RESTORE Council FPL 3 Proposal Document

General Information

Proposal Sponsor:
State of Florida Department of Environmental Protection

Title:
Florida Gulf Coast Resiliency Program

Project Abstract:
Florida, through the Florida Department of Environmental Protection (FDEP), is requesting $15M in Council-Selected Restoration Component funding for the proposed Florida Gulf Coast Resiliency Program. This would include $6M in planning funds as FPL Category 1, as well as a separate $9M implementation component as an FPL Category 2 priority for potential funding. The program will support the primary RESTORE Comprehensive Plan goal to enhance community resilience through activities to identify vulnerabilities and implement sustainable solutions to improve coastal resiliency. Activities include vulnerability assessments to identify strategies to improve resiliency; living shorelines to protect against erosion and reduce wave energy; and coastal and submerged lands management and acquisition activities to protect habitats that enhance resiliency. The FDEP would partner with the Florida Forever Program to identify acquisitions with the Office of Resilience and Coastal Protection on vulnerability assessments and submerged lands management activities. Developing strategies to address resiliency is critical to Florida's ability to adapt to a changing coastline. This program would result in environmental benefits such as resiliency improvements, protections against wave energy and storm surge, habitat protection (e.g., marshes, mangroves, seagrass, coral, and oyster reefs), sustaining healthy wildlife populations, water quality benefits, recreation and tourism opportunities, and fisheries benefits. Program duration is 10 years.

FPL Category: Cat1: Planning/ Cat2: Implementation

Activity Type: Program

Program: Florida Coastal Resiliency Program

Co-sponsoring Agency(ies): N/A

Is this a construction project?:
Yes

RESTORE Act Priority Criteria:
(II) Large-scale projects and programs that are projected to substantially contribute to restoring and protecting the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast ecosystem.
(IV) Projects that restore long-term resiliency of the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands most impacted by the Deepwater Horizon oil spill.

Priority Criteria Justification:
The Florida Gulf Coast Resiliency Program includes a suite of intrinsically-linked activities aimed at improving coastal communities' resiliency to climate change and changing environmental conditions. Program activities would include identifying risks and vulnerabilities, implementing solutions, and

protecting and managing lands to mitigate effects of climate change. The program meets the large-scale and restore long-term resiliency priority criteria.

This program is designed to result in large-scale environmental benefits, particularly in relation to the needs of Florida's coastal communities. Florida is especially susceptible to the effects of climate change, specifically sea level rise. Program activities such as vulnerability assessments would identify areas most susceptible to the effects of climate change and identify strategies to counteract those effects. Program activities would also include projects to improve resiliency, such as planning and implementing living shorelines that protect coastal areas against erosion and acquiring and managing lands, including offshore submerged lands that mitigate effects of climate change (e.g., sequester carbon, protect against flooding and sea level rise). These activities would result in significant environmental benefits to coastal communities, identifying those communities most at risk for future planning and improving protection against erosion, coastal flooding, and sea level rise.

Program activities would help restore long-term resiliency of natural resources most impacted by the Deepwater Horizon oil spill by protecting and enhancing coastal communities and resources that were impacted by the spill. Coastal land protection of marshes, mangroves, seagrass, coral, and oyster beds will help improve coastal community resiliency by protecting communities against sea level rise and storm surge; and improve ecosystem resiliency and sustainability by providing opportunities for coastal wetland migration.

Project Duration (in years): 10

Goals

Primary Comprehensive Plan Goal:
Enhance Community Resilience

Primary Comprehensive Plan Objective:
Promote Community Resilience

Secondary Comprehensive Plan Objectives:
N/A

Secondary Comprehensive Plan Goals:
N/A

PF Restoration Technique(s):
Create, restore, and enhance coastal wetlands, islands, shorelines and headlands: Protect natural shorelines
Improve science-based decision-making processes: Develop tools for planning and evaluation
Protect and conserve coastal, estuarine, and riparian habitats: Land acquisition

Location

Location:
Florida coastlines and estuaries along the Gulf of Mexico.

HUC8 Watershed(s):
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Florida Panhandle Coastal(Perdido Bay)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Choctawhatchee(Upper Choctawhatchee)
South Atlantic-Gulf Region(Southern Florida) - Southern Florida(Everglades)
South Atlantic-Gulf Region(Southern Florida) - Southern Florida(Florida Bay-Florida Keys)
South Atlantic-Gulf Region(Southern Florida) - Southern Florida(Big Cypress Swamp)
South Atlantic-Gulf Region(Southern Florida) - Southern Florida(Caloosahatchee)
South Atlantic-Gulf Region(Southern Florida) - Southern Florida(Florida Southeast Coast)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Peace(Peace)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Peace(Myakka)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Peace(Charlotte Harbor)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Sarasota Bay)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Manatee)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Little Manatee)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Alafia)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Hillsborough)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Tampa Bay)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Crystal-Pithlachascotee)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Withlacoochee)
South Atlantic-Gulf Region(Suwannee) - Aucilla-Waccasassa(Waccasassa)
South Atlantic-Gulf Region(Suwannee) - Aucilla-Waccasassa(Econfina-Steinhatchee)
South Atlantic-Gulf Region(Suwannee) - Suwannee(Lower Suwannee)
South Atlantic-Gulf Region(Ochlockonee) - Ochlockonee(Lower Ochlockonee)
South Atlantic-Gulf Region(Apalachicola) - Apalachicola(Apalachicola)
South Atlantic-Gulf Region(Apalachicola) - Apalachicola(New)
South Atlantic-Gulf Region(Apalachicola) - Apalachicola(Apalachicola Bay)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Florida Panhandle Coastal(St. Andrew-St. Joseph Bays)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Florida Panhandle Coastal(Choctawhatchee Bay)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Florida Panhandle Coastal(Pensacola Bay)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Florida Panhandle Coastal(Yellow)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Florida Panhandle Coastal(Blackwater)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Choctawhatchee(Lower Choctawhatchee)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Escambia(Escambia)
South Atlantic-Gulf Region(Suwannee) - Aucilla-Waccasassa(Aucilla)
South Atlantic-Gulf Region(Ochlockonee) - Ochlockonee(Apalachee Bay-St. Marks)

