

**CITY OF SANIBEL
RESOLUTION 20-004**

**A RESOLUTION APPROVING BUDGET AMENDMENT 2020-009 AND
PROVIDING AN EFFECTIVE DATE**

WHEREAS, the City has an existing consulting services agreement with Delisi, Inc., dated September 9, 2019 to provide services related to water quality; and

WHEREAS, the City has determined that additional services identified in the Scope of Services attached hereto as Exhibit A are needed relating to Lake Okeechobee System Operations Manual modeling; and

WHEREAS, the City of Sanibel desires to amend the fiscal year 2020 budget by \$15,000 to fund these additional services.

NOW, THEREFORE, BE IT RESOLVED by City Council of the City of Sanibel, Florida:

SECTION 1. The revised Beach Parking fund budget for fiscal year 2020, Budget Amendment 2020-009, a true copy of which is attached hereto as Exhibit B and incorporated herein by this reference, is hereby approved and accepted.

SECTION 2. Effective date.

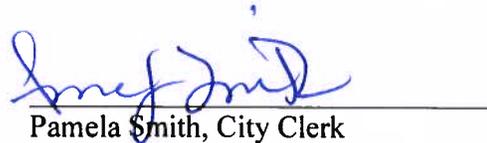
This resolution shall take effect immediately upon adoption.

DULY PASSED AND ENACTED by the Council of the City of Sanibel, Florida this 7th day of January, 2020.

AUTHENTICATION:

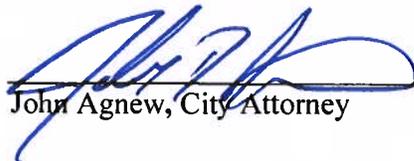


Kevin Ruane, Mayor



Pamela Smith, City Clerk

APPROVED AS TO FORM:



John Agnew, City Attorney



Date

Vote of Councilmembers:

Ruane	<u>yea</u>
Denham	<u>yea</u>
Johnson	<u>yea</u>
Maughan	<u>yea</u>
Smith	<u>yea</u>

Date filed with City Clerk: January 7, 2020

SCOPE OF SERVICES

Lake Okeechobee System Operating Manual (LOSOM) Scope of Services for Independent Modeling Evaluation and Recommendations

Introduction

The U.S. Army Corps of Engineers is in the process of updating the Lake Okeechobee Regulation Schedule (LORS2008). The new lake regulation has been named the Lake Okeechobee System Operating Manual (LOSOM) in order to reflect the inclusion of the anticipated completion of the Herbert Hoover Dike (HHD) rehabilitation and relevant aspects of the Comprehensive Everglades Restoration Plan. LOSOM aims to maximize flexibility in Lake Okeechobee operations, while still meeting the congressionally authorized project purposes. The current LOSOM project schedule is located on page 2 of this document.

The modeling work for LOSOM is being performed by a team of staff from the Army Corps of Engineers and the South Florida Water Management District. The team is currently developing and running sensitivity analyses using the Lake Okeechobee Operations Screening (LOOPS) Model. LOOPS is a hydrologic routing screening model that simulates Lake Okeechobee stages and discharges through the primary outlets as prescribed by a user-defined regulation schedule. The model performs a 46-year continuous simulation (daily time-step) of the hydrology and operations of the water management system over a period of record from 1965-2012.

Project Scope

Lee County, the City of Cape Coral, and the City of Sanibel are stakeholders in the LOSOM process, each of which have representatives that serve on the LOSOM Project Delivery Team (PDT). The partnership of these three local governments is obtaining professional services to independently review, evaluate, and provide recommendations on modeling approaches and parameters used for development of the LOSOM. The consultant team that is being put together is familiar with the models that the SFWMD and Army Corps are using for the sensitivity runs, the creation of performance measures for the environmental systems that are and the future evaluation of a revised Lake Operations Schedule.

Specific tasks include:

1. Evaluation of the model inputs, operational and/or system constraints, sensitivity runs and other screening tools, outputs and model results that will be used to develop the final recommended alternatives.
2. Evaluation of model results with regard to the effect of alternatives on the health of the Caloosahatchee Estuary and Lake Okeechobee.
3. When requested, participation in the LOSOM Plan Formulation and Modeling Sub-Team meetings as a representative of the Lee County, Cape Coral and Sanibel Partnership.

EXHIBIT A

PROJECT TEAM

DeLisi, Inc. will serve as the Project Manager for all three local governments and retain the following consultants for use to complete this scope of work:

Daniel DeLisi

Mr. DeLisi is a water policy consultant based in West Palm Beach, Florida. He serves as an advisor and lobbyist to multiple counties and local governments throughout South Florida on planning and funding for water quality restoration projects, advocacy for State policies that will protect water resources, and support for Everglades Restoration projects. Mr. DeLisi served as the Chief of Staff for the South Florida Water Management District (SFWMD), overseeing the agency's external affairs, all internal mission support functions, real estate acquisition and legislative affairs. Prior to serving as Chief of Staff, Mr. DeLisi served as the Southwest Florida representative on the South Florida Water Management District Governing Board.

