Final Project Memorandum
Southeast Climate Adaptation Science Center Project

1. ADMINISTRATIVE

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Project Title:
Communicating Future Sea-Level Rise Scenarios for Gulf Coast National Wildlife Refuge and National Park Lands

SE CASC Project #:
37

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Period of Performance:
August 2018 - October 2019

Total Cost:
$49,959

2. PUBLIC SUMMARY

Low-lying public lands along the northern Gulf of Mexico coast are vulnerable to sea-level rise. Coastal planners and resource managers in the region have requested customized information that can be used to concisely communicate local sea-level rise scenarios and identify potential impacts to the missions of management agencies.

In this project, researchers worked with the Northern Gulf of Mexico Sentinel Site Cooperative to develop information sheets outlining potential sea-level rise scenarios for the region through 2100 including their potential impact on the missions of federally-managed lands. Researchers drew from existing information on regional and global sea-level rise scenarios to develop customized information sheets for 54 federally-managed lands in the region (e.g., National Wildlife Refuges, National Park Service lands, National Estuarine Research Reserves) (Chivoiu et al. 2020).

This project was developed in response to a request for customized sea-level rise scenario products from partners at the Northern Gulf of Mexico Sentinel Site Cooperative and the U.S. Fish and Wildlife Service's Gulf Restoration Program. The results of this project support the

conservation stewardship missions of the U.S. Fish and Wildlife Service and National Park Service by providing science to inform management of their lands along the Gulf of Mexico.

3. TECHNICAL SUMMARY

This project represents a collaboration between individuals at the U.S. Geological Survey's (USGS) Wetland and Aquatic Research Center, the Northern Gulf of Mexico Sentinel Site Cooperative, and the U.S. Fish and Wildlife Service (USFWS) to produce customized two-pager information sheets for 54 federal coastal refuges, parks, and reserves across the northern Gulf of Mexico (i.e., sea-level rise sensitive federally-managed lands within Texas, Louisiana, Alabama, Mississippi, and Florida) (Chivoiu et al. 2020). The project team included Bogdan Chivoiu (Cherokee Nation Technologies at USGS), Michael Osland (USGS), Renee Collini (Northern Gulf of Mexico Sentinel Site Cooperative), Sara Martin (Northern Gulf of Mexico Sentinel Site Cooperative), Benjamin Wilson (National Academy of Sciences Science Policy Fellow at USFWS) and John Tirpak (USFWS). The two-page information sheets were produced for the following National Wildlife Refuges: Anahuac, Aransas, Bayou Sauvage, Bayou Teche, Big Boggy, Big Branch Marsh, Bon Secour, Brazoria, Breton, Caloosahatchee, Cameron Prairie, Cedar Keys, Chassahowitzka, Crystal River, Delta, Egmont Key, Grand Bay, Great White Heron, Island Bay, J.N. Ding Darling, Key West, Lacassine, Laguna Atascosa, Lower Rio Grande Valley, Lower Suwannee, Mandalay, Matlacha Pass, McFaddin, Mississippi Sandhill Crane, Moody, National Key Deer Refuge, Passage Key, Pine Island, Pinellas, Sabine, San Bernard, St. Marks, St. Vincent, Ten Thousand Islands, and Texas Point. We also produced information sheets for the Apalachicola National Estuarine Research Reserve (NERR), Grand Bay NERR, Mission Aransas NERR, Rookery Bay NERR, Weeks Bay NERR, Big Thicket National Preserve, De Soto National Memorial Park, Everglades National Park, Gulf Islands National Seashore (in FL), Gulf Islands National Seashore (in MS), Jean Lafitte National Historical Park and Preserve, Marjory Stoneman Douglas Wilderness, Padre Island National Seashore, and Lathrop Bayou Tract (Bureau of Land Management Area of Critical Environmental Concern).

4. PURPOSE AND OBJECTIVES

Low-lying public lands along the northern Gulf of Mexico coast are vulnerable to sea-level rise, and there is a need for public information related to future flooding and saltwater intrusion. Coastal planners and resource managers in the region have requested customized information that can be used to concisely communicate local sea-level rise scenarios within the context of potential mission impacts. In this project, we worked with the Northern Gulf of Mexico Sentinel Site Cooperative to develop sea-level rise scenario information sheets that address mission vulnerabilities for National Wildlife Refuge, National Park, and other federally-managed lands along the U.S. Gulf Coast. In addition to addressing the potential sea-level rise impacts to the mission of these federally-managed lands, each information sheet provides customized, local sea-level rise scenarios obtained from Sweet et al. 2017.

