

Qualifications Summary

- 13 years experience in coastal and geologic processes evaluation
- Proficient in the use of ESRI GIS products for displaying and analyzing spatially related data for terrigenous, coastal and marine mapping projects
- Analysis of shoreline change using aerial photographs, historical maps, charts, and digital orthophoto quadrangles
- Processing, manipulation and geologic interpretation of marine geophysical data for seafloor geologic mapping
- Terrigenous vibracoring, pulse auger, and hollow stem auger coring using continuous and split spoon sampling methods
- Core processing, description and grain-size analysis including sieve, pipette and insoluble residue techniques
- Technical dive experience with submersible pneumatic vibracoring and hydraulic rotary coring
- Strong written, communication, and organizational skills

TARA P. MARDEN, M.S., B.A.

Coastal Geologist

Professional Affiliations

The Geological Society of America (GSA)
The Association of Women Geoscientists (AWG)

Fields of Expertise

Managing and assisting with projects related to tidal inlet and barrier island processes and geomorphology, shoreface geologic framework and sand resource investigations. Geophysical and bathymetric data collection and scientific SCUBA diving. Experience with local, state and federal permitting processes.

Higher Education

M.S., Geology-UNC at Wilmington (1999)
B.A., Geology-Northeastern University (1996)

Training

NAUI Recreational SCUBA (1996)
Enriched Air Nitrox Diver (IANTD/EANx) (1996)

Employment History

1999-Present Woods Hole Group, Inc.
1996-1999 University of North Carolina at Wilmington's
Center for Marine Science Research
1994-1996 Camp, Dresser & McKee, Inc.

Key Projects

Triton Way Revetment Reconstruction, Mashpee, MA – Project Manager

Woods Hole Group re-designed, permitted and oversaw construction of 350 linear feet of coastal revetments along the New Seabury shoreline in 2006-2007. The existing revetments were originally designed and constructed in the late 1980s and reconstructed in the late 1990's. Since that time, the entire New Seabury shoreline had undergone dramatic erosion and significant lowering of the beach had occurred. What once was a dry beach fronting the revetments became occupied by as much as 2 feet of water even during low tide, resulting in changes to the wave action affecting the structures. The three structures were redesign by Woods Hole Group to withstand current oceanic conditions.

Woods Hole Group worked cooperatively with the Mashpee Conservation Commission, Department of Environmental Protection (DEP) and the U.S. Army Corps of Engineers (ACE) to obtain environmental permits for the redesign of the revetments and the construction of a 1000-foot long, 15-foot wide, construction access comprised of large boulders that was built along the intertidal beach. In addition to the permitting, Woods Hole Group performed the contractor solicitation, assisted our clients with contractor selection, construction oversight, and obtained Certificates of Compliance from all of the regulatory agencies.

The project required a large management component due to the remote location of the properties along the shoreline and the required construction access along the beach that spanned over ½ mile of shoreline. Access and Escrow agreements had to be arranged with number adjacent property owners, including New Seabury Properties, for the use of the private beaches for access. The project required multiple on-site meetings with regulatory agencies, property owners, their consultants and legal representatives.

Sylvia State Beach Management Plan, Martha's Vineyard, MA – Project Manager

Woods Hole Group worked with a coalition of stakeholders under the auspices of the County of Dukes County to prepare a Beach Management Plan for Joseph A. Sylvia State Beach on Martha's Vineyard. State Beach is one of the most heavily used public beaches on the island. The beach is located on a barrier beach which contains two structured inlets that connect Sengekontacket Pond to the open waters of Nantucket Sound. The narrow barrier beach is also the site of a state highway that provides a primary access route between two of the largest towns on the island. State Beach is owned by the Massachusetts Department of Conservation and Recreation, managed by the County of Dukes County, and regulated locally by the Towns of Edgartown and Oak Bluffs. Portions of the beach also provide habitat to threatened and endangered species of shorebirds.

Woods Hole Group worked with stakeholders and members of a Barrier Beach Task Force to develop the Management Plan and to provide recommendations for long-term management that balances interests of the stakeholders. Recommendations for monitoring beach response through profiling, digital photography, and bathymetric surveys were developed. On-going activities associated with routine maintenance of the beach, such as planting, fencing, and beach access, were reviewed and recommendations provided for improved management. Opportunities for beach and dune restoration were examined, as were activities associated with education, outreach, enforcement, and fund raising.