South Florida Engineering and Consulting, LLC (SFEC)

Tom Conboy, P.E., President South Florida Engineering and Consulting

South Florida Engineering and Consulting, LLC (SFEC) is an expert team of engineers and scientists with extensive experience providing Environmental Restoration Professional Services throughout the State of Florida. SFEC is unique in that their team includes many staff members who have worked with and for local, state and federal agencies involved with Environmental Restoration in the State of Florida. Most of SFEC's Senior and Lead staff have worked together for more than 20 years on water resource projects in Florida. SFEC's staff are experts in hydrologic modeling, data collection and analysis, permitting, and project ecological goal setting (target setting).

Peter Doering, Ph.D.

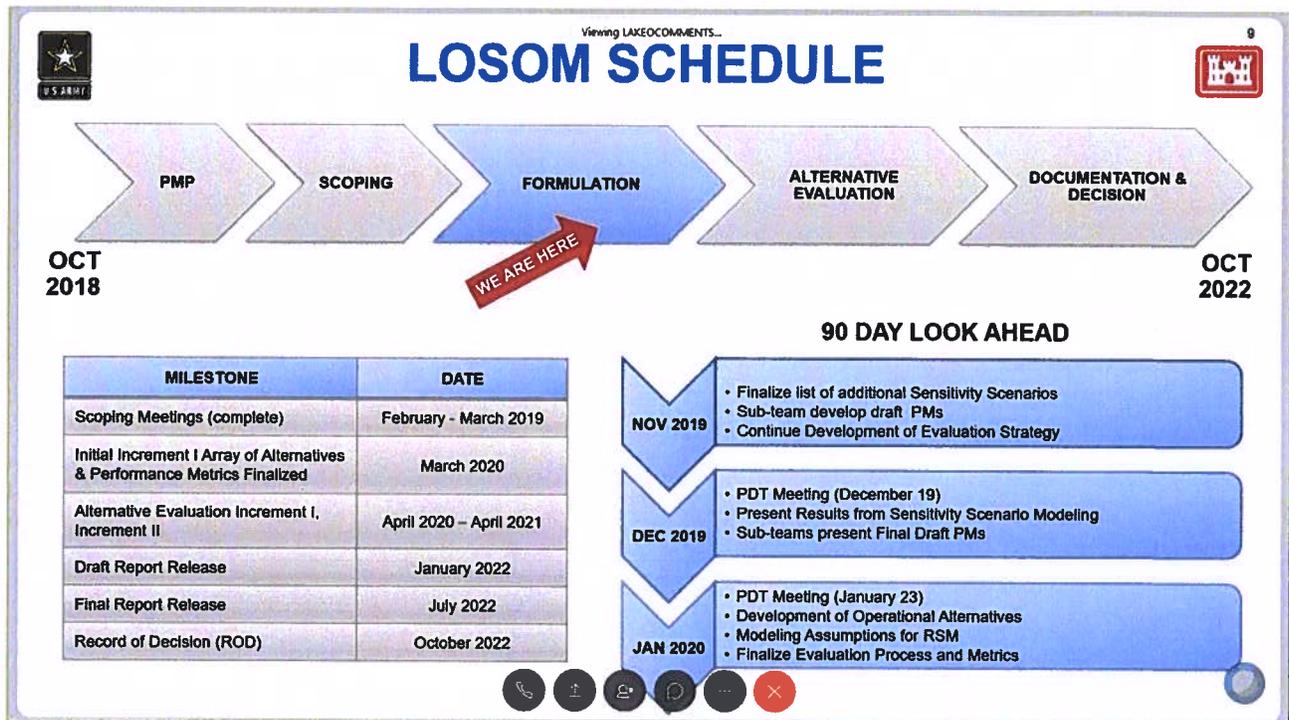
Dr. Doering is the former Section Administrator in the Applied Sciences Bureau at the South Florida Water Management District (SFWMD). At the SFWMD he led a team of estuarine scientists and modelers. The goal of their work was to quantify the responses of estuarine ecosystems to changes in the quality and quantity of freshwater inflow. The results supported comprehensive water resources management and were specifically applied to the development of Minimum Flows and Levels, Water Reservations, Total Maximum Daily Loads, Lake Regulation Schedules and the design and evaluation of Everglades restoration projects.

Over Dr. Doering's 25-year career at the SFWMD he author or Co-authored nearly 100 peer reviewed papers and technical reports on estuaries and coastal ecosystems, with many of those publications specific to the Caloosahatchee. He has also been a presenter at conferences throughout the United States on water quality and estuary ecosystems, often specifically focused on the Caloosahatchee.

