

Steven G. Underwood, B.S., M.S.

*Coastal Policy
Nearshore Coastal Geological Processes
Wetland Creation and Restoration
Strategic Planning*

YEARS OF EXPERIENCE 32 (5 with USACE Coastal Engineering Research Center, 10 with LDNR-Office of Coastal Restoration, 12 with NCDENR-Office of Coastal Management, and 5 with others)

EDUCATION M.S., Oceanography and Coastal Sciences, Louisiana State University, 1995
B.S., Marine Biology, University of North Carolina-Wilmington, 1979
A.A., Marine Laboratory Technology - Cape Fear Technical Institute, 1977

AFFILIATIONS Coastal Education and Research Foundation (CERF)
American Shore and Beach Preservation Association

PROFILE Mr. Underwood is a Senior Coastal Scientist at Applied Coastal Research and Engineering, Inc. His primary responsibilities include coastal scientific analyses and technical report preparation; coastal science and engineering business development in the southeastern U.S., with a primary focus on the northern Gulf of Mexico region; marketing, proposal preparation, and project acquisition for science/engineering and coastal restoration projects; manage operations at Applied Coastal's Baton Rouge office.

Mr. Underwood has over 30 years of scientific and planning experience conducting and managing complex coastal initiatives to ensure that scientific research and policy development are conducted in the areas of greatest need. In addition to spending the last 12 years as an Assistant Director for the State of North Carolina, Mr. Underwood was one of the original 8 technical personnel hired when the Louisiana Office of Coastal Restoration and Management was formed in 1990 (now the Coastal Protection and Restoration Authority). He served first as a Geoscience Specialist, and then became their Program Supervisor of the Biological Monitoring Section, and served concurrently as OCR's representative for oil spill response and biological remediation techniques. He has invaluable experience in applied coastal policy and planning, facilitating regional sediment management initiatives, quantifying coastal hazards and mitigation measures, updating estuarine shoreline strategies relative to sea-level rise, and designing and planning of mapping programs to achieve effective long-term natural resource protection and restoration strategies.

RELEVANT EXPERIENCE **Louisiana Sediment Management Plan Recommendations for an Implementation Strategy**

- Mr. Underwood served as project manager and lead author for development of recommendations for The Louisiana Sediment Management Plan (LASMP). The LASMP (developed by CPRA) provides a baseline framework upon which to establish a working strategy for sediment management in coastal Louisiana. Overall project needs were focused on: 1) improvements on the issues already identified by Khalil et al. (2010), 2) addressing identified issues toward effective use of sediment for restoration in coastal Louisiana, and 3) developing recommendations for establishing an implementation plan strategy that compliments the overall goals of the 2012 Louisiana Comprehensive Master Plan. The LASMP is a sediment resource strategy that could be further expounded upon in the 2017 Master Plan. It should serve as the nexus when contemplating approaches to restoring coastal wetlands, and become fully integrated into all the design, planning and implementation processes.

Development and Implementation of North Carolina Coastal Habitat Protection Plan

- Mr. Underwood was a key participant in developing NC's first Coastal Habitat Protection Plan (CHPP). The CHPP documented the ecological role and function of aquatic habitats; provided status and trends information on the quality and quantity of coastal fish habitat; described and documented threats (both human activities and natural events) to coastal fish habitat; described the current rules concerning each habitat; identified management needs; and developed management options. Served as team member, Public Participation Plan project manager, and led Coastal Resources Commission CHPP discussions prior to sign-off by DENR Secretary.

NC Department of Environment and Natural Resources-Beach and Inlet Management Plan

- Mr. Underwood served as project manager of the NC Beach and Inlet Management Plan (BIMP) - NC's first comprehensive management strategy for the 320-mile shoreline and 19-inlet complexes. The BIMP was developed by the Division of Water Resources (DWR) and the Division of Coastal Management (DCM) in order to provide the necessary information to address the natural resources, funding mechanisms and strategies for the comprehensive management of the state's ocean and inlet shorelines. The BIMP is the first statewide compilation of data and issues related to managing the beaches and inlets.

Report to Congress on the Effectiveness of Louisiana's Coastal Restoration Projects

- Mr. Underwood oversaw the development of the first evaluation of the effectiveness of Louisiana's coastal restoration projects - "1997 Evaluation Report to the U.S. Congress on the Effectiveness of Louisiana Coastal Restoration Projects. He also assisted with Louisiana's (OCRM) program's first National Public Outreach campaign that included public service messages, assessments of the effectiveness of the restoration program and a variety of other educational display and public outreach materials.

North Carolina Coastal Management, Mapping of the Estuarine Shoreline of North Carolina.

- Mr. Underwood participated in NC Coastal Management's Estuarine Shoreline Mapping Project design and development – the first-ever digital representation of the state's estuarine shoreline attributed by shoreline type, as well as an inventory of previously permitted commercial, recreational and erosion control structures. The mapping products provide a basis for informing improved management strategies, as well as the development of new rule language pertaining to NC's management of the estuarine shoreline.