State(s):
Florida

County/Parish(es):
FL - Escambia
FL - Pasco
FL - Pinellas
FL - Charlotte
FL - Citrus

FL - Collier
FL - Dixie
FL - Franklin
FL - Sarasota
FL - Taylor
FL - Wakulla
FL - Bay
FL - Gulf
FL - Santa Rosa
FL - Walton
FL - Hernando
FL - Hillsborough
FL - Jefferson
FL - Lee
FL - Levy
FL - Manatee
FL - Monroe
FL - Okaloosa

Congressional District(s):
FL - 14
FL - 15
FL - 26
FL - 11
FL - 13
FL - 16
FL - 5
FL - 12
FL - 1
FL - 19
FL - 25
FL - 2
FL - 17

Narratives

Introduction and Overview:

The Florida Gulf Coast Resiliency Program includes planning and implementation activities to identify risks and vulnerabilities and implement sustainable solutions to improve coastal resiliency to the effects of climate change, extreme weather, coastal inundation, and other stressors. Increasing community resilience is a priority for Florida where coastal communities and habitats are at significant risk to rising sea levels (FDEP 2018). The program would consist of a suite of intrinsically linked activities that in combination result in significant improvements in resiliency. Activities may include: vulnerability assessments, construction of living shorelines, and land acquisition and management. All program activities would occur within the 23 counties along the Florida Gulf of Mexico coastline (see Figures 1 through 3) and would address similar environmental stressors resulting from climate change, rising sea levels, and increasing intensity of storms.

FDEP would evaluate proposals submitted by the public and select those that fulfill the program purpose (e.g., enhance resiliency in vulnerable communities, protect natural resources, sustain healthy ecosystems, and allow communities to adapt to changing conditions). The proposed program, at the requested funding level, would enable FDEP to fund critical projects that would make significant, measurable improvements to the long-term resiliency of natural resources, fisheries, marine and wildlife habitats, beaches, coastal habitats, and Florida's coastal communities.

Goals/Objectives: This program meets the Enhance Community Resilience Comprehensive Plan goal and the Promote Community Resilience objective. The program would increase the capacity of the highest risk communities to adapt to short-term changes, such as increased flood risks or storm surge, and long-term changes, such as rising sea levels, by: identifying strategies to address resiliency, which is critical to Florida's ability to adapt to a changing coastline; creating living shorelines to reduce erosion, wave energy, and protect against storms; and acquiring and managing lands in critical areas that will allow habitats and species to adapt or migrate in response to changing climate and coastlines.

Commitments: The proposed program illustrates Florida's commitment to science-based decision-making. Vulnerability assessments allow ecological, social, and economic information to be viewed alongside sea level rise and storm surge scenarios to assist in resiliency planning. These efforts allow FDEP to identify science-based strategies to counteract the effects of climate change. For land acquisitions, FDEP would leverage the Florida Forever Program (FF) priority list targeting the Climate Change Lands category (FF 2019); FF utilizes a science-based evaluation process where parcels are ranked based on environmental conditions that include protection of coastal habitat and mitigation of effects of sea level rise.

FDEP is committed to public engagement, inclusion, and transparency. Stakeholders were engaged in the development of this proposal through numerous meetings with local entities. The public will also have the opportunity to propose projects for implementation during the project proposal stage. Vulnerability assessments and implementation of resiliency strategies will have required public engagement elements, particularly targeting vulnerable populations in the community. Products of all program activities will be required to be posted on a publicly available website by the grantee. The program would leverage resources and partnerships to identify and implement activities. When evaluating activities, FDEP will consider whether the project leverages other funding sources. For land acquisitions, the program will coordinate with FF to identify projects. FDEP will also coordinate with local entities to identify projects and program activities; as well as FDEP's Office of Resilience and Coastal Protection (ORCP), which has identified communities that need a vulnerability assessment. Finally, illustrating Florida's commitment to coordinating resources and partnerships, delivering results, and relying on the best available science, Florida's Governor appointed the first

Chief Resilience Officer (CRO) in August 2019. The CRO is tasked with preparing for the environmental, physical, and economic impacts of sea level rise. The CRO will coordinate, as needed, with the FDEP and the ORCP to execute this program.

Environmental Benefits: Much of the Florida coast is developed and approximately 80 percent of Florida's population live within 10 miles of the coast (FDEP 2018). Due to low elevations, coastal communities and habitats are at significant risk from the effects of climate change, especially rising sea levels and flooding (FDEP 2018). The proposed program would result in significant environmental benefits to coastal communities by increasing coastal resiliency, specifically through implementation of vulnerability assessments, living shorelines, and conservation or increased protection of natural areas, including offshore submerged lands and riparian buffers.

Efforts to assess a community's vulnerability to projected climate change-related short and long-term changes have become increasingly valuable for planning and implementing appropriate strategies for mitigation and adaptation. Vulnerability assessments help identify communities at risk by evaluating the range and magnitude of impacts based on various scenarios (e.g., sea level rise, temperatures, frequency and duration of fires, drought, and extreme weather events). Understanding what makes a community most vulnerable to climate change allows resource managers to plan and implement corrective measures to mitigate threats (FDEO 2015, FDEP 2018, Stys et al. 2017).

Coastal habitats such as barrier islands, marsh, mangroves, seagrass, oyster reefs, and coral reefs have the capacity to reduce wave energy and erosion, protecting coastal communities from sea level rise and in some cases, storm surge (Beck et al. 2018, Boutwell and Westra 2016, Ferrario et al. 2014, Guannel et al. 2016, Liu et al. 2013, USGCRP 2018, Zhang et al. 2012). Natural vegetation and networks of connected wetlands stabilize shorelines by trapping sediments and filtering excess nutrients from urban runoff, while providing essential habitat for commercially valuable species. Living shorelines enhance shoreline stabilization and coastal protection against sea level rise and wave energy (Bilkovic and Mitchell 2017).

Acquisition, conservation, and regulatory protection of natural areas, including unique, imperiled, and ecologically valuable habitats (e.g., riparian buffers, wildlife corridors, submerged lands), promotes coastal resiliency and strengthens natural resources. Protecting large areas of natural lands preserves the ecosystems that reduce wave energy and erosion. Land conservation protects native biodiversity and ecosystem function, promotes connectivity, increasing genetic diversity and species fitness, and allows for migration or adaptation as climate change induces shifts in species' range of distribution (Damschen et al. 2019, DeFreese 1995, Tewksbury et al. 2002). Land conservation enhances water resource protection by reducing impervious surfaces, allowing water to filter naturally, reducing flooding, and improving water quantity and quality (Shepard et al. 2016).