Key Projects (continued)

A component of the Management Plan also included strategies for emergency response following a major storm event. Recommendations for a number of emergency preparedness action items were developed. Points of contact for responsible officials, local contractors, and materials suppliers were developed as part of the emergency preparedness activity. In addition, a range of possible emergency response actions based on extent of storm damage was examined. The purpose of developing the emergency response strategy was to expedite roadway protection as well as beach and/or dune restoration following a major storm event.

Delineation of Historical “New Inlet”, Debidue Island, South Carolina - Project Manager/Coastal Geologist

An historical inlet investigation was performed to settle a land boundary dispute between two contiguous parcels of land along Debidue Island, South Carolina. Research and fieldwork were designed to determine the location of "New Inlet" prior to its closure in the early 1800's. Using historical maps, plats, and aerial photographs, an approximate historical position of the inlet was initially identified using Geographic Information System (GIS) technology.

A detailed field investigation was implemented to determine the exact location of the paleo-inlet, consisting of geophysical surveying and sediment coring. Ground penetrating radar (GPR) profiles were collected to identify potential inlet fill sequences and to characterize the sub-surface geology. Sediment cores were collected and sampled for grain size and organics to ground-truth the GPR data. Organic samples were radiocarbon dated to prove a chronology for the evolution of the barrier and tidal inlet system. Dendrochronology was used to verify the geological data at the inlet location.

The Paleo-inlet was identified along the central portion of Debidue Island, 280-m south of the current property boundary. A four-stage model was developed to illustrate the evolution of the southern half of Debidue Island, including the opening and closing of “New Inlet”. Most recently, a state of the art 3D animation was produced in preparation for litigation. WHG recently provided expert testimony for this project.

Triton Way Homeowners Environmental Permitting and Revetment Repair – Project Manager

During the past twenty years, WHG has been serving individual homeowners along Triton Way, Mashpee, MA with environmental permitting and revetment repairs for a number of individual shore protection structures. WHG maintains the proper permits including local Orders of Conditions, and state and federal licenses to ensure that a number of individual clients whose homes are situated at the top of a coastal bank, along a severely eroding shoreline of Nantucket Sound, are always in compliance. In addition, WHG is responsible for performing quarterly site inspections at each of these properties and coordinating revetment repairs as necessary with local contractors, as well as lining up access agreements with adjacent homeowners and developers. WHG performs also the construction oversight during repairs and yearly beach nourishment.

Key Projects (continued)

TideWatch Condominiums, Mashpee, MA - Shore Protection Structure Rebuild – Project Manager/Coastal Geologist

A structural damage assessment was first required to evaluate the extent of required repairs along the 600-foot sloping revetment along the Nantucket Sound shoreline in Mashpee, MA. The damage assessment consisted of a field inspection, including a survey intended to define the extent and depth of existing toe stones. WHG then performed an engineering evaluation of the existing structural design to determine the adequacy of the existing design for resistance to extreme storms. In conjunction with the damage assessment, an alternatives analysis was performed. The alternatives analysis defined a suite of repair alternatives; however, rebuilding the entire structure was found to be most appropriate. Once the engineering analysis was complete, all of the respective permits were secured. Finally, the construction specifications were drafted and contractor solicitation was performed. WHG also performed the construction oversight that included daily inspections and reporting to the Conservation Commission during the winter of 2004/2005, to ensure that the required toe stone depth was met. Upon completion of the project WHG was responsible for final compliance reporting.

