else. The tool was provided to county staff to review other watershed models.
- Project engineer responsible for H&H ICPR modeling and GWIS geodatabase management for the watershed management plan for Trout Creek in Hillsborough County, Florida, based on Southwest Florida Water Management District specifications. Tasks included watershed database generation and review, field reconnaissance and surveying, watershed evaluation and deliverables, surface water assessment inventory and approach development, immediate maintenance evaluation, hydrologic and hydraulic modeling and natural systems evaluation, water quality analysis, and floodplain modeling.
- Project engineer responsible for hydrologic and hydraulic modeling (SWMM) to update the watershed management plan model for the 63-square-mile Pemberton/Baker Creek area watershed in Hillsborough County, Florida. Services include selected ERPs, CIPs, and FDOT plans collection, evaluation and incorporation into the watershed model, geodatabase development, hydrologic and hydraulic data updates, model calibration and verification, level of service determination, alternative analysis and recommendations, development of BMPs, 100-year floodplain delineation, and final report. Final product consisted of integrated GIS/model database to allow users to access updated watershed management information in GIS environment.
- Project engineer responsible for ICPR model update of the Stevenson Creek watershed for expanding Lake Bellevue to provide additional flood storage capacity, creating littoral zone for water quality improvement, roadway drainage improvements, and reconstruction of nearby streets. The lake's outfall structure was modified to control 100-year flood discharge.
- Project engineer responsible for stormwater improvement design and permitting for the Ruskin Commongood Park Stormwater Improvements in Hillsborough County, Florida. Installed a small linear pond to provide water quality treatment and conducted parking lot improvements to alleviate flooding during storms.

Selected Publications and Presentations

Nachabe, M. and Sabeh, D. (2015). "Infiltration in Shallow Water Table Environments: Simple Two-Phase Model Accounting for Air Compression and Counterflow." Journal of Hydrologic Engineering, Vol. 20, No. 10.

James Dozier, PG
Senior Hydrogeologist

HSW Engineering, Inc.

Education

- MS, Hydrogeology, University of South Florida
- BS, Zoology, University of Florida

Fields of Specialization

- Groundwater flow and mass transport modeling
- Saltwater intrusion modeling
- Integrated surface water and groundwater modeling
- Expert witness testimony
- Production and monitor well design and installation
- Statistical and geospatial analysis of data
- Permitting and permit compliance assistance
- Water budget/hydrologic investigations of lakes, wetlands and aquifers
- GIS mapping and analysis
- Hydrologic and water quality data collection
- Aquifer performance testing and analysis

Years of Experience

23

Licensure

PG, FL, #2190

Certificates of Training

40-hour HAZWOPER, 1995 with annual 8-hour refresher courses

Professional Affiliations

Tampa Bay Association of Environmental Professionals

American Institute of Professional Geologists

Summary

Mr. Dozier has hydrogeological and numerical modeling experience in the fields of water resource, environmental assessment, saltwater intrusion, and remediation of groundwater contamination. He has experience in the use of numerical models for wetland assessments, wellfield management, recovery analysis, permitting, and other water resource assessments. He has extensive experience in conceptual model development, setup, data input, calibration, and post-processing of data output MODFLOW and for the integrated surface and groundwater models ISGW and MIKE SHE and the saltwater intrusion models SEAWAT and SWIFT.

Mr. Dozier conducts geological assessments, soil and groundwater sampling and analysis, aquifer testing, and well installation and testing supervision. He has used spreadsheet models to evaluate lake/wetland augmentation scenarios. He has used MODFLOW and ISGW in conjunction with WHPA, WhAEM, and MODPATH to delineate groundwater contribution zones for public supply wells. Mr. Dozier has provided groundwater peer review services for several Water Management District and has provided expert testimony.

Mr. Dozier has performed and analyzed data from slug tests and aquifer tests and is knowledgeable about commonly used well drilling and well development techniques for remediation, testing, and water supply. He has supervised the drilling of exploratory core holes and the installation of numerous surficial and Floridan aquifer monitoring and production wells.

Select Project Experience

Evaluation of Aquifer Test in Marion County and Recalibration of North Central Florida Groundwater Flow Model – St. Johns River Water Management District

- Assisted with the design and evaluation of a long-term aquifer performance test (APT) in Marion County using multiple Floridan aquifer and surficial aquifer monitor wells. The test design and analysis was implemented using a sub-regional APT MODFLOW model of the area. Combined the results of the APT model with nearby historical APT data to recalibrate the regional North Central Florida (NCF) model of the St. Johns River Water Management District.