FDEP has demonstrated success implementing these project types previously across the Gulf Coast of Florida. FDEP, in coordination with other State and Federal partners, has developed guidance on adaptation planning and vulnerability assessments (FDEO 2015, FDEP 2018) and has funded approximately 60 projects that produced vulnerability assessments for more than 20 communities. FDEP has successfully constructed a number of living shoreline projects, notably "Project Greenshores" in Pensacola Bay (FDEP 2019a) and a living shoreline in Panama City that received EPA's Gulf Guardian Award in 2013 (Florida Living Shorelines 2020). Nearly 10 million acres of land has been acquired and managed for conservation in Florida, more than 2.5 million acres of which were purchased under FF and an earlier State program (FNAI 2020).

Environmental Stressors: Comprehensive resource management and planning efforts, such as FF,

Florida Gulf Environmental Benefit Fund Restoration Strategy, Basin Management Action Plans, Aquatic preserve Management Plans, and others have identified stressors and threats to Florida's natural resources including habitat loss and fragmentation, and effects of climate change such as sea level rise. This proposed program would directly address habitat loss and fragmentation through acquisitions and land management protections, address the effects of climate change by constructing living shorelines to reduce wave energy and protect coastal lands to enhance resiliency and sustainability.

Costs: $15,000,000. Funds requested for this program will leverage resources from FF. Category 1 funds would be used for program management, monitoring and adaptive management, and data management activities, living shoreline planning, design, and environmental compliance; and development of vulnerability assessments. Category 2 funds would be used for implementation of living shorelines, land acquisition, and project monitoring.

Timeline: The duration of program planning and implementation is expected to be 10 years. Land acquisitions identified from the FF priority list could begin as funding is received; lands would be maintained in perpetuity.

Partners: FDEP would partner with FF to leverage FF's science-based approach to conservation and streamline the land acquisition process. Other program partners include the FDEP ORCP on submerged lands stewardship activities and vulnerability assessments. ORCP has awarded more than $4 million over the last two years to prepare coastal communities for the effects of rising sea levels, flooding, and erosion.

FPL 3 Planning Framework: This proposed program is consistent with the Protect and Conserve Coastal, Estuarine, and Riparian Habitats priority approach identified in the FPL 3 planning framework. The primary goal and objective of this program is to improve coastal resiliency, through techniques such as living shorelines and coastal habitat protection. Identifying strategies to improve coastal resiliency will help ensure Florida's coastal communities are able to adapt to the effects of climate change by conserving Florida's natural resources, reducing wave energy, protecting against storm surge, and providing opportunities for species and habitat migration.

Proposed Methods :

The proposed Florida Gulf Coast Resiliency Program consists of a suite of intrinsically linked conservation activities designed to identify risks and vulnerabilities and implement sustainable solutions to improve coastal community resiliency to the effects of climate change, extreme weather, coastal inundation, and other environmental stressors. This program could include various activities such as vulnerability assessments; planning, design, and construction of living shorelines (where needed and viable); acquiring and managing lands for conservation; as well as other activities that improve coastal resiliency such as habitat restoration (e.g., oyster reef, marsh, beach and dune, floodplain, mangrove, coastal forest, coral reef), or restoring flowways to sustain marsh vegetation. As such, the program would rely on a range of methods for the various activities. The methods FDEP would utilize to select projects or activities under this program (i.e., decision criteria) and a description of methods for some of the activities is provided below.

Project or activity selection criteria. The goal of this proposed program is to enhance and promote community resilience by increasing the capacity of Florida's coastal communities to adapt to short- and long-term changes such as increased flood risks, storm surge, and rising sea levels. The objectives of the proposed program are to identify communities most vulnerable to the effects of climate change and their resources which are most at risk; identify strategies to address coastal resiliency; and to implement sustainable solutions to improve coastal resiliency, such as constructing living shorelines to reduce wave energy which protects against storms, or acquiring and managing

coastal lands, offshore submerged lands, urban riparian buffers, flowways or other habitats that would help mitigate the effects of climate change.

Program activities would be selected from proposals submitted by the public. We anticipate one request for proposals for all three project types. FDEP would utilize an approach similar to the Deepwater Horizon natural resource damage assessment project portals and issue a public notice to solicit proposals. The notice would clearly describe the goal and objectives of the program and the types of activities that would be considered.

In selecting program activities from submitted project proposals, FDEP would screen and evaluate each proposal to ensure it meets the goal and objective of the program. If a proposal meets the screening criteria, FDEP would evaluate the proposal further according to the evaluation criteria. FDEP would then select program activities based on the extent to which the proposals meet the evaluation criteria and those that are likely to benefit coastal community resilience most cost-effectively. Proposals that meet all of the initial screening and evaluation criteria would be further evaluated within the framework outlined below for each of the three project types included in this program. The project selection process for each of the three project types are distinct. Ultimately, the number and type of projects selected for implementation will depend on project proposals and will be scaled to the program budget.

Screening criteria

1) Does the proposal have sufficient information to allow for screening and evaluation?
2) Is the project proposal consistent with the program goal and objective?
3) Is the proposed project feasible (i.e., has not already been completed, does not conflict with any State or Federal regulations, etc.).

Evaluation criteria

1) Extent to which the project proposal is cost-effective (i.e., reasonable and comparable to other equivalent activities; low cost compared to likely benefits).
2) Extent to which the project proposal is supported by the local community.
3) Extent to which the project proposal leverages other funding sources (including in-kind services).
4) Extent to which the project proposal provides benefits to multiple communities and/or multiple natural resources.
5) Extent to which the project proposal meets the goal and objective of the program.
6) Proposed project location (i.e., whether it is located in an area that is vulnerable to current and future risks including flooding, storm surge, erosion, or rising sea levels).
7) Sustainability and/or likelihood of long-term success of the proposed project.