5. ORGANIZATION AND APPROACH

We worked with the Northern Gulf of Mexico Sentinel Site Cooperative to develop sea-level rise scenario information sheets that address mission vulnerabilities for 54 federal coastal refuges, parks, and reserves across the northern Gulf of Mexico (i.e., sea-level rise sensitive federally-managed lands within Texas, Louisiana, Alabama, Mississippi, and Florida). In addition to

addressing the potential sea-level rise impacts to the mission of these lands, each information sheet provides customized, local sea-level rise scenarios. The information sheets build from existing extension products and data that have been developed from a recent report that provided regional and global sea-level rise scenarios (Sweet et al. 2017) for the 4th National Climate Assessment. The information sheets include short sections that address the following: (1) the potential impacts of sea-level rise on the specific mission of each federally-managed land; (2) a figure that illustrates the projected increases in mean sea level for each location through 2100; (3) a table that communicates the probabilities for each of the six scenarios; (4) a map that illustrates the spatial extent of sea-level rise impacts; and (5) the text to accompany and explain this information. Initially, we produced a general draft information sheet in consultation with individuals from the Northern Gulf of Mexico Sentinel Site Cooperative, the USFWS Gulf Restoration Program, USFWS National Wildlife Refuges, the National Park Service, and scientists and resource managers from other agencies in the region. Next, we produced a subset of customized information sheets for individual public lands in consultation with local managers and coastal planners. Finally, we produced customized sea-level rise scenario information sheets for 54 federally-managed lands in the region (Chivoiu et al. 2020). These information sheets are housed online at the Northern Gulf of Mexico Sentinel Site Cooperative's webpage (http://masgc.org/northern-gulf-of-mexico-sentinel-site-co/two-pager). They are also posted on Sciencebase (https://www.sciencebase.gov/catalog/item/5ba005b1e4b08583a5c277eb) and the SE CASC website (https://secasc.ncsu.edu/resources/sea-level-rise-fact-sheets-for-federally-managed-lands).

6. PROJECT RESULTS

We produced customized sea-level rise scenario information sheets for 54 federally-managed lands along the U.S. Gulf of Mexico coasts (Chivoiu et al. 2020). These information sheets are housed online at the Northern Gulf of Mexico Sentinel Site Cooperative's webpage (http://masgc.org/northern-gulf-of-mexico-sentinel-site-co/two-pager). They are also posted on Sciencebase (https://www.sciencebase.gov/catalog/item/5ba005b1e4b08583a5c277eb) and the SE CASC website (https://secasc.ncsu.edu/resources/sea-level-rise-fact-sheets-for-federally-managed-lands).

7. ANALYSES AND FINDINGS

Many federally-managed lands along the Gulf of Mexico coast are vulnerable to sea-level rise. Coastal flooding will become more frequent and occur in more places as sea levels rise. In addition to the potential effects on low-lying roads, buildings, and infrastructure, sea-level rise is expected to lead to more nuisance flooding and increased saltwater intrusion, which may transform many of the region's coastal ecosystems. Under higher sea-level rise scenarios, some ecosystems may be lost, while others may move upslope at the expense of less flood- or salt-tolerant ecosystems. As a result, sea-level rise has the potential to greatly impact low-lying federally-managed lands in the region.

8. CONCLUSIONS AND RECOMMENDATIONS:

Many federally-managed lands along the Gulf of Mexico coast are vulnerable to sea-level rise. Coastal flooding will become more frequent and occur in more places as sea levels rise. In addition to the potential effects on low-lying roads, buildings, and infrastructure, sea-level rise is expected to lead to more nuisance flooding and increased saltwater intrusion, which may

transform many of the region's coastal ecosystems. Under higher sea-level rise scenarios, some ecosystems may be lost, while others may move upslope at the expense of less flood- or salt-tolerant ecosystems. As a result, sea-level rise has the potential to greatly impact low-lying federally-managed lands in the region. The scenarios presented in Sweet et al. (2017) and in these information sheets provide a foundation for planning efforts to prepare for the effects of sea-level rise.

