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Examining the Vulnerability of Coastal Ecosystems to Sea-level Rise

As part of a regional effort to understand natural and human impacts on the lower Cape Fear River (CFR) estuary, as well as prioritize habitat restoration projects, measures of shoreline erosion, sea-level rise inundation, and ecosystem transition, and other parameters were examined. Additionally, specific sites within the lower estuary have been targeted for more in-depth study at a greater spatial and temporal resolution. Sea-level rise threatens coastal development and habitat throughout the world, and the issue will only become more problematic with increasing levels of greenhouse gas emissions. Proactive planning is needed in order to address this expansive issue in order to abate the potential effects of sea-level rise in the coming years. Between 2010 and 2045, sea level is expected to increase between 6.1 centimeters and 17.3 centimeters in the study area. This increase in sea level will impact coastal wetland vegetation since it is restricted to ranges dependent on the frequency of tidal inundation and salinity. This will cause marsh migration and habitat change in the nearshore environment. The Sea Level Affecting Marshes Model (SLAMM), along with flood inundation mapping was utilized to predict the extent of sea level rise, as well the change in coastal habitats. The model was tested for a case study site within the estuary. Carolina Beach State Park is located in New Hanover County, NC, and is situated south of the city of Wilmington in the CFR. This data will inform park managers as to the potential impacts of sea-level rise and the habitat change that will be associated with it. The model has since been expanded to cover the entire lower CFR estuary. The model clearly illustrates the potential loss of critical wetland habitat, especially under the highest SLR scenario. This loss will likely be compounded in the future from the combination of SLR and coastal erosion.