Estimated Budget

\$45,000 (\$15,000 per entity)

EXHIBIT A





South Florida Engineering and Consulting LLC

Environmental Solutions through Science and Technology

Our Team of South Florida Engineers and Environmental Professionals for the LOSOM Project includes but is not limited to:

- **Tom Conboy, P.E.**
Principal Engineer/Project Manager
- **Paul J. Trimble**
Applied Hydroclimatologic Researcher
- **Wossenu Abtew, Ph.D., P.E., DWRE**
Principal Engineer
- **M. Zaki Moustafa, Ph.D.**
Principal Modeler/Scientist
- **Andrew D. Gottlieb, Ph.D.**
Environmental Engineer / Draftsman
- **Christopher McVoy, Ph.D.**
Lead Environmental Scientist/Hydrologist / Biologist



We are a registered **Federal Contractor** and **Certified Small Business** in the United States Governments **SAM** database and a **Certified Small Business Enterprise** with the **South Florida Water Management District** and the **City of West Palm Beach** that will bring to your project: Florida certified Professional Engineers; knowledgeable Water Resources Professionals; skilled H&H Modelers; experienced Program and Project Managers; world-class Field Researchers; prolific Scientific and Technical Writers; a wealth of GIS experience; critical thinking and other skills to ensure delivery of your project on time, within budget and that meet or exceed stakeholder expectations.



South Florida Engineering and Consulting LLC

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The South Florida Engineering and Consulting Team expertise includes:

- **Engineering**
 - Hydrology and Hydraulic Modeling
 - Water Quality Modeling
 - GIS
 - AutoCAD
 - Paving and Drainage Plans
 - Design of Restoration Projects
 - Stormwater Master Plans
 - Flood Studies/Watershed Studies
 - Climate and Rainfall modeling and analysis

- **Permitting**
 - Environmental Impact Statements/Environmental Assessments
 - PD & E Studies (FDOT Preapproved for Small Projects)
 - Environmental Resource Permits
 - Water Use Permits
 - Dewatering Permits
 - Phase I and II Site Environmental Assessments

- **Environmental**
 - Watershed Studies
 - Habitat Restoration
 - Water Quality Monitoring and Evaluation
 - Stormwater Treatment
 - Ecohydrology
 - Habitat Assessments /Evaluation of Ecosystem Structure and Function
 - Impact Assessment and Minimization
 - Experimental Design
 - Landscape Ecology
 - T & E Species Evaluations
 - Floristic Surveys
 - Periphyton/Algal Taxonomy
 - Performance Measure Development and Application
 - Scientific Peer Review



Our Team integrates the fields of Engineering, Biology and Planning to bring our clients Environmental Solutions through Science and Technology.



South Florida Engineering and Consulting LLC

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Thomas V. Conboy, P.E.
Principal Engineer / Project Manager



Mr. Conboy is the President and Principal Engineer of South Florida Engineering and Consulting LLC. An internationally-experienced Professional Engineer and Project Manager, he advised the Water Sanitation and Hygiene Program in Kenya; and led the initiative to develop a geospatial database. His accomplishments include sizing reservoir storage and optimizing operations for the C-44, Ten Mile Creek and C23/24 Reservoirs/STA's for the IRL South component of CERP. Mr. Conboy served as Project Manager for the Loxahatchee River Preservation Initiative in Florida. He provided engineering support, performed hydrologic modeling, and developed stage-flow curves for the Restoration Plan for the Northwest Fork of the Loxahatchee River.

[Relevant Experience: 25 years]

Education

Bachelor of Science
 Environmental
 Engineering
 University of Florida

Registration

Professional Engineer

Leadership

NSPE Vice Chair of
 Professional Engineers in
 Construction Executive
 Board

Principal Engineer

South Florida Engineering and Consulting LLC

- **SFWMD Work Order.** Review and edit Stormwater Treatment Area 1 East G-716 Divide Structure Design and Technical Specifications. Worked with Dr. Checks to resolve comments and issues.
- **SFWMD Work Order No: 460003017-WO8.** Determination of future rainfall frequency estimates for planning flood protection projects. Reviewed rainfall frequency approaches in South Florida and made recommendations to SFWMD for their Level of Service modeling inputs.
- **East Lake Tohopekaliga Environmental Impact Statement.** Directed the NEPA process and development of the EIS. Provided project management and engineering support.
- **Corbett WMA Hydrologic Assessment.** Direct restoration and management strategies to reestablish sheet flow and rainfall-driven hydroperiods to improve terrestrial and aquatic habitat function of 94 square mile water management area. Project Budget: \$600,000.
- **Bonita Springs Woodchip Bio-Reactor Pilot Project.** Oversee chemical and biological summaries, and implement Everglades West Coast Basin Management Action Plan pilot project to improve Imperial River water quality. Project Budget: \$84,000.
- **Determination of Future Rainfall Frequency Estimates for Planning Flood Protection Projects for SFWMD.** Directed the investigation of projections of future extreme rainfall to provide recommendation for an update of methodology for estimating design rainfall for current and future conditions.
- **Dinner Island Ranch WMA Hydrologic Assessment.** Directing the development of restoration strategies and management activities that reestablish sheet flow and rainfall driven hydroperiods in order to improve the function of both terrestrial and aquatic habitats within the 34 square mile water management area. Project Budget: \$300,000.