Vulnerability assessments. Vulnerability assessments would be conducted specifically to identify sensitive areas (i.e., communities and resources at risk) and assist in resiliency planning for sea level rise and storm surge scenarios. Assessments may include an exposure analysis, a sensitivity analysis, an assessment of adaptive capacity, and selection of focus area for adaptation strategies (FDEO 2015, FDEP 2018). Proposals to conduct vulnerability assessments would be prioritized for coastal areas where hazard evaluations and adaptation planning have not been previously conducted, or where the largest concentration of people and property are at risk. Butler et al. (2016) found that only 49 percent of coastal counties in Florida had conducted some form of hazard assessment or developed some type of plan for sea level rise. Ultimately, the results of any vulnerability assessments conducted may be used to inform living shoreline and land acquisition project selection, by prioritizing those projects that will improve coastal resiliency in areas deemed to be the most vulnerable or with high adaptive capacity. Participation of stakeholders in the vulnerability

assessments will be required when possible.

When planning vulnerability assessments, Florida will utilize a science-based process, coordinate with ORCP staff as needed, and follow state guidance. Specifically, vulnerability assessments will follow guidance outlined in the Florida Adaptation Planning Guidebook (FDEP 2018) and the Sea-Level Rise Vulnerability Assessment Tools and Resources (FDEO 2015), among others. FDEP may also refer to previously conducted local and regional vulnerability assessments (e.g., Beever III et al. 2009, Taylor Engineering, Inc. 2019) which have included sea level rise and storm surge risk models such as the Sea Level Affecting Marshes Model (SLAMM) and an ADvanced CIRCulation Model (ADCIRC).

Living shorelines. Living shoreline proposals may be considered independent of any specific vulnerability assessment or they may be prioritized based on the results of a vulnerability assessment conducted. Selection of individual living shoreline proposals will be based on best available science (Miller 2015, NOAA 2015). Proposal evaluations will consider factors such as ecological resources present and adjacent land use as part of a science-based process to prioritize projects (Taylor Engineering, Inc. 2019). For any living shoreline proposals selected, FDEP would require a professional services contractor to conduct site investigations, complete necessary engineering and design, and regulatory compliance. Any professional services agreement would be drafted and executed in accordance with Florida laws and regulations. The selected professional services contractor would be required to conduct site visits as necessary, develop designs, construction drawings as applicable, and determine the necessary permits required to complete the project. Upon receipt of all needed approvals an Invitation to Bid for construction would be issued in accordance with Florida State procurement laws.

Land acquisition and management. Each land acquisition or management proposal would be considered independently. However, some land acquisition proposals may be prioritized based on the results of a vulnerability assessment conducted. Land acquisitions may be suggested by the public through project proposals or identified through the FF priority list which is updated annually (FF 2019). Florida would employ a science-based process in selecting lands for acquisition and management. This would involve evaluating a parcel's habitat, location, and the potential benefits related to improving coastal resiliency to the effects of climate change, extreme weather, coastal inundation, and other stressors and increasing coastal community resilience. For parcels on the FF priority list, Florida may consider lands for acquisition from the Climate Change Lands category, or other parcels that drain to the Gulf of Mexico which may help strengthen coastal resiliency or mitigate the effects of climate change including coastal salt marshes, mangroves, oyster reefs, riparian buffers, or flowways. FF utilizes a science-based process including a thorough scientific review and a comprehensive natural resource analysis and scoring process to rank parcels and develop the FF priority list. The goal of the process is to conserve environmentally unique and irreplaceable lands or rare ecosystems, native flora and fauna, important breeding locations, natural areas for recreation, and archaeological or historic sites (Section 259.105, F.S.). A series of geographic data layers including information on various measures used by FF (e.g., rare species habitat conservation priorities, ecological greenways, landscape-sized protection areas, significant surface waters, natural floodplains, functional wetlands) are utilized to help rank the parcels (see FNAI 2018 for additional details on the methods and process). Once a parcel is selected for acquisition, FDEP would follow the land acquisition procedures outlined in the Florida Statutes, Chapter 259, Land Acquisitions for Conservation or Recreation (Section 259.105, F.S.) for parcels within FF. FDEP's Division of State Lands or its local acquisition partners would contract an appraisal of land from an independent private sector appraiser to estimate market value, negotiate with owners to buy the land, conduct any required due diligence such as site environmental assessments, and complete the acquisition. Lands acquired would be titled to the State, a county, or local

government and protected in perpetuity. Land management proposals could include seagrass, coral reef, marsh, and mangrove restoration activities along with other types of stewardship activities identified in land management plans.

Environmental Benefits:

Florida has approximately 1,350 miles of coastline including diverse habitats such as beaches, dunes, estuaries, and more than 10 million acres of wetlands (Beaver 2006, Dahl 2005, FNAI 2010). Much of Florida's coast is developed and approximately 80 percent of the population live within 10 miles of the coast (FDEP 2018). Due to the State's low elevations, coastal communities are at significant risk from the direct and indirect effects of climate change, especially rising sea levels, extreme weather, storm surge, flooding, and erosion (FDEP 2018). Conserving coastal lands can enhance community and ecosystem resiliency to both direct and indirect impacts of climate change (USGCRP 2018). The proposed program would result in significant environmental benefits to coastal communities by increasing community resiliency through vulnerability assessments, living shorelines, and land conservation and management.

As impacts from climate change increase, efforts to assess a community's vulnerability are increasingly valuable for planning and implementing appropriate mitigation and adaptation strategies. Vulnerability assessments help identify those areas most at risk and evaluate the potential range and magnitude of impacts based on various scenarios (e.g., increasing sea levels, temperature, frequency and duration of fires, drought, or extreme weather). Understanding what makes a community most vulnerable to climate change allows resource managers to plan and implement corrective measures to mitigate future threats. Previous regional vulnerability assessments have integrated projected sea level rise with socioeconomic data to identify locations that might be most vulnerable (Emrich et al. 2014, Thatcher et al. 2013), helping communities effectively distribute limited resources.

