

Patuxent Wildlife Research Center

Shoreline Changes and Impacts to Natural Resources in Chesapeake Bay



The Challenge: Climate change and sea level rise are expected to affect many miles of shoreline in the Chesapeake Bay and elsewhere along the Atlantic Coast in the coming years. In this scenario, federal and state agencies need to make more detailed assessments of how different watersheds and shoreline types might influence an array of ecosystem functions and components. Recently, most states are promoting “living shorelines” (soft engineering with marsh vegetation) rather than hardening methods (riprap or bulkheads) to cope with sea level rise and erosion. Not all methods can effectively be applied in all locations; therefore both field and modeling approaches are needed to determine how different shoreline types and watershed conditions influence water quality, submerged vegetation (SAV), and macrofauna, including top-level trophic waterbirds.



The Science: The USGS, along with the Smithsonian Institution and several universities and other organizations, conducted studies at a number of subestuaries along the entire Chesapeake Bay salinity gradient, and on the ocean coast (DE to VA). The studies were conducted over a five-year period (2009-2014) to assess how variations in watershed condition and shoreline types, ranging from bulkhead and riprap to natural marsh, influence water quality, SAV abundance, and fish, macroinvertebrate, and waterbird population abundance and densities. In addition, a study was conducted on the experimental control of the invasive wetland species *Phragmites australis*. More than 30 subestuaries were included in the study as part of an overall plan to compare the results among the following watershed conditions: developed-urbanized, mostly agricultural, or relatively forested.



The Future: Investigators are currently analyzing and summarizing data to compare the diversity and/or abundances of each natural resource studied to different shoreline types and overall watershed condition. Information on how these key resources respond to different shorelines will be critical for managers at local (county, state) and regional (federal agencies) scales. Predictive models and other tools developed in the course of this project will assist coastal managers in prescribing shoreline management schemes and targeting protection or restoration efforts that ultimately will have the best impact on the natural resources of the Bay and ocean coasts.