Peer Review of Northeast Florida Regional Groundwater Flow Model Revision and Expansion – St. Johns River Water Management District

- Conducted a peer review of the revision and expansion of the Northeast Florida Regional Groundwater Flow (NEF) Model for the St. Johns River Water Management District. Evaluated the design, revision, calibration, and documentation of the NEF model. Provided recommendations for improvements in future versions of the NEF model.

Peer Review of Palm Coast and Flagler County Groundwater Flow Model – St. Johns River Water Management District

- Conducted a peer review of the Palm Coast and Flagler County (PCF) Groundwater Flow Model for the St. Johns River Water Management District. Evaluated the conceptual design, calibration, and documentation of the PCF model and provided recommendations for improvements in future versions of the model.

Third Party Review for Punta Gorda Shell Creek RO Wellfield – SWFWMD

- As a subcontractor, provided third-party review to the SWFWMD for the groundwater modeling aspects for the City of Punta Gorda Shell Creek RO Wellfield. Provided comments on the relevant aspects of the groundwater modeling using the District's DWRM3 model for feasibility of the RO wellfield, permitting and APT analysis, addressing the assumptions, methodology, and expected modeling cost and schedule, and/or operations and maintenance for the proposed RO wellfield.

Wellfield Modeling, Permitting and Expert Testimony - City of Titusville

- Provided hydrologic analysis of aquifer test and water quality data using groundwater models. Developed a MODFLOW groundwater model and a variable-density SEAWAT salt-water intrusion model in support of a new wellfield. Models were used to evaluate the environmental impacts and the potential for salt-water intrusion. Provided expert witness testimony in support of client's water use permit during court challenges.

Field Testing and Groundwater Modeling for Aquifer Augmentation Project – City of Tampa

- Two alternatives for the feasibility of beneficial use of reclaimed water to augment the regional potable water supplies were evaluated. The first alternative utilized a MODFLOW groundwater model to assess the feasibility of Rapid Infiltration Basins (RIBS) for aquifer augmentation. For the second alternative, a variable-density transport model was developed using SEAWAT to investigate the feasibility and operations of indirect potable reuse using aquifer recharge and recovery.

Monitoring and Assessment Reports – Tampa Bay Water

- Provided the hydrological data support services for the Cypress Creek and Cross Bar Ranch wellfield annual reports as part of Tampa Bay Water's compliance with the Consolidated Water Use Permit.
    - Hydrologic data assessment and analysis.
    - Statistical analysis including trend analysis and box and whisker plots.

Expansion of East Central Florida Transient (ECFTX) Groundwater Model – SWFWMD

- Expanding the groundwater model for use as the primary analytical tool used to quantify effects of and allocate groundwater withdrawals in the Central Florida Water Management Initiative (CFWI). Provided SWFWMD with MODFLW-NWT files for ECFTX. Tasks included expanding the model grid including implementing model layer thicknesses, prepopulating the grid with appropriate aquifer parameters, identifying other data for inclusion in the model, and compiling calibration target information for groundwater levels.

Scott Emery, Ph.D.
Senior Technical Consultant / Ecologist

HSW Engineering, Inc.

Experience Overview

Dr. Emery's primary areas of technical expertise are in applied ecology (wetlands, uplands, lakes, rivers, estuaries, marine systems); ecological risk assessments; minimizing impacts from water supply development projects; assessing impacts from groundwater withdrawals on lakes/streams/wetlands; resource management; water supply development, treatment, and testing. He is also skilled in professional facilitation services for a variety of resource and habitat issues.

Dr. Emery has over 35 years of professional experience, more than 30 of which are in Florida. Dr. Emery has developed and implemented comprehensive water quality/ecologic/hydrologic monitoring programs for some of the largest wellfield systems in the southeast U.S. He developed and helped to implement a comprehensive monitoring program for portions of Tampa Bay plus three major river systems and many lakes. He has undertaken restoration projects for streams and wetlands, and has developed management plans for large tracts of land. He has also undertaken biological monitoring in over 1,000 wetland and upland systems in Florida. Dr. Emery's expertise in wetlands, lakes, rivers and springs are routinely utilized by three different water management districts (mostly for MFLs work) as well as local governments and certain industries. He has assisted in the development of wetland assessment and monitoring programs for governments, and has undertaken multiple wetland assessments (including jurisdictional wetland work) for clients in the public and private sectors.

Dr. Emery has provided ecological/hydrological/water quality services to a large local Florida government for 19 years running. Services have included: wetland, lake, river, and spring assessments, expert witness services, developing options for mitigation plans/banking. He has done field survey work on hundreds of wetland systems for this client alone. Dr. Emery has won awards for his efforts in the development of resource protection and management plans around the state.