An understanding of the adverse effects of hardened shorelines and the value of natural shorelines for coastal protection has led to a reprioritization of coastal management policy (Bilkovic and Mitchell 2017, Reguero et al. 2018). Natural communities such as barrier islands, marsh, mangroves, seagrass beds, oyster reefs, and coral reefs can reduce wave energy and erosion, protecting coastal communities from sea level rise and in some cases, storm surge (Beck et al. 2018, Boutwell and Westra 2016, Ferrario et al. 2014, Guannel et al. 2016, Liu et al. 2013, USGCRP 2018, Zhang et al. 2012). Wetland presence has been shown to be negatively correlated with economic damages following hurricanes and storm surge (Boutwell and Westra 2016), providing further evidence that wetlands increase community resilience. Natural vegetation and networks of connected wetlands further stabilize shorelines by trapping sediments and filtering excess nutrients from urban runoff. Living shorelines are constructed to enhance shoreline stabilization and coastal protection to climate change impacts. A review of restoration projects following Hurricane Sandy found that living shorelines were five to eight times more cost-effective than stone revetments for erosion control (Abt Associates 2019).

Florida ranks in the top three states nationally where existing coastal habitat is expected to defend the greatest number of people and property from sea level rise (Arkema et al. 2013). It is estimated that preserving and restoring coastal habitats in the U.S. could reduce the impacts of sea level rise on people and their property by half (Arkema et al. 2013). Conservation of natural lands in Florida, including unique, imperiled, and ecologically valuable habitat (e.g., riparian buffers, wildlife corridors), promotes coastal resiliency. Protecting large areas of natural lands directly protects the communities by reducing wave energy and shoreline erosion and reducing the impacts of future development. Land acquisition conserves native biodiversity, ecosystem function, promotes connectivity, increasing genetic diversity and species fitness, and allows for migration as climate

change induces shifts in species' distribution ranges (Damschen et al. 2019, DeFreese 1995, Tewksbury et al. 2002). Conservation of riparian buffers and natural flowways can help mitigate floods and protect coastal communities susceptible to flood risk (World Bank 2018).

Acquisition or management of coastal areas can protect against "coastal squeeze," when rising sea levels coupled with urban barriers prevent marsh from migrating to higher elevations (Borchert et al. 2018). Vegetated coastal habitats (e.g., marsh, mangrove, seagrass) contribute one- to two-orders of magnitude greater carbon sequestration per unit area compared to terrestrial forests (Mcleod et al. 2011). Thus, conserving and protecting these coastal ecosystems will contribute positively to offsetting increased atmospheric carbon dioxide that contributes to climate change. Finally, land conservation enhances water resource protection and management, reducing impervious surfaces, allowing water to filter naturally, and reducing flooding (Shepard et al. 2016).

Metrics:

Metric Title: RES003 : Community Resilience - # of residential, commercial, and public facilities benefiting
Target: TBD
Narrative: Florida proposes this as a program-wide metric to evaluate the success of the program. Program success would be determined as the number of residential, commercial, and public facilities benefited by the program, as applicable. Because specific projects or activities have not been identified as of yet under the program, a target value or range of values cannot be proposed, as it would be purely speculative. As projects or activities are selected for funding a range of values for this program metric can be proposed at that time. Each project or activity funded under this program may not be captured by this metric. Additional metrics would be determined to capture the benefits of each technique utilized under this program; specifically, each project or activity selected under the program would have specific metrics aimed at evaluating the success of the individual project or activity.

Metric Title: HR012 : Shoreline protection - Miles of living shoreline installed
Target: TBD
Narrative: Florida proposes this as a project or activity metric. The project or activity metrics may be adjusted as needed once projects or activities are funded. Metrics may be added, removed, or replaced as appropriate at the project work plan application stage. Once a project or activity is selected a target value will be established. Project or activity success would be determined as the number of miles of living shoreline installed. The purpose of this metric would be to verify that the living shoreline had been completed according to plans and designs. The outcome would be an increase in miles of living shoreline.

Metric Title: HC001 : Conservation easements - Acres protected under easement
Target: TBD
Narrative: Florida proposes this as a project or activity metric. The project or activity metrics may be adjusted as needed once projects or activities are funded. Metrics may be added, removed, or replaced as appropriate at the project work plan application stage. Once a project or activity is selected a target value will be established. Project or activity success would be determined as the total number of acres protected under a conservation easement. The purpose of this metric would be to verify that the conservation easement has been acquired and recorded in property records. The performance measure would be an executed and recorded conservation easement agreement. Upon receipt of the executed and recorded agreement, this metric would be complete. The outcome would be an increase in acres protected under easement, and lands would be conserved in perpetuity.

Metric Title: HC003 : Land acquisition - Acres acquired in fee
Target: TBD
Narrative: Florida proposes this as a project or activity metric. The project or activity metrics may be adjusted as needed once projects or activities are funded. Metrics may be added, removed, or replaced as appropriate at the project work plan application stage. Once a project or activity is selected a target value will be established. Project or activity success would be determined as the total number of acres acquired in fee. The purpose of this metric would be to verify that acquisition has been completed, and the performance measure would be an executed and recorded deed. Upon transfer of the parcel to Government ownership, this metric would be complete. The outcome would be an increase in protected acres.

Metric Title: PRM010 : Research - # studies used to inform mgmt.
Target: TBD
Narrative: Florida proposes this as a project or activity metric. The project or activity metrics may be adjusted as needed once projects or activities are funded. Metrics may be added, removed, or replaced as appropriate at the project work plan application stage. Once a project or activity is selected a target value will be established. Project or activity success would be evaluated and determined as the number of vulnerability assessments completed and used to inform management over the duration of the program. The purpose of this metric would be to verify and track that the vulnerability assessment has been completed, and the performance measure would be a completed vulnerability assessment report.

Risk and Uncertainties:

Florida's coastal communities are at significant risk from the effects of climate change, especially rising sea levels and temperatures, flooding, storm surge, erosion, and drought (Emrich et al. 2014, EPA 2017, FDEP 2018, Neumann et al. 2015, Strzepek et al. 2010). Florida has demonstrated a commitment to coastal resiliency and adaptation planning. In 2009, the first Climate Leadership Summit was convened by Broward, Miami-Dade, Monroe, and Palm Beach Counties. Since that time, FDEP, in coordination with other State and Federal partners, has developed guidance on adaptation planning and vulnerability assessments (FDEO 2015, FDEP 2018). FDEP has funded approximately 60 projects that produced vulnerability assessments for more than 20 communities. In 2019, the Governor appointed the first CRO to help prepare for the impacts of sea level rise in partnership with FDEP. Based on FDEP's experience, and the technical assistance available, there is a strong likelihood of success for executing the climate resiliency activities proposed in this program. Nevertheless, both short- and long-term risks and uncertainties are inherent in planning and implementing this program. There are also risks associated with climate change and uncertainties with climate change projections, both of which require careful consideration in planning for the long-term success of the program. This program will promote long-term coastal resiliency in each activity through an adaptive management approach and site-specific consideration of local and regional risks and uncertainties.

