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USING THE SLAMM MODEL FOR PREDICTING MARSH RESPONSE TO SEA LEVEL RISE

Robert W. Scarborough, Ph.D., DNREC, Delaware Coastal Programs
David B. Carter, DNREC, Delaware Coastal Programs

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The science community is certain that sea level is rising and coastal marshes are changing as a result, however, predicting these changes presents a challenge. Computer models are often used to simulate future conditions based on historic trends. However, because of the inherent unpredictability of natural systems there is always a high level of uncertainty in the model results. One model, developed for the USEPA, for predicting marsh migration and coastal land cover change is the Sea Level Affecting Marshes Model (SLAMM). This model simulates the dominant processes involved in wetland conversions and shoreline modifications from long-term sea level rise. SLAMM is free, relatively user friendly, and capable of being run by operators with basic GIS experience. However, this may lead to it being used by coastal managers that do not fully understand the limitations and uncertainty of predictive models. Unfortunately, the general public often does not understand this uncertainty either, especially when just shown maps and charts of the model outputs. To insure the end user is properly informed certain precautions must be taken when interpreting and conveying the results.

This presentation will focus on the evaluation of the SLAMM model and proper interpretation of the results of an application along the Delaware Bay. The US Fish and Wildlife Service has recommended that their coastal refuges use the model as a tool in developing their 15-year Comprehensive Conservation Plans. The Delaware Coastal Programs (DCP) was asked by the Delaware refuges' Manager to assist in utilizing the model to estimate the impacts of various sea level rise scenarios on the refuges.

To effectively evaluate a model the individual input parameters must be examined separately, this is called a sensitivity analysis. Certain inputs often have greater influence on the output than others, and based on the quality or quantity of the data could produce drastically different results. The outcome of the sensitivity analysis indicated where future applications should devote the greatest amount of time and expense to acquire the best data possible. The model was also evaluated based on the spatial resolution of the input GIS data. The minimum model dataset requirement of the National Wetland Inventory (NWI) coverage and 30-meter spatial resolution Digital Elevation Models (DEMs) are readily available from governmental websites. The State of Delaware has LiDAR elevation data with 2-meter resolution and wetlands classified at less than quarter acre parcel size. The spatial resolution analysis demonstrated the tradeoffs with data accuracy, quantity, and computer capabilities for regional simulations versus specific areas of concern. A limitation of the model is the inability to include dynamic input values, hindering the ability to simulate the documented accretion rate responses to fluctuating sea level rise rates. To compensate for this, several scenarios were run at

various constant rates to develop a suite of results for analysis. Because of the limitations of SLAMM, the DCP chose to provide the results in generalized terms with ranges of possible marsh change scenarios and aggregating some of the output classifications for easier interpretation by stakeholders.

Robert W. Scarborough, Ph.D.
DNREC/DSWC/Delaware Coastal Programs
89 Kings Highway
Dover, DE 19901
Bob.Scarborough@state.de.us
(302) 739-3436