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- **Indian River Lagoon Stormwater Capture and Treatment Project Development and Feasibility Study for SJRWMD.** Directing the efforts intended to reduce nutrient and sediment discharges to the estuarine systems, and where feasible, restore the historical flow of waters currently being diverted east to tidal systems with emphasis on Martin and St. Lucie Counties.
- **FEMA 2013 Flood Insurance Rate Maps (FIRM).** Collaborate on review and analysis of preliminary Village of Tequesta FIRM.
- **Broward County Stormwater Recertifications.** Manage Phase I Environmental Site Assessments.
- **Expert Witness.** Provide expert testimony in Hydrology, Water Resources and Environmental Restoration for Cowbone Marsh.

Senior WASH Advisor

CARE Kenya, Department of Water Sanitation and Hygiene

- **Refugee Camp Advisor.** Advise two camps with 485,000 refugees in Dadaab, Kenya. Oversee 14 water supply boreholes (150 meter depth) with pumps and generators, and 21 elevated steel tanks. Lead development of Geospatial Database using PostgreSQL. Launch Geo-Information Users group for information sharing among non-governmental agencies.

Project Manager

Palm Beach County Environmental Resources Management

- **Pal-Mar Basin Project.** Manage modeling contract for 230-acre hydrologic restoration project. Determine pre- and post-project surface water flows, groundwater flows, and water quality.
- **Northlake Boulevard Bridge.** Manage tri-party agreement to construct a bridge over Grassy Waters Preserve to provide a more natural flow of water, and pedestrian, canoeing, and wildlife crossings. Manage \$1.5 million FDEP grant for project.
- **FDOT Projects.** Design multi-use trails, pedestrian bridge and public use facilities for projects totaling \$1.2 million.

Project Manager and Staff Engineer - Coastal Ecosystems Division

South Florida Water Management District

- **Loxahatchee River Preservation Initiative.** Manage over 45 projects totaling over \$26 million to improve and protect river and watershed natural resources. Coordinate among 11 state and local government entities and non-profit entities.
- **CERP Indian River Lagoon Project.** Co-chair of the Modeling Sub-Team for the IRL South Project Implementation Report. Provide hydrologic and water quality for use in OPTI-5 Reservoir Operation Optimization Model and Water Quality Analysis.
- **Martin and St. Lucie Stormwater Retrofits.** Manage three urban stormwater retrofit totaling over \$1 million in grant monies.
- **Basin Studies.** Manage Hydrologic and Hydraulic Modeling.



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Paul J. Trimble **Applied Hydroclimatologic Researcher**



Mr. Trimble is a pioneer in regional hydrologic development and applications for South Florida. He is noted for his work on the application of climate research for more efficient operational rules and water resources planning. Mr. Trimble has developed regional hydrologic models for central and southern Florida. He has applied models for the development of efficient multi-objective regional operational rules including the incorporation of inter-annual to multi-decadal climate variability. He is experienced in applying models for long term water resources planning including the challenges of climate change and sea level rise.

[Relevant Experience: 39 years]

Education

Master in Water
Resources Engineering
Florida Atlantic
University, 1995

Dynamic Meteorology
Florida State University,
1977

Bachelor in Meteorology
University of
Massachusetts, 1975

Applied Hydroclimatologic Researcher

South Florida Engineering and Consulting, LLC

- Determine future rainfall frequency estimates for planning flood protection projects for **SFWMD**. Investigate the projections of future extreme rainfall from various sources and literature. Provide recommendation for an update of the design rainfall for the current and future conditions. Provide methodology for estimating design rainfall for future conditions.

Applied Hydroclimatologic Researcher

South Florida Engineering and Consulting LLC

- **SFWMD Work Order No: 4600003017-WO8**. Determination of future rainfall frequency estimates for planning flood protection projects. Reviewed rainfall frequency approaches in Florida and made recommendations to SFWMD for the Level of Service modeling inputs. Investigated the projections of future extreme rainfall from various sources and literature, provided recommendation for an update of the design rainfall for the current and future conditions and provided methodology for estimating design rainfall for future conditions.
- **SFWMD Work Order No: 4600003017-W11**. Supplemental Hydrologic Modeling Support for Interagency Modeling Center (IMC). Worked with agencies such as US Army Corp of Engineers and SFWMD in collaboration on regional modeling. Developed the regional special rainfall datasets for modeling for the Caloosahatchee Watershed.

Principal Engineer

South Florida Water Management District

- **Regional Hydrologic Model Development**. Early contributions focused on regional hydrologic model development and applications. The South

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Florida Regional Routing Model (SFRRM; Trimble, 1986) and contributions to the development of the South Florida Water Management Model (SFWMM) are the most well-known of these models. The SFRRM was the predecessor of the SFWMM; many of the operational rules and the methodology for the simulations of the structure operations were acquired from the earlier model.