Near-term risks and uncertainties associated with this program are related to planning and implementing program activities (e.g., vulnerability assessments, living shorelines, or acquisitions). Risks include the uncertainty in project budget estimates and potential cost overruns. These risks can be mitigated through careful cost estimation, including reasonable contingencies, effective planning and design, third-party oversight, and adaptive management. Climate change science remains a source of public debate, thus public controversy is another near-term risk for this program that can be minimized through public engagement and transparency. Entities receiving funding would be required to document strong operation and management capabilities and financial resources to assure long-term project success.

While FDEP has successfully funded vulnerability assessments, funded and implemented living

shoreline projects, and conserved natural areas, there may be unexpected issues that arise. In planning living shorelines, unknown aspects of current site conditions, changing conditions, and unanticipated changes to a project's scale can alter plans. For land acquisition projects, near-term risks and uncertainties include the continued availability of properties, the successful negotiation of sales with landowners, and the cost of the land. These can be mitigated through thoughtful discussion with landowners, quality appraisals, and due diligence.

No near-term socioeconomic risks are anticipated from land acquisition or vulnerability assessment projects. Some near-term socioeconomic risks may be associated with construction of living shorelines. Construction activities have the potential to impact aesthetics, increase noise and local traffic, restrict access to recreational or commercial fishing sites, or navigation channels. However, impacts would be mitigated to the extent possible. Further, any impacts would be offset by the socioeconomic benefits of the program overall.

Long-term risks and uncertainties for this program are primarily associated with the uncertainty in making projections of future climate change scenarios for project implementation and design and the potential impact of climate change on the success and sustainability of program activities.

Climate change is projected to have a number of potential impacts in Florida, including but not limited to rising sea levels, warming air and water temperatures, increased frequency and magnitude of extreme weather events, storm surge, floods, drought, wildfires, increased erosion, and increases in invasive species. Florida is especially susceptible to sea level rise due to the overall low elevations and subtle topography (Emrich et al. 2014). Emrich et al. (2014) evaluated potential climate change impacts in Florida using a range of available models. Despite the uncertainties associated with model predictions, the risk associated with sea level rise is clear; every coastal county in Florida was found to be at risk for storm surge and 12 counties had residents at extreme risk to the lowest prediction of sea level rise investigated. As cited in Stys et al. (2017), 25 percent of 1,200 species tracked by the FNAI are expected to lose more than half of their current habitat area due to sea level rise. Studies have demonstrated the direct impact of sea level rise, reducing abundance and distribution of plant and animal species restricted to low elevation habitats in Florida (LaFever et al. 2007, Ross et al. 1994).

Vulnerability assessments rely on the selection and application of appropriate climate change projections. A range of future scenarios currently exist. Climate change modeling and decision support tools would be used to develop scenarios of future conditions, in the development of vulnerability assessments, but also during planning of living shorelines and identification of lands for acquisition. The current state-of-the-art approaches for climate change vulnerability and resilience/adaptation assessments, recognizing the significant uncertainty in projections of climate and sea level rise, includes just such an assessment of robust results across multiple scenarios (Chambwera et al. 2014, Moss et al. 2019). In general, resilience practitioners indicate that a common challenge is that action plans are stalling at the implementation stage, and in cases where uncertainty is considerable, project implementation is often structured as an iterative adaptive process (see Moss et al. 2014). This has led to an interest in alternative risk-based decision-analysis frameworks for adaptation, such as robust decision-making (Hallegatte et al. 2012), multicriteria analyses, or qualitative risk matrix calibrations when data are scarce. For this proposed program, ensuring robustness of the projected outcomes of project applications across multiple climate scenarios is one way to limit the risk associated with climate science uncertainty.

Assessing the long-term success of living shorelines and land acquisition projects in sustaining climate resiliency may depend on future climate projections. During project planning, accounting for future sea level rise in determining the appropriate depth for a living shoreline will help to

effectively reduce wave energy for shoreline protection. Also, for land acquisition, the success of conservation for coastal resiliency depends on the appropriate consideration of climate change impacts on those lands in the future. The sections below summarize some of the risks and uncertainties associated with climate change as well as the risks and uncertainties associated with the program activities and the long-term success of the program. A source for U.S. sea level rise and storm surge scenarios is the U.S. Global Change Research Program's Climate Change Science Report, which includes six sea level rise trajectories for the contiguous U.S. and storm surge return period exceedance curves at all Florida tide gauge locations (Sweet et al. 2017, USGCRP 2017).

Conservation and management of coastal habitats that have the capacity to provide a natural buffer to waves and storm surge (e.g., marshes, mangroves, submerged aquatic vegetation, oyster reef, coral reef, and barrier islands) will increase Florida's resiliency to climate change (Beck et al. 2018, Boutwell and Westra 2016, Ferrario et al. 2014, Guannel et al. 2016, Liu et al. 2013, USGCRP 2018, Zhang et al. 2012). Feagin et al. (2010) suggest that while coastal vegetation is effective in attenuating short-period wave energy, they may be less effective in reducing the impacts of storm surge. Thus, some uncertainty is associated with the ability of coastal habitats to reduce storm surge impacts.

Projects that conserve habitat corridors, riparian buffers, and natural flowways can sequester carbon, promote population and habitat connectivity, and provide protection against floods. However, the degree to which individual conservation lands achieve connectivity is uncertain. The effectiveness of a corridor depends on a variety of factors (e.g., size and shape of the patches connected by the corridor, distance between patches) and may be difficult to quantify (Tewksbury et al. 2002). Mcleod et al. (2011) outline some of the uncertainties associated with the mechanisms that control carbon sequestration; however, there is no doubt that conserving and protecting these vegetated coastal ecosystems will contribute positively to offsetting increased atmospheric carbon dioxide that contributes to climate change.