Dr. Emery was the Director of Resource Management/Director of Environmental Services for the West Coast Regional Water Supply Authority. He developed and implemented innovative, state-of-the-art ecologic, hydrologic and water quality monitoring and analytical programs for each wellfield/source of supply designed to identify potential impacts from groundwater production and developing mitigating methodologies (including well rotation and augmentation programs). He developed and directed all activities associated with the Authority's fully certified (DHRS, DER, EPA) analytical testing laboratory. He directed all activities in management of Authority water supply facilities (serving 1 million people) with total asset value of $150 million. He was the Authority's in-house expert on all issues pertaining to matters of ecology and wellfield impacts, water quality, water treatment, and public health considerations.

Fields of Specialization

- Minimum Flows and Levels for Wetlands, Lakes, Springs, Rivers
- Wetland and Stream Restoration
- Water Management District Permitting
- Ecological Risk Assessments/Land and Habitat Assessments
- Professional Facilitation to Multiple Agencies/Organizations on Natural

Professional Affiliations

IES Board of Directors, University of South Florida (USF), 1993-present

Minimum Flows/Levels Committees/Sub-committees, 1996-present

Chairman, FDEP Groundwater Rule TAC, 1996-2000

Visiting Research Professor, USF, 2003-present

Chairman, Environmental Protection Commission Committee on Wetland Rule Revisions 2007-2008

American Water Works Association

Society of Wetland Scientists

Training Courses

Toxicology for Chemists

National Wetlands Inventory and Wetlands Mapping

Pesticides in Groundwater

Gas Chromatography

Principles of Accounting

Essentials of Management/Management Principles

Radiation Safety/Nuclear Soil Gauge Certifications

Wetland Assessment Procedure

Resource Issues

- Assessing Impacts from Groundwater Withdrawal on Lakes/Streams/Wetlands/Springs
- Wetland Ecology and Hydrology
- Water Conservation and Demand Management
- Water Supply Development, Treatment, and Testing
- Water Quality Sampling, Assessment, Analysis
- Wildlife/Ornithological Studies
- Expert Witness Services

Education & Training

- Ph.D., Ecology, Biological Sciences, SUNY at Stony Brook, NY
- M.S., Zoology, Clemson University, SC
- B.A., Biology, Williams College, MA

Sample Project Experience

MFL Method Development

- Wildlife usage on and adjacent to Florida lakes: designed and was the Project Manager for a major multi-year sampling and survey study (birds, amphibians, vegetation, water quality) for the Southwest Florida Water Management District for 30 different lakes ranging in size from 10 acres to greater than 4,000 acres. This project involved identification of multiple species, description of the habitats, and the GPS coordinates of the habitats. Dr. Emery has worked as an expert advisor to the SWFWMD on the development of new possible MFL methods for wetlands.
- Work plan development: Dr. Emery helped to prepare a work plan for the technical assessment and data collection that will support NWFWMD's development of MFLs for Jackson Blue Spring. His primary focus was on a plan to evaluate water resource values relating to aquatic and wetland habitat and recreation in Merritt's Mill Pond and Spring Creek.

Expert Peer Reviewer

- MFLs for Springs and Riverine Systems for Suwannee River Water Management District. Dr. Emery was one of a panel of technical experts and the group's facilitator for examining proposed MFLs for the District. These projects involve springs and river systems. Three separate springs have been examined to date, along with several river segments.

Ecological Risk Assessments

- Involving wildlife (including listed species), streams, wetlands, estuaries, and uplands as these may be impacted by a variety of water sediment and soil contaminants. Ecological investigations and ecological risk assessments (ERA) involving wildlife, fish and "listed species" associated with Work Plans and RFI's for approximately two dozen projects at various locations within Kennedy Space Center and Cape Canaveral Air Station; ERA work for private clients in Titusville, Pinellas Park, Sanford, Temple Terrace and Winter Haven, Florida plus ecological risk work in Milledgeville, Georgia; risk analysis of mercury in a surface water body in Florida for a regional government; sanitary survey for private client in Pasco County; environmental risk assessment for a Florida municipality. In total, these evaluations involved over 100 wetland systems, many species of fish and wildlife, and several water bodies of national priority.

Expert Witness

- Services to state, regional, and local governmental and private interests dealing with wetlands and lakes, water use / consumptive use permitting and water quality issues.

Water Resource / Environmental Advisor

- To Hillsborough County since 1992. During this time, Dr. Emery has been utilized as an expert advisor for multiple water resource, MFL, Water Use Permitting, Land Use Planning, and hydroecologic issues of concern to the County and its Environmental Protection Commission. Dr. Emery has represented the County