- **SFWMM Model Algorithm Development.** Develop additional SFWMM algorithms, including: canal mass balance iterative scheme; levee seepage algorithm; and many of the structure operational rules for gate openings and discharge capacities. Develop operational regional rules for the South Florida regional hydrologic system including operational schedules for Lake Okeechobee and the Water Conservation Areas. Lead efforts to develop the Run25 operational. This temporary schedule was designed for the benefit of the St. Lucie and Caloosahatchee estuaries but recognized that further refinement was needed for the Lake littoral zone.
- **Lake Okeechobee Water Supply Littoral Zone Refinement.** Complete refinement for the littoral zone with development of the Water Supply and Environmental (WSE) schedule and incorporation of climate outlooks.
- **Atlantic Ocean Multi-Decadal Shifts.** Apply climate outlooks towards more proficient operational and water resources planning. Identify the link between multi-decadal shifts in the Atlantic Ocean thermohaline current [now known as the Atlantic Multi-decadal Oscillation] to meteorologic and hydrologic records in south Florida - a landmark finding in the understanding of the importance of the Atlantic Ocean thermohaline current variations to Florida and global climate variability. Reference and verify this relationship peer-reviewed national and international journals. Include the relationship between the AMO and that of the El Nino-Southern Oscillation in the SFWMM Lake Okeechobee operational decision trees.
- **Climate Outlooks for Operational Planning.** Apply climate outlooks within the South Florida Water Management Model in Position Analysis for Operational Planning. Co-author refereed articles on climate variability and its application to water resource and operational planning. Co-author American Society of Civil Engineers document: "Climate Variations, Climate Change and Water Resources Engineering". Evaluate the challenges that climate change and sea level rise will have on operational and long-term water resources planning.



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Wossenu Abteu, Ph.D., P.E., DWRE

Title: Principal Engineer



Dr. Abteu is a registered professional civil engineer and a certified water resource engineer by the American Academy of Water Resource Engineers. He worked in the field of water resources for 30 years and is a trained agricultural engineer and hydrologist. At SFWMD, he served as a principal engineer whose expertise included STA design review, operation plan development, hydrology and water quality monitoring, permit development and compliance reporting, wetland mitigation reporting, water budget analysis and treatment performance analysis, where a series of reports and technical papers are published. Dr. Abteu has a thorough knowledge of South Florida hydrology and the water management system and has analyzed and documented the region's annual hydrology and water management since 2004 through, droughts, floods and hurricane impacts.

Education

Post-Doctoral research at
University of Florida

Ph.D.

Interdisciplinary Engineering

Texas Tech University

Master of Science

Agricultural Engineering

Texas Tech University

Bachelor of Science

Agricultural Engineering

Haile Selassie University

Ethiopia

Registration

Professional Engineer

Certification

Certified Water Resources

Engineer (D.WRE) by

American Academy of Water

Resources Engineers

Professional Membership

ASCE

ASABE

The Everglades Stormwater Treatment Areas (STAs)

- STAs design reviews, seepage study, hydrology and water quality monitoring network design.
- Analysis and publications on water budget, treatment performance, permit reports and wetland mitigation analysis.
- Worked on a restoration strategy science project and reviewed other project deliverable and provide input.

Hydrology and Water Management

- Analysis and publication of South Florida regional hydrology and water management in a chapter in the annual South Florida Environmental Report (2004-2018).
- South Florida monthly regional and rainfall frequency analysis and publication of reference tables; spatial rainfall analysis with field study; EAA water budget and drainage study; extreme hydrology analysis; ET field study and method development; Lakes and water bodies water budget.
- Developed hydrologic data quality assurance process currently in use in SFWMD.
- Evaluate NEXRAD rainfall data quality and application.
- Climate teleconnection and regional hydrology – developed ENSO (El Nino/La Nina) relations to South Florida region and Blue Nile basin hydrology (journal papers and book chapters published).

Hydrologic System Modeling

- Supervise system project model application in the 1990s; apply WGEN weather data generation model and developed use of synthetic data.
- Co-developed the original grid rainfall input generation for the South Florida water Management Model, Water Budget Program, ETcalc model, EAA Makeup Water Model.

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- Dam design analysis, hydropower generation evaluation and reservoir simulation analysis for the Grand Ethiopian Renaissance Dam in Ethiopia (book published).
- Reviewed and provided input into the UF-IFAS groundwater modeling project in C-111 basin.
- Analyzed maximum design flow for S65EX1; conducted field A-1 FEB seepage study.

Northern Everglades CERP and Other Projects Design Review

- Coordinate Water Quality Bureau design review for CERP projects and provide and compile comments (C-44 Reservoir, Lake Side Ranch STA, Southern Corkscrew Restoration DDR, C-23/25 STA-Reservoir, EAA Reservoir PMP, Ten Mile Creek Reservoir/STA, Estero Bay Watershed Assessment Phase II, DECOMP project).
- Lake Okeechobee Watershed Project PDT member.
- Participate in RECOVER project and contribute hydrology section to the 5-year system report to Congress.
- Developed research plan for Everglades Agricultural Area BMPs evaluation as part of the Everglades restoration program.

Expert Witness

- Testified as expert witness on water quality, hydrology and water management of the Loxahatchee National Wildlife Refuge in USA vs SFWMD Lawsuit Case No. 88-1886-Civ-Moreno (2011).
- Expert witness on Everglades Agricultural Area water budget (1993).