Despite the risks and uncertainties associated with climate change and future scenarios, the proposed program would identify areas most at risk for climate change-induced hazards and implement projects that improve coastal community's resiliency through careful future planning, identifying effective strategies, and conserving habitats that protect against the effects of climate change. While some risks and uncertainties exist for the long-term success of program activities, these may be mitigated through monitoring and adaptive management. Ultimately, any remaining risks and uncertainties would be offset by the long-term environmental benefits of the program.

No long-term socioeconomic risks are anticipated from living shorelines or vulnerability assessments. There may be long-term socioeconomic risks associated with some land acquisition projects, which could limit economic development, also resulting in lost property tax revenues in most areas; however, these are likely offset by the socioeconomic benefit of the program overall in reducing costs associated with storm and flood damage.

Other sources of long-term risk include a range of factors beyond the control of FDEP and program applicants, and include the trajectory and timing of population change and infrastructure development in project areas (which can in turn affect measures of resilience of physical assets and indicators of socioeconomic factors); the impact of natural disasters beyond the range of historical or projected science; or other site-specific factors. While some aspects of these long-term risks could be addressed through scenario analysis and assurances that project performance is robust to these uncertainties, we expect that program applicants would address these factors qualitatively.

Monitoring and Adaptive Management:

Program-wide monitoring for RES003, Community Resilience - # of residential, commercial, and

public facilities benefiting would occur for the duration of the program, if applicable to all projects or activities. Program success would be tracked as the number of residential, commercial, and public facilities benefiting under this program; the total number benefitting would be verified using associated program implementation documents.

FDEP will utilize a monitoring and adaptive management framework consistent with the Deepwater Horizon NRDA MAM Manual guidelines (DWH Trustees 2019) and the RESTORE Interim Observational Data Plan (ODP) Guidance (2018). The program would be adaptively managed to ensure the greatest benefits are achieved. For example, as new information on climate change and sea level rise becomes available, the information would be incorporated into planning and implementing vulnerability assessments and living shorelines. Project reports would be utilized to document applicable lessons learned to allow for improvements to be incorporated into future activities.

Project or activity monitoring including the metrics, duration, performance criteria, and adaptive management activities, would vary depending on the technique implemented in each project or activity. FDEP would require the development of adaptive management plans for all funded projects or activities to ensure long-term success.

Monitoring for HR012 - Miles of living shoreline installed would be conducted using surveys or aerial imagery, consistent with methods outlined in the NRDA MAM Manual (DWH Trustees 2019) and ODP Guidance (RESTORE 2018).

Monitoring for HC001: Conservation easements - Acres protected under easement and HC003: Land acquisition - Acres acquired in fee would take place following acquisition and acres would be verified by survey or aerial imagery, consistent with methods in the NRDA MAM Manual (DWH Trustees 2019) and ODP Guidance (RESTORE 2018).

Monitoring for PRM010: Research - # studies used to inform management would be used to verify and track the completion of vulnerability assessments funded; the number of studies (i.e., vulnerability assessments) would be tracked and documented for the duration of the program.

Data Management:

FDEP would develop an ODP and Data Management Plan detailing how data will be collected and managed at the time a project or activity is selected. FDEP would provide a publicly accessible central location to access relevant data.

Depending on the project technique, the following types of data would be collected: number, type, and location of vulnerability assessments conducted; planning and engineering data and miles of living shoreline installed; acreage acquired, location, and property information. For any partnerships with FF, property information will be made available on the FDEP Oculus site. Information on any FF activities are available at http://www.dep.state.fl.us/lands/FFplan_county.htm.

To the extent any environmental data are collected, field personnel would utilize standardized datasheets. Handwritten data will be transcribed into standard digital format or scanned to PDF. Transcribed data will be verified and validated prior to being released. After any identified errors are addressed, data would be considered QA/QC'd. Spatial data collected will have properly documented FGDC/ISO metadata, a data dictionary that defines codes and fields used in the dataset, or a Readme file describing how data was collected, QA/QC procedures, and other information such as relationships to other data, origin, usage, and format. FDEP would utilize the RESTORE MEtadata Records Library and Information Network for metadata records creation.

Collaboration:

FDEP collaborated with numerous State, regional, and local entities and stakeholders to develop and refine this program proposal. Meetings were held with local governments, Water Management Districts, National Estuary Programs (NEP), non-governmental organizations (NGO), Florida's RESTORE Act Center of Excellence (COE), and other RESTORE Council members. At these meetings, NGOs, local entities, State agencies, and NEPs reiterated their support for funding coastal resiliency projects, especially living shorelines and land acquisition.

FDEP also intends to coordinate with FDEP's ORCP which has already identified approximately 120 Florida communities that need a vulnerability assessment to measure the impacts of sea level rise and identify resources at risk. ORCP has awarded more than $4 million in the last two years to prepare coastal communities for the effects of rising sea levels, including coastal flooding, erosion and ecosystem changes.

Public Engagement, Outreach, and Education:

FDEP collaborated with the public and local entities to develop this program proposal through numerous meetings with local governments, Water Management Districts, NEPs, NOGs, and Florida's COE. FDEP will continue to collaborate with local entities and the public for their assistance in identifying potential program projects and activities. The public will have the opportunity to nominate projects through submitting proposals for funding as activities under this program. Prior to finalizing project screening and selection criteria, FDEP would hold a webinar to solicit and consider public comment and have similar public engagement opportunities associated with draft project lists.

This proposed program would partner with FF to streamline the process of identifying potential lands for acquisition, which incorporates additional opportunities for public engagement, outreach, and education. FF promotes land acquisition on behalf of the public, in part to improve public land management and increase public access to natural areas and public engagement is a critical component of the selection process. Acquisition projects may be nominated by Federal, State and local government agencies, conservation organizations, or private citizens. ARC meetings are publicly noticed, and the public is encouraged to provide comment on the projects. Nonprofit organizations may play a role in helping acquire conservation lands. They advocate for parcels to be placed onto the FF priority list and can act as intermediaries with owners, including assisting them with tax and estate planning issues. FF has previously collaborated with The Nature Conservancy, the Trust for Public Land, and The Conservation Fund. In addition to providing opportunities for the public to participate in the site selection and land acquisition process, FF provides education and outreach to ensure the public has knowledge of the accessibility of public lands. A publicly available database and mobile application are available to provide the public with information on the location, types of recreational opportunities, access points, facilities, amenities, and restrictions for public lands in Florida (Section 259.105, F.S.).

