# NOAA'S NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE (NCCOS) FY21 EFFECTS OF SEA LEVEL RISE PROGRAM AWARDS

## Surface Transportation, Sea Level Rise, and Coastal Storms: A Sustainable Path to Increased Resilience

**Institutions:** Auburn University, University of South Alabama, and University of Wisconsin-Madison

**Project Period:** September 2021 - August 2025

**Location:** Alabama

**FY21 Funding:** $458,892

**Total Anticipated Funding:** $1,539,933

**Project Summary:** Sea level rise and extreme climate events are complex problems that require a multidisciplinary solution to address surface transportation resilience.This project aims to evaluate the effects of sea level rise on coastal road and ferry access infrastructure, and to determine the ability of natural and nature-based features to mitigate those effects in a manner that leads to more resilient pavements while simultaneously enhancing socio-ecological outcomes. This effort brings together engineering, ecosystem, and economic expertise in collaboration with state Department of Transportation to address three main objectives: quantify the vulnerability of coastal communities, infrastructure, and ecosystems due to sea level rise and inundation; quantify the social, economic, and/or ecological benefits that natural and nature-based features provide for communities, infrastructure, and ecosystems in comparison to grey protective infrastructure; and predict the effects of sea level rise and inundation on ecosystems, communities, and infrastructure under varying risk management strategies to inform technical and policy actions that increase long term coastal resilience.

## Coastal Communities' Pavement Resilience to Sea Level Rise Using Natural and Nature-Based Features

**Institutions:** University of New Hampshire, University of South Alabama, and Rockingham Metropolitan Planning Organisation

**Project Period:** September 2021 - August 2025

**Location:** New Hampshire, Maine, Massachusetts, and Alabama

**FY21 Funding:** $479,961

**Total Anticipated Funding:** $1,821,544

**Project Summary:** The transportation networks of coastal communities face an increasing threat from rising sea levels. Sea level rise can lead to increased high tide flooding, rising groundwater, storm surge, wave action, and increased inundation duration of floods, threatening coastal roadways. The impacts from both gradual changes and extreme events will increase the rate of pavement deterioration over time and could trigger pavement failures that require reconstruction to restore serviceability. The focus of this project is to understand the causal linkages between coastal hazards and pavement damage, and to identify primary coastal processes that cause pavement deterioration and damage. To understand combined hazards of overtopping and subsurface moisture to roadways, this work will combine numerous process-based hydrodynamic numerical models, groundwater modeling, pavement modeling, and an adaptation impact assessment. These various project components will lead to the development of a toolkit with a multiple tiered approach to assess the vulnerability of roadways to sea level rise flooding hazards and for quantitatively considering natural and nature-based adaptation alternatives to protect and increase the longevity of roadway infrastructure.

## Living with Sea Level Rise in the Texas Coastal Bend

**Institutions:** Texas A&M University Corpus Christi, and Louisiana State University

**Project Period:** September 2021 - August 2024

**Location:** Texas

**FY21 Funding:** $296,249

**Total Anticipated Funding:** $894,632

**Project Summary:** The Texas Coastal Bend is a region of barrier islands, lagoons, and estuaries on a broad coastal plain. Communities embedded in this dynamic system engage in a wide range of economically important activities, however sea level rise poses a threat to the region due to low-lying gently sloping topography, land

subsidence, small estuarine tide ranges, and exposure to hurricanes. To retain and plan for future resiliency in this growing economic setting, communities need information on the impacts of future sea level rise and the effectiveness of natural and nature-based features. This project will model the effects of sea level rise and storm surge by improving and adapting an existing hydro-morphodynamic model to determine where in the region are the best opportunities for natural and nature-based features to improve resilience. The project will consider several alternative natural and nature-based feature options, including thin-layer placement of dredge material, use of black mangroves, and land acquisition.

## Evaluating Risk of Tidal Marsh Inundation and Monetizing Services to Prioritize Management Actions

**Institutions:** University of Georgia, Villanova University, and University of South Carolina

**Project Period:** September 2021 - August 2025

**Location:** Delaware, Pennsylvania, New Jersey, Georgia, and South Carolina

**FY21 Funding:** $357,657

**Total Anticipated Funding:** $1,420,729

**Project Summary:** Tidal marshes are recognized as important natural and nature based features in coastal regions, serving as buffers between storms and upland development. As sea level rises, tidal marshes are expected to experience increased tidal inundation and saltwater intrusion, likely resulting in losses to total marsh area and decreasing marsh health. The decline in protective marsh ecosystems puts coastal communities at increased risk for flooding that could lead to infrastructure damage and loss of land and life during storm events. The project will identify marshes most susceptible to sea level rise in three study regions along the East Coast from Georgia to Delaware, and the benefits they provide. In addition, the project will identify specific marshes that could be targeted for management interventions prior to impact. The data generated will inform where proactive interventions are most needed, and support robust management decisions and prioritizing adaptation, restoration, and mitigation activities.

# Modeling, Visualizing and Communicating Nor'easter and Hurricane Threats with Sea-Level to Support Coastal Management within New England

**Institutions:** University of Rhode Island, Penn State University, Schoodic Institute, and National Park Service

**Project Period:** September 2021 - August 2025

**Location:** Maine, Massachusetts, and Rhode Island

**FY21 Funding:** $375,825

**Total Anticipated Funding:** $1,525,059

**Project Summary:** Coastal communities and critical habitats are at increased risk due to sea level rise. Adapting to sea level rise and extreme weather conditions in our changing climate is a growing concern. In New England, strong winds and heavy precipitation resulting from the common occurrence of nor'easters and intermittent occurrence of hurricanes can change the shape of the coastline. However, there is limited information on how the impact of both types of storms may be amplified under a changing climate and sea level rise. This project seeks to inform and improve resource management and resilience to extreme events in coastal areas using a suite of existing numerical models to quantify the impacts of future storm and sea level rise scenarios on ecosystem and infrastructure vulnerability. The project has identified study sites at five National Parks and two National Wildlife Refuges in three New England states.