Dune Restoration Design – South Shore of Long Island, New York – Project Manager/Coastal Geologist

WHG has performed a number of coastal damage assessments for individual homeowners along the southern shore of Long Island, New York. Many of these included an analysis of storm damage protection ability of the existing coastal dune using the numerical model EDUNE. The purpose of the modeling is to identify the level of protection afforded by an existing dune during 10-, 50- or 100-year storms and to develop design specifications for the coastal dune that would result in enhanced storm damage protection and flood control. WHG defines the appropriate width and height of the dune and calculates the volume of fill required for the restoration. WHG also makes recommendations for planting and sand fence placement

Analysis of Contemporaneous Shoal and Shoreline Migration, Chatham, MA - Coastal Geologist

A computer-based shoreline mapping methodology, within a Geographic Information System (GIS) framework, was used to compile and analyze spatial and temporal changes between 1988 and 1999 within Chatham Inlet, Aunt Lydia's Cove and along the adjacent Cape Cod National Seashore (North and South Beach). The gross sediment transport pathway was defined and the time history of the flood shoals within Chatham Inlet and Aunt Lydia's Cove were mapped using the most accurate data sources and compilation procedures available for use with aerial photography.

Analysis of Historical Shoreline Change for the Siasconset, Nantucket Coastline - Project Manager/Coastal Geologist

Performed a comprehensive analysis of historical shoreline change for a 4-mile shoreline segment at Siasconset, Nantucket. Vertical aerial photography, digital orthophotographs and MA Coastal Zone Management shoreline change data were used to perform the analysis. Rates of shoreline change were computed at 100-ft intervals along the study area. The shoreline change analysis was used to determine historical shoreline change rates in the vicinity of an

Key Projects (continued)

existing wastewater treatment facility disposal beds along Low Beach Road, and to estimate future rates of change for management purposes.

Historical Shoreline Change Analysis, Cow Neck Farm, NY - Coastal Geologist

Performed a comprehensive analysis of historical shoreline change along a 5-mile shoreline segment at Cow Neck Farm, NY. Historical T-sheets, traditional aerial photography, and low-altitude, high-resolution digital photography were used to perform the analysis. Rates of shoreline change were computed at 100-ft intervals throughout the study area. The impacts of shoreline protection structures and storms on the historical rates of shoreline change were evaluated.

North Carolina's Inlet Initiative, North Carolina, North Carolina Division of Coastal Management - Assistant Project Manager

Performed ArcView/GIS analysis of aerial photographs to compile historic database of inlet induced shoreline change. Constructed graphs and charts depicting parameter changes of selected inlets using Microsoft Excel. Delineated inlet induced hazard zones for coastal land use planning.

A Pictorial Atlas of North Carolina's Inlets, North Carolina, North Carolina Sea Grant - Project Manager

Utilized desktop scanners and publishing software to image and manipulate scaled aerial photographs for graphic presentation. Compiled in-depth histories describing individual inlet characteristics including inlet stability and migration, erosion and accretion patterns, tidal-delta morphology, inlet modification and dredging scenarios and future trends. Assisted with final layout design.

Relationship of Hazard Zones to the Underlying Geologic Framework, North Carolina, National Oceanic and Atmospheric Administration/ National Undersea Research Center - Research Assistant

Collected, processed and interpreted sidescan sonar and seismic reflection profile data. SCUBA diver retrieved vibracore and rock core samples, core processing, description, and grain-size analysis for seafloor mapping project. Described local geologic framework and its relationship to hazard zones on adjacent shorelines.

Barrier Evolution at Coastal Headlands, North Carolina, SE/NE Coastal Consortium - Research Assistant/Project Manager

Assisted in a Ground Penetrating Radar investigation of barrier island evolution at coastal headlands in Southeastern NC. Performed subsurface sampling for grain size analysis and stratigraphic correlation using pulse auger and vibracoring techniques.

Central Artery/Tunnel Project, Boston, MA, MA Highway Dept. - Environmental Scientist

Supervised the installation of soil borings and monitoring wells. Sampled and characterized soil borings and groundwater samples for the MA Highway Department (MHD). Coordinated DIGSAFE permitting for over two hundred proposed boring locations. Supervised MHD sampling and analysis programs and underground storage tank removals. Prepared necessary reports pertaining to individual sites.

Key Projects (continued)

Aquifer Restoration, Acton, MA, W.R. Grace - Environmental Scientist

Monitored and performed qualitative measurements of site groundwater as part of an aquifer restoration project. Implemented a phased post-excavation sampling and analysis program to verify the remediation of contaminated sediment and sludge from on-site disposal areas.

Publications and Presentations **17**

Technical Reports **18**