

Coastal Wetland Dynamics and Wildlife Populations: Modeling the Effects of Sea Level Rise and Landscape Change

The “Coastal wetland dynamics and wildlife populations: modeling the effects of sea level rise and landscape change” proposal was jointly developed by Drs. Allan O’Connell and Glenn Guntenspergen of the USGS Patuxent Wildlife Research Center and staff of the Atlantic Coast Joint Venture (ACJV). Funding is being provided through USGS Science Support Program.



Eastern Shore of Virginia. Ben Fertif, IAN, UMCES

Need

The ACJV partnership has invested considerable monetary resources into the conservation of coastal wetlands in the Northeast and Mid-Atlantic. Unfortunately, most of these coastal wetlands are vulnerable to additional stress and higher rates of loss due to global climate change. Within the Northeast Region, it is generally believed that the Mid-Atlantic States will experience the greatest change. The Mid-Atlantic area will be extremely susceptible to both rise in sea levels and marsh subsidence, putting some of the region’s most important coastal marshes at risk of being lost. In the Chesapeake Bay for example, sea level rise may be as much as 19cm by 2030 and 66cm or more by the end of the century. Under these conditions, the rate of sea level rise is likely to be greater than the rate of sediment deposition into estuaries and barrier islands, resulting in coastal wetland loss. Loss of these habitats is a threat to many high priority species identified by ACJV partners through Bird Conservation Region plans and State Wildlife Action Plans.

Description and Objectives

It is important that the potential impacts of climate change be understood so that appropriate management plans can be drafted and actions taken. Furthermore, studies are needed at larger scales because conservation planning is occurring at the regional, national, and continental levels. Our ability to model expected changes due to sea level rise in the extent and quality of coastal tidal marshes and link those results to models predicting how wildlife species will respond are crucial steps. The objectives of this project are to better understand salt marsh response to sea level rise. This will be accomplished by subdividing the entire Northeast Atlantic coast into four or five geomorphological subdivisions and modeling the response of individual intertidal wetland complexes using a state of the art computer simulation model being developed by USGS. This new computer simulation model incorporates ecological feedback mechanisms that alter how coastal marshes respond to sea level rise. In certain situations, this has been shown to allow marshes maintain themselves relative to sea level rise. We will then develop hierarchical spatial models to determine how wildlife species endemic to the Northeast coastal zone, such as rails, bitterns, several species of coastal sparrows, and small mammals will be affected by sea level rise (i.e., climate change) and changing land use patterns.

Project Timeline

Project funds were dedicated in August 2009 and completion is expected in the fall of 2012. We have hired a Post-doctoral Associate that will be stationed at North Carolina State University. He will be working closely with the Dr. O’Connell and statisticians at the Patuxent Wildlife Research Center. Current efforts are focusing on obtaining existing survey data from partners throughout the Northeast and evaluating each data set for possible inclusion in the development of hierarchical statistical models. Dr. Guntenspergen is overseeing translation of a complex, state-of-the-art ecosystem model of marsh response to sea level rise into a Bayesian Belief Network model appropriate for large, regional analyses.



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