Leveraging:

Funds: TBD
Type: Bldg on Others
Status: Proposed
Source Type: State
Description: The proposed Florida Gulf Coast Resiliency Program would leverage funds and resources from the Office of Resiliency and Coastal Protection (ORCP) and the Florida Resilient Coastlines Program. The proposed Florida Gulf Coast Resiliency Program would leverage the knowledge and resources of the ORCP when identifying program activities. The ORCP which works to prepare Florida's coastal communities for current and future effects of rising sea levels, coastal flooding, erosion, and ecosystem changes and has identified communities in need of a vulnerability assessment (FDEP 2019b).

Funds: TBD
Type: Bldg on Others
Status: Proposed
Source Type: State
Description: The proposed Florida Gulf Coast Resiliency Program would leverage funds and resources from FF, including leveraging the FF priority list to help identify land acquisitions that might be implemented as part of this program. The FF priority list includes parcels ranked by the ARC as well as parcels in the Climate Change Lands category that when protected would help to improve coastal resiliency.

Environmental Compliance:

As per the RESTORE FPL 3 Proposal Submission Guidelines, this program includes Category 1 planning funds for living shorelines planning and design, and vulnerability assessments, which do not involve any construction or ground-breaking activities, program management, monitoring and adaptive management, and data management activities. Implementation of living shorelines and land acquisition is currently proposed for Category 2. Florida may work with other Council members to secure a categorical exclusion for National Environmental Policy Act requirements for land acquisition projects and activities implemented under this proposed program.

Bibliography:

Abt Associates. 2019. Evaluation of Hurricane Sandy Coastal Resilience Program. Prepared for National Fish and Wildlife Foundation (NFWF) and U.S. Department of the Interior (DOI). Abt Associates, Rockville, MD.

Arkema, K.K., Guannel, G., Verutes. G., Wood, S.A., Guerry, A., Ruckelshaus, M., Kareiva, P., Lacayo, M. and J.M. Silver. 2013. Coastal habitats shield people and property from sea-level rise and storms. Nature Climate Change, 3: 913–918.

Beaver, J.C. 2006. U.S. international borders: Brief facts. Library of Congress Washington DC Congressional Research Service.

Beever III, J.W, Gray, W., Trescott, D., Cobb, D., Utley, J. and L.B. Beever. 2009. Comprehensive Southwest Florida/Charlotte Harbor Climate Change Vulnerability Assessment. Prepared for: Southwest Florida Regional Planning Council and Charlotte Harbor National Estuary Program. Technical Report 09-3.

Beck, M.W., Losado, I.J., Menedez, P., Reguero, B.G., Diaz-Simal, P. and F. Fernandez. 2018. The global flood protection savings provided by coral reefs. Nature Communications, 9: 2186.

Bilkovic, D.M. and M.M. Mitchell. 2017. Designing Living Shorelines Salt Marsh Ecosystems to Promote Coastal Resilience, Chapter 15 in Bilkovic, D.M., Mitchell, M., LaPeyre, M., & J. Toft (Eds.), Living Shorelines: The Science and Management of Nature-Based Coastal Protection, CRC Press.

Borchert, S.M., Osland, M.J., Enwright, N.M. and K.T. Griffith. 2018. Coastal wetland adaptation to sea level rise: Quantifying potential for landward migration and coastal squeeze. Journal of Applied Ecology, 55: 2876-2887.

Boutwell, J.L. and J.V. Westra. 2016. The role of wetlands for mitigating economic damage from hurricanes. Journal of the American Water Resources Association, 52(6): 1472-1481.

Butler, W.H., Deyle, R.E. and C. Mutnansky. 2016. Low-regrets incrementalism: Land use planning adaptation to accelerating sea level rise in Florida's coastal communities. Journal of Planning Education & Research, 1: 9–10.

Chambwera, M., Heal, G., Dubeux, C., Hallegatte, S., Leclerc, L., Markandya, A., McCarl, B.A., Mechler, R. and J.E. Neumann. 2014. Economics of adaptation. In Field, C.B., Barros, V.R., Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Bilir, T.E., Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma,B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, S.R. and L.L. White (Eds.). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 945-977.

Dahl, T.E. 2005. Florida's wetlands: an update on status and trends 1985 to 1996. U.S. Fish and Wildlife Service, Washington D.C. Retrieved from https://www.fws.gov/wetlands/Documents/Floridas-Wetlands-An-Update-on-Status-and-Trends-1985-to-1996.pdf

Damschen, E. I., Brudvig, L. A., Burt, M. A., Fletcher, R. J., Haddad, N. M., Levey, D. J., Orrock, J.L., Resasco, J. and J.J. Tewksbury. 2019. Ongoing accumulation of plant diversity through habitat connectivity in an 18-year experiment. Science, 365(6460): 1478–1480.

DeFreese, D.E. 1995. Land acquisition: a tool for biological diversity protection in the Indian River Lagoon, Florida. Bulletin of Marine Science 57(1): 14-27.

DWH Trustees (Deepwater Horizon Natural Resource Damage Assessment Trustees). 2019. Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0. Originally released in December 2017, Updated August 2019. Retrieved from https://www.gulfspillrestoration.noaa.gov/sites/default/files/2019-08%20MAM_Manual_FULL_Updated%202019.pdf

Emrich, C.T., Morath, D.P., Bowser, G.C. and R. Reeve. 2014. Climate-sensitive hazards in Florida: Identifying and Prioritizing Threats to Build Resilience against Climate Effects. Hazards and Vulnerability Research Institute. EPA 430-F-16-011.

EPA (U.S. Environmental Protection Agency). 2017. Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A technical report for the Fourth National Climate Assessment. U.S. Environmental Protection Agency, EPA 430-R-17-001. Chapter 15: Coastal Property.

FDEO (Florida Department of Economic Opportunity). 2015. Sea level Rise Vulnerability Assessment Tools and Resources: A Guide for Florida's Local Governments. Tallