

The Threat of Sea Level Rise and the Impacts on First Landing State Park



Internship Executive Summary
Angela Kennedy
Old Dominion University, VA



First Landing State Park (FLSP) was originally opened as Seashore State Park in 1936. It was opened along with five other parks in the Virginia state park system. It was renamed FLSP to memorialize the landing of the first settlers of Virginia. FLSP encompasses approximately 2,888 acres of secondary dunes, beaches, interdunal swales and ponds, maritime forests, saltwater marshes, and freshwater wetlands. The park is a National Natural Landmark and is the most ecologically significant one in the Virginia Commonwealth. Today, there are over 19 miles of trails and 1.5 miles of beach (DCR, 2010; Mitchell, 1997). It provides a wide array of recreational and educational opportunities for the public (DCR, 2000). It is one of the leading Virginia State Parks in visitation numbers and economic impact for the state (Mignini, 2018).

Anthropogenic factors have driven climate change and sea level rise (SLR). Accelerated melting of the Greenland and Antarctic ice sheets could further impact sea level rise by year 2100. The rate of SLR in the past 25 years is significantly higher than in the past 100 years, and data shows that this rate is accelerating (Glick et al., 2008, IPCC, 2015). Rising sea level poses more of a threat to low-lying coastline areas, including FLSP and the Chesapeake Bay area. The coastal area is more prone to coastal erosion and flooding due to a rising water table and increased storm surge effects. Salt intrusion also poses risk to the ecosystem composition. Though many species of FLSP are resilient to a wider range of salinities, prolonged higher salinity levels can have negative impacts on the system (Glick et al., 2008).

There are over sixty rare flora, fauna, and invertebrate species that occur in the park. This includes the rare chicken turtle and the rare carpenter frog. Many of the species are tolerant of salinity fluctuations, however prolonged inundation and flooding of seawater into the area would pose a threat to species composition in the tidal marshes, maritime swamps, and non-riverine swamps (DCR, 2000). A loss of land and habitat due to increased flooding and inundation would also impact recreational and economic activity of the park (Mignini, 2018).

Data and models were utilized from the 2014 synthesis report of the Intergovernmental Panel on Climate Change (IPCC), studies of the Union of Concerned Scientists (UCS), studies of the US

Geological Survey (USGS), the findings of scientists Robert Deconto and David Pollard, and Carnegie Mellon University's CREATE Lab's EarthTime project to create the future scenarios. Three main scenarios were considered that showed impacts for a range from 0.26 m to over 15.0 m in the global average sea level rise. 70% of the coastal areas, including FLSP, could experience a sea level rise 20% higher than the global average (IPCC, 2015; Caldas et al., 2017). In all three scenarios, the ecosystem stability and recreational activity of the park was impacted.

Further topography research of the changes on the shoreline, dune complexes, and marsh areas of the park will allow for more effective plan development. This coupled with more involved wetland restoration efforts could lead to prolonged protection of FLSP and the naturally significant ecosystems and recreational opportunities it provides can be sustained. Citizen science programs could be developed from existing educational programs at FLSP and expanded into mobile-app projects to facilitate interest in conservation efforts and scientific data collection (Klemick, 2018).