Water Quality

- Evaluated performance of various water quality sampling methods and published results.
- Developed auto-sampling method for collecting representative samples from variable flow canals and method is applied in SFWMD water quality monitoring program for regulatory compliance.
- Analyzed particulate fraction of total TP in EAA runoff and publish results.
- Analyzed relations between inflows, inflow TP concentrations and Loxahatchee wildlife refuge marsh TP concentrations as expert witness in court case.
- Produced permit reports with hydrologic and water quality data evaluation for permit compliance.



South Florida Engineering and Consulting LLC

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M. Zaki Moustafa, Ph.D. **Principal Modeler / Scientist**



Dr. Moustafa is an expert in hydrodynamic and water quality modeling, WQ science (including data analysis and modeling), water resources engineering, environmental science and wetland ecology, restoration science, and modeling studies. He applied models (e.g., EFDC, ICM-CEQUAL, HSPF and BASINS) to a gamut of projects requiring EIS, EA and specialized experience (e.g., water quality, sediment transport, Florida Bay, Biscayne Bay, and Lake Okeechobee). He applied hydrodynamic and WQ models for mixing zone permits, TMDL and regulatory compliance evaluation. Dr. Moustafa assisted the US EPA in modeling Gulf of Mexico oil and gas discharge activities; evaluated environmental impact under new regulations; analyzed large databases; and provided the methodology now is used to determine and evaluate phosphorus removal efficiencies in large constructed wetlands. [Relevant Experience: 35 years]

Education

Ph.D. Oceanography,
Hydrodynamic & Water
Quality Modeling
Virginia Institute of
Marine Science (VIMS),
School of Marine
Science, College of
William & Mary

Youth Sports

22-years as a volunteer
soccer Coach for the
American Youth Soccer
Organization (AYSO)
and seven years soccer
coach for special needs
Children (VIP) in West
Palm Beach.

Principal Scientist

South Florida Water Management District

- **Hydrologic and Environmental Systems Modeling (HESM).** Developed field scale (large and small) research programs to determine vegetation resistance and internal hydraulics in large constructed wetlands. The main focus of our approach is to send pre-selected discharge waves with pre-selected frequencies and amplitudes through large STAs and small (~two acres) wetlands, monitor pressure changes in the interior, and determine vegetation resistance as a function of water depth and plant density; the first of its kind, particularly for the large-scale experiment.
- **SFWMD Office of Modeling, Florida Bay Freshwater Impact Analysis (EFDC Model):** The goal of this project was to determine how freshwater inflow to Florida Bay (FB) impacts material distributions (e.g., salinity & nutrients), and determine the impacts of freshwater contributors (Taylor Creek, Shark River Slough, and Rainfall) on salinity distributions within the bay as well as other parameters (DO, Temperature, Nutrients).
- **SFWMD, Office of Modeling.** Develop hydrologic, hydrodynamic, water quality and ecological modeling tools,
- Conduct Technical Peer Reviews of newly developed models (RSM and NSRSM) and prepare model documentation,
 - Conduct model code validation, select analytical solution comparisons and model verification tests for each model type. Document model verification and validation results.
 - Prepare model documentation (code architecture design documents, user's manuals, tutorials, implementation manuals, and conduct model training).
 - Select external panel members and conduct independent peer review, including workshops; review documents and prepare responses to technical issues.

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- **SFWMD, Office of Modeling.** Provide District-wide technical guidance for model development and requirements, including:
 - Biscayne Bay Coastal Wetland and C-111 Basin (WASH123D);
 - Loxahatchee River 3D Integrated Surface and Groundwater Model
 - TIME/SICS, EFDC, and HYCOM models (FBFKFS)
 - FATHOM
- **SFWMD, Office of Modeling.** Establish and select a library of models for District use and applications,
 - Develop a standardized methodology to develop, implement, and apply models to all projects,
 - Establish a process to review statements of work, contract deliverables, and expert peer review for model development, documentation, and application,
 - Develop infrastructure to support customer service, productivity, quality, documentation, model development and maintenance, and
 - Implement a process to improve staff capabilities through training plans, recruitment of talented modelers, mentoring, and coaching.
- **SFWMD Office of Modeling, River Of Grass Phase I and II (Everglades Restoration):** Perform water quality (total phosphorus; TP) evaluations and sensitivity analysis; evaluate water quality performance and hydraulic loading rates of water quality treatment features. Develop water quality modeling tools including Unit model and 1-dimensional transport water quality model to evaluate selected configuration and water quality conditions. Applied DMSTA to all test cases and developed a five-year DMSTA STA hydrology and water quality bench mark.
- **Tetra Tech, Inc. Indian River Lagoon Salinity & Transport Model (EFDC).** Developed and applied a 3D hydrodynamic and salinity transport model to the Indian River Lagoon, to determine fresh water impacts on salinity distribution and hard-shell clams during wet and dry seasons.
- **Tetra Tech, Inc. Bird River Water Quality Model (WASP)** Developed and applied the 3D hydrodynamic and water quality models to Bird River Estuary. The 3D-WASP5 receiving water model was linked to a watershed model, which provided nutrient and sediment loading data.
- **Technical Reviewer, University of California at Davis & the California Bay-Delta Authority Science Program (2004-2015):** Technical reviewer for University of California at Davis and the California Bay-Delta Authority Science Program to evaluate proposals addressing water quality network, Ecosystem response to restoration, wetlands monitoring, and wetland modeling of flow/transport.



South Florida Engineering and Consulting LLC

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Andrew D. Gottlieb, Ph.D.

Lead Environmental Scientist / Biologist



Dr. Gottlieb is a nationally-recognized professional scientist who has managed, designed and implemented coastal and wetland water quality studies throughout Florida. Dr. Gottlieb published his research on the effects of hydroperiod and nutrients on the structure and function of Everglades periphyton and plant communities. His peer-reviewed work has appeared in *Aquatic Botany*, *Hydrobiologia* and *Ecological Indicators*. Dr. Gottlieb also coauthored the book *Microbiology of the Everglades Ecosystem*. He has developed quantitative tools used to evaluate and model hydrology, water quality and vegetation patterns for the \$11.9 billion Comprehensive Everglades Restoration Plan.

[Relevant Experience: 20 years]

Education

Ph.D.

Biology and Aquatic Ecology

Florida International University

Master of Science
Environmental Science
and Agricultural Ecology
Washington State
University
Pullman, Washington

Bachelor of Science
Biology and
Environmental Studies
George Washington
University

Senior Environmental Scientist / Biologist

South Florida Engineering and Consulting LLC

- **East Lake Tohopekaliga Environmental Impact Statement.** Developed the Listed Species Biological Assessment for submission to USFWS. Provided expertise in water quality and ecology to refine project alternatives. Conducted project alternative affects analysis for water quality, wetlands, and fish and wildlife.
- **J. W. Corbett WMA Hydrologic Assessment.** Conduct ecological assessment of the flatwood, marsh, prairie and cypress mosaic within the WMA. Evaluate hydrologic optima and develop recommended hydroperiod targets for WMA habitats. Develop targets based on field assessment of habitat and plant/hydroperiod indicator elevations and soil profiles (peat depths and elevation). Develop hydro-ecological performance measures to evaluate potential of management measures to improve ecological health of WMA upland and wetland habitats.
- **Bonita Springs Woodchip Bio-Reactor Pilot Project.** Evaluate the potential for using woodchip denitrifying bioreactors to reduce nitrate concentrations within the Imperial River Watershed. Literature review, characterization of the potential for implementation in variable site conditions, water budgets and nitrate treatment estimates.
- **Dinner Island Ranch WMA Hydrologic Assessment.** Analyze the development of restoration strategies and management activities that reestablish sheet flow and rainfall driven hydroperiods in order to improve the function of both terrestrial and aquatic habitats within the 34 square mile water management area. Developed performance measures for hammock and depressional wetland communities. Conducted field assessments. Conducted research (aimed at restoration of pasture to wet prairie habitat) comparing the effects of inundation duration on native and exotic seed germination rates.

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Senior Environmental Scientist

CECOS

- **State Road 710 Environmental Assessment/Project Development and Environmental Study/Permitting.** Evaluate wetland mapping and design components to identify habitat and species concerns and minimize construction effects. Evaluate wetlands, sheetflow, hydrology and potential animal crossing locations. Develop NEPA documentation including Wetland Evaluation Report and Endangered Species Biological Assessment.
- **Lake Worth Lagoon Benthic Habitat Surveys.** Evaluate seagrass distribution and cover in the central lagoon, with particular concern for the threatened seagrass *Halophila johnsonii* to inform operations and policy aimed at protecting the fragile lagoon/estuarine ecosystem.
- **Wood Stork Roadside Habitat Utilization Study.** Evaluate morphology and plant community structure of roadside water features in urban, wetland and agricultural land cover classes. Couple characterization of habitat with water feature fish biomass and wood stork presence absence data to understand the effects of roadside water features on distribution and abundance of wood storks. Data also used to evaluate the US FWS Wood Stork Core Foraging habitat mitigation methods and assumptions.

Lead Environmental Scientist

South Florida Water Management District

- **Comprehensive Everglades Restoration Plan Research / Statistical Designs.** Evaluate landscape vegetation patterns, hydrology and water quality concerns. Develop monitoring design for the Greater Everglades Ridge and Slough landscape. Develop quantitative tools to post-process hydrologic model output to better understand expected ecological responses associated with restoration alternatives.
- **Benthic Habitat Surveys.** Conduct surveys to characterize animals and plants of the Caloosahatchee River Watershed and Estero Bay Estuary.

Senior Scientist / Senior Project Manager

Post, Buckley, Schuh & Jernigan, Inc. (PBS&J)

- **SJRWMD, Wekiva Springs Watershed Hydrology and Water Quality Project.** Design and implement scientific studies on algal community structure.
- **U.S. Army Corps of Engineers Evaluation of Everglades Restoration Projects.** Provide support including benefits to water quality and vegetation patterns for the Broward County WPA and Biscayne Bay Coastal Wetland projects.

Ph.D. Candidate Florida International University

- **Research Assistant.** Assess effects of phosphorus additions and hydroperiods on periphyton mat community structure and function.
- **Kissimmee River Vegetation Mapping Project.** Hyperspectral Radiometry ground-truthing in support of vegetation mapping

30 South M Street, Lake Worth, Florida 33460

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South Florida Engineering and Consulting LLC

Environmental Solutions through Science and Technology

Christopher W. McVoy, Ph.D.

Lead Environmental Scientist / Hydrologist / Biologist



Dr. McVoy is a noted eco-hydrologist, Everglades expert, author, and empiricist trained in systems analysis and simulation modeling. He is experienced in remote sensing, historical and modeling research, and the ecosystems and hydrology of South Florida. Dr. McVoy authored *Landscapes and Hydrology of the Predrainage Everglades*, the definitive characterization of the pre-drainage hydrology and ecology of the Everglades. His work has been published in *Ecological Economics*, *Agriculture, Ecosystems and Environment*, and other peer-reviewed journals. He maintains a geomorphology program in Water Conservation Area 3-A.

[Relevant Experience: 26 years]

Education

Post-Doctoral
Systems Ecology
Technical University of
Braunschweig, Germany

Ph.D.
Soil Physics
Cornell University,
Ithaca, New York

Master of Science
Soil Physics
University of Florida,
Gainesville, Florida

A.B.
Biology / Systems
Ecology
Cornell University,
Ithaca, New York

Senior Hydrologist

South Florida Engineering and Consulting LLC

- **East Lake Tohopekaliga Environmental Impact Statement.** Developed the Biological Assessment for UFWS and provided environmental expertise in water quality and ecology for the NEPA process and development of the EIS.
- **Bonita Springs Woodchip Bio-Reactor Pilot Project.** Analyze peer-reviewed and gray literature on woodchip bio-reactors to evaluate feasibility and develop design of C-enriched, anaerobic reactors to remove nitrate-N from stormwater runoff for the Everglades West Coast Basin Management Action Plan.
- **Corbett WMA Hydrologic Assessment.** Analyze the restoration and management strategies to reestablish sheet flow and rainfall-driven hydroperiods to improve terrestrial and aquatic habitat function of 94 square mile water management area.
- **Dinner Island Ranch WMA Hydrologic Assessment.** Analyze the development of restoration strategies and management activities that reestablish sheet flow and rainfall driven hydroperiods in order to improve the function of both terrestrial and aquatic habitats within the 34 square mile water management area.

Consultant

U.S. Department of Interior

- **Central Everglades Protection Plan.** Prepare and present technical material in support of fast-tracked U.S. Army Corps of Engineers Central Everglades Planning Policy.



South Florida Engineering and Consulting LLC

Environmental Solutions through Science and Technology

City Commissioner

City of Lake Worth, Florida

- **Elected Official.** Served four terms. General fund annual budget: \$150 million.

Senior Environmental Scientist

South Florida Water Management District

- **Book: Landscapes and Hydrology of the Predrainage Everglades (University Press of Florida, 2011.).** Lead multi-year, interdisciplinary research effort characterizing the Everglades of the 1800s, prior to human constructed compartmentalization and drainage. Research and write book on predevelopment ecohydrology. Perform field and remote sensing research of hydrology, geomorphology and landscape ecology. Synthesize historical observations with soil, water and vegetation data to develop a spatially explicit reconstruction of predevelopment conditions. The resultant book was published in 2011 by University Press of Florida and forms the basis for regional hydrologic models. Budget: \$110,000.
- **The Role of Flow in the Everglades Ridge and Slough Landscape, Science Coordinating Team Paper.** Co-author a critical paper that shifted the focus of hydrologic restoration from water depths to the actual movement of water. Demonstrate the link between absence of flow and loss of characteristic Everglades vegetation and geomorphology.
- **Predrainage Hydrology of the St. Lucie Watershed, Estimated from Historical Sources.** Reconstruct the predevelopment hydrology of the wetland/upland mosaic originally present in the St. Lucie watershed to support regional modeling of surface and groundwater behavior and set minimum flows for the St. Lucie River and Estuary.
- **Monitoring Water Flow and Sediment in the Everglades.** Use robotics and specialized field instrumentation to identify causal relationships between: environmental drivers, including temperature, flow, wind, and rainfall; water transport of flocculent organic material; and preservation of characteristic Ridge and Slough landscape morphology. [See: www.ridgeandslough.org]

Staff Scientist

Environmental Defense Fund

- **Regional Hydrologic Model Validation.** Validate a regional hydrologic model of the Everglades by synthesizing soil, vegetation, surveying and historical data. Develop supporting research for Everglades Minimum Flows and Levels. Advise Governor's Commission for a Sustainable South Florida.