9. MANAGEMENT APPLICATIONS AND PRODUCTS:

We produced customized two-pager information sheets for 54 federal coastal refuges, parks, and reserves across the northern Gulf of Mexico (i.e., sea-level rise sensitive federally-managed lands within Texas, Louisiana, Alabama, Mississippi, and Florida) (Chivoiu et al. 2020). These information sheets are housed online at the Northern Gulf of Mexico Sentinel Site Cooperative's webpage (http://masgc.org/northern-gulf-of-mexico-sentinel-site-co/two-pager). They are also posted on Sciencebase (https://www.sciencebase.gov/catalog/item/5ba005b1e4b08583a5c277eb) and the SE CASC website (https://secasc.ncsu.edu/resources/sea-level-rise-fact-sheets-for-federally-managed-lands). The two-page information sheets were produced for the following National Wildlife Refuges: Anahuac, Aransas, Bayou Sauvage, Bayou Teche, Big Boggy, Big Branch Marsh, Bon Secour, Brazoria, Breton, Caloosahatchee, Cameron Prairie, Cedar Keys, Chassahowitzka, Crystal River, Delta, Egmont Key, Grand Bay, Great White Heron, Island Bay, J.N. Ding Darling, Key West, Lacassine, Laguna Atascosa, Lower Rio Grande Valley, Lower Suwannee, Mandalay, Matlacha Pass, McFaddin, Mississippi Sandhill Crane, Moody, National Key Deer Refuge, Passage Key, Pine Island, Pinellas, Sabine, San Bernard, St. Marks, St. Vincent, Ten Thousand Islands, and Texas Point. We also produced information sheets for the Apalachicola National Estuarine Research Reserve (NERR), Grand Bay NERR, Mission Aransas NERR, Rookery Bay NERR, Weeks Bay NERR, Big Thicket National Preserve, De Soto National Memorial Park, Everglades National Park, Gulf Islands National Seashore (in FL), Gulf Islands National Seashore (in MS), Jean Lafitte National Historical Park and Preserve, Marjory Stoneman Douglas Wilderness, Padre Island National Seashore, and Lathrop Bayou Tract (Bureau of Land Management Area of Critical Environmental Concern).

Quote Attributable to a stakeholder/partner:

"This product will provide two primary benefits to the intended audience of decision-makers and stewards for federally managed lands. The first, is that it will enhance the capacity to access, understand, and act on locally-relevant sea-level rise information. This will occur through distribution of the materials directly and through subsequent formal and informal dialogue inspired by these materials. The second benefit is that it will increase the capacity of the staff at these parks, reserves, and preserves to communicate to visitors and other stakeholders the potential risks and changes associated with rising seas. In some cases, this will be the only materials they have to share about sea-level rise, in other locations this will enhance existing programming. By developing these materials in collaboration with the targeted end-users we have been able to ensure that these materials will meet their needs. Additionally, as an Extension professional, I will be utilizing these materials to engage parks and reserves across my area of responsibility to advance the conversations around potential impacts. These efforts have already begun and will continue into 2020." *Quote from Renee Collini of the Northern Gulf of Mexico Sentinel Site Cooperative*

10. OUTREACH

The Northern Gulf of Mexico Sentinel Site Cooperative is providing outreach for these products and is hosting the 54 information sheets on their webpage: http://masgc.org/northern-gulf-of-mexico-sentinel-site-co/two-pager.

REFERENCES

Chivoiu, B., M. J. Osland, R. Collini, S. Martin, J. Tirpak, and B. Wilson. 2020. Local sea level rise information sheets for Texas, Louisiana, Mississippi, Alabama and Florida: Northern Gulf of Mexico Sentinel Site Cooperative, U.S. Geological Survey and U.S. Fish and Wildlife Service: Mississippi-Alabama Sea Grant Consortium, http://masgc.org/northern-gulf-of-mexico-sentinel-site-co/two-pager.

Sweet, W. V., R. E. Kopp, C. P. Weaver, J. Obeysekera, R. M. Horton, E. R. Thieler, and C. Zervas. 2017. Global and regional sea level rise scenarios for the United States. NOAA Technical Report NOS CO-OPS 083. NOAA, Silver Spring, Maryland, USA.