Qualifications Summary

- Experience applying numerical models to support studies for coastal restoration and coastal protection projects including hurricane storm surge simulations
- Experience developing large finite element grids for parallel ADCIRC simulations
- Strong background knowledge of coastal processes and coastal hydrodynamics
- Strong written and verbal communication skills
- Knowledge of high performance computing concepts and parallel programming experience using MPI and OpenMP
- Numerical model experience with EFDC, ADCIRC, PADCIRC, RMA2, HEC-RAS, CORMIX, StormCAD
- Programming experience with MATLAB, SCILAB, FORTRAN, C

NATHAN DILL, M.S.C.E., B.A.

Coastal Engineer

Professional Affiliations

Associate Member, Association of Coastal Engineers (ACE)

Fields of Expertise

Conducting numerical modeling efforts for the simulation of hydrodynamics and water quality in the coastal environment and selecting the appropriate model software for the job, Applying and developing tools with various software and programming languages to support model development and meaningfully present model results, Utilizing high performance computing and parallel programming to increase performance of numerical models and related data analysis.

Higher Education

M.S.C.E., Louisiana State University (2007)
B.A., Physics-Bowdoin College (2002)
Passed Fundamentals of Engineering Exam (2008)

Employment History

2007-Present	Coastal Engineer, Woods Hole Group
2006-2007	Coastal Scientist, URS Corp
2004-2007	Research Assistant, Louisiana State University
2002-2004	Physics Teacher, Northfield Mount Hermon

Key Projects

Herring River Estuary Restoration Project, Wellfleet, MA, Town of Wellfleet – Coastal Engineer/Modeler
Currently Conducting a numerical modeling program to support planning for restoration of over 1000 acres of wetland within the Herring River Estuary in Wellfleet, Massachusetts; the largest Estuary on Cape Cod. After evaluating the potential application of over twenty different hydrodynamic models, the Environmental

Key Projects (continued)

Fluid Dynamics Code (EFDC) was chosen as the most suitable model for the project. The modeling program included the development of a large curvilinear-orthogonal grid, calibration and verification of the model for simulating hydrodynamics and salinity throughout the estuary, simulations of various alternatives for the restoration of tidal exchange to the estuary, and support for the design of engineering structures for restoration. This large complex system contains more than a dozen hydraulic control structures (dikes, culverts, sluice gates, flap gates) and a vast floodplain making the modeling effort particularly difficult. Significant enhancements were made to the EFDC code to overcome these difficulties including: developing a multi-threaded version of EFDC with OpenMP to decrease simulation time. Developing subroutines for explicitly calculating flow through various control structures (sluice gates, flapper gates, box culverts, pipe culverts), enhancing the GEFDC grid generation code to account for aspect ratio control and sliding boundary points making it possible to generate a nearly orthogonal grid covering over 1000 acres with resolution down to 2 meters using only 85,000 cells, and modifications to the wetting/drying code to aid in simulating smooth flooding and draining of the vast inter-tidal zone in the estuary.

Sengekontacket Pond ENF/EIR, Town of Edgartown, Massachusetts – Coastal Engineer/Modeler
Performed data analysis for bathymetric and water-level data collected by Woods Hole group for the project. Used the collected data to construct and calibrate a RMA2 model of Sengekontacket and Trapps ponds to simulate tidal circulation.

Feasibility Analysis of Alternate Discharge Locations for Reverse Osmosis Water Treatment Plant in Melbourne, FL. Reiss Environmental Inc - Coastal Engineer/Modeler
Assessed the feasibility of increasing the discharge volume and relocating the outfall for Reverse Osmosis (RO) concentrate produced by the Melbourne RO water treatment plant. Concerns of negative water quality impacts at times of low flow at the current outfall in the Eau Gallie River and increased demand for potable water in the City of Melbourne have led to the desire to find a more suitable discharge location for the RO concentrate produced by the plant. Both the Indian River Lagoon and the Atlantic Ocean were considered as alternatives. Data collected from previous studies were used to determine the necessary mixing zone sizes that would be required to meet Florida water quality standards for the radio-nucleotides combined radium (226/228) and gross alpha, and potential for acute toxicity was assessed by examining the bulk dilution. Different diffuser designs, including a single port and a multi-port diffuser were considered for each location.

Assessing Baseline and Modified Astronomical Tide Propagation in the Pontchartrain Basin Using ADCIRC, LA – Graduate Assistant (work conducted as a research assistant at Louisiana State University under the direction of Clinton Wilson and Bob Jacobsen for URS Corp. under contract to U.S. Army Corp of Engineers). Developed a large finite element mesh (~300,000 nodes) for a parallel ADCIRC model of the Lake Pontchartrain basin. Executed model simulations and performed pre and post processing of model data. The model was developed to evaluate the potential impact on tidal circulation within the Pontchartrain basin

Key Projects (continued)

caused by the introduction of barrier structures for storm protection and hydrologic restoration. Astronomical tides were simulated in the basin and resulting tidal amplitudes and currents were examined to demonstrate the relative effect on tidal circulation caused by alternative restriction scenarios of major tidal passes.

Mississippi River Re-introduction into Maurepas Swamp, Reserve, LA – Coastal Scientist (completed while working for URS Corp.) Performed pre and post processing for parallel ADCIRC simulations of a proposed Mississippi River diversion into the Maurepas swamp. Developed a particle tracking code (in SCILAB language) to aid in steady-state flow field visualization and estimation of median residence time of diverted water. Performed mesh modifications to calibrated model to add the proposed diversion channel then conducted various simulations with further modification to maximize distribution and residence time of diverted water. Simulations were also conducted to evaluate the potential effect of the diversion on the drainage of nearby communities whose storm water drains into the swamp. For this evaluation output from a SWMM model of the drainage network was used to provide boundary conditions for the ADCIRC model and vice-versa in an iterative fashion to simulate a rainfall event.

Publications

Dill, Nathan L. 2007. "Hydrodynamic Modeling of a Hypothetical River Diversion Near Empire, Louisiana" Master's Thesis, Louisiana State University, Baton Rouge, LA.

Wilson, Clinton S., Nathan Dill, William Barlett, Samantha Danchuk, and Ryan Waldron. 2007. "Physical and Numerical Modeling of River and Sediment Diversions in the Lower Mississippi River Delta" ASCE Coastal Sediments 2007, 1, 749-761.