Coastal Processes Analysis for Segmented Breakwater System, Southwest Louisiana

- Mr. Underwood was monitoring project manager when the State of Louisiana constructed 85 shore-parallel segmented breakwaters in four phases from 1991-1994, along 12 km of shoreline in Cameron parish. Several data sets were used to quantify beach volume changes within the breakwater system and included; (1) historical shoreline change from 1883-1994; (2) a numerical wave energy dissipation model (WAVENRG) for quantifying wave-inner shelf reactions and net longshore trends prior to breakwater construction; and (3) beach volume changes analyzed from approximately 360 beach profiles from 1990-1995.. These findings provided insight into morphological response during and after breakwater construction and provided vital design information used for subsequent breakwater modifications and beach nourishment design templates.

Assistant Director and Strategic Planner for the State of North Carolina's Department of Environment and Natural Resources, Division of Coastal Management

- Mr. Underwood served as Assistant Director for Policy and Planning, and Coastal Hazard Specialist over his 12 year career with the NC Division of Coastal Management. In this role he was in charge of all the non-regulatory program initiatives (i.e. coastwide shoreline change analysis, sea-level rise policy, estuarine shoreline mapping, and land-use planning) and led efforts since 2000, in coordination with NOAA, to write, edit, and manage the Division's Five-Year Program Enhancement Strategy. He also served as an advisor/scientific and technical staff member for the NC Coastal Resources Commission (CRC), the CRC Science Panel for Coastal Hazards, the Coastal Resources Advisory Council, Attorney General, the General Assembly, other governmental and non-governmental agencies, the media, and the general public.

Selected Publications

- Underwood, S.G., Chen, C., Stone, G.W., Zhang X.P., Byrnes, M.R., McBride, R A., 1999. "Beach Response to a Segmented Breakwater System, Southwest Louisiana, U.S.A.", *Proceedings of Coastal Sediments '99*, ASCE Press, Long Island New York, June 1999.
- Underwood, S.G., 1998. "Adaptive Management Strategies and Beach Response to Construction of 85 Segmented Breakwaters, Southwest Shoreline Louisiana, U.S.A." Recent Research in Coastal Louisiana: Natural System Function and Response to Human Influences.
- Anders, F.J., Kimball S.M., Phelps D.C., and S.G. Underwood, 1996. "Detailed Seismic and Sediment Sampling of the Nearshore Shoal Complex, Ocean City, Maryland",. *Proceedings American Geophysical Union, San Francisco, Ca.*
- Underwood, S.G., 1995. "Re-Establishment of Natural Sediment Bypassing Mechanisms at Ocean City Inlet, Maryland". M.S. Thesis, Louisiana State University, Baton Rouge, Louisiana.
- Underwood, S.G., Byrnes, M.R., and Hiland, M.W., 1995. "Historical Development of Ocean City Inlet Ebb Shoal and It's Effect on Northern Assateague Island", Report to National Park Service-Assateague Island Md, contracted through USACE-Waterways Experiment Station, Vicksburg, Ms.
- Byrnes, M.R., R.A. McBride, S.G. Underwood, and K.P. Kolby, 1994. Losing Ground: mapping Louisiana's disappearing coastline. *GPS World*, p.46-50
- Stauble, D.K., Underwood, S.G., Byrnes, M.R., and M.W. Hiland, 1993. "Large Scale Coastal Evolution: Fenwick to Assateague Island, Maryland: The Impact of Inlet Engineering and Beach Nourishment". *Proceedings Large Scale Coastal Behavior*, St. Petersburg, Florida.
- Stone,G.W., Grymes, J.M., Robbins, K., Underwood, S.G., Steyer, G.D., and R. Muller, 1993.. "A Chronological Overview of Climatological and Hydrological Aspects Associated with Hurricane Andrew and its Morphological Effects along The Louisiana Coast, U.S.A." *Shore and Beach*, Vol 61, No. 2, April 93, pp2-12.
- Steyer,G.D., Simon,C.I., and S.G. Underwood, 1992. "A Resource Management Approach for Evaluating the Effectiveness of Wetland Restoration Projects" *Conference of Society of Wetland Scientists*, New Orleans, La.
- Steyer,G.D., Underwood,S.G., Steller,D.L., Trepagnier,C.M., and C.I. Simon, 1992. "Sediment Capture Techniques and their Application to Barataria-Terrebonne Estuary". *National Estuary Program*.
- Hansen, Mark., Underwood, S.G., 1991. "Coastal Response to the Port Sheldon Jetties at Pigeon Lake, Michigan". MPCERC-91-4, NTIS NO.AD A239815, Coastal Engineering Research Center, Vicksburg, Ms.
- Underwood, S.G., Steyer G., and B.J. Good, 1990. "Bay Bottom Terracing and Vegetative Planting: An Innovative Approach to Coastal Restoration". *Wetland Restoration Conference -Tampa Florida*.
- Underwood, S.G., Anders F.J., 1989. "A Case Study of Ebb-Tidal Delta Equilibrium: Ocean



City Maryland", Coastal Zone 89, Barrier Islands: Process and Management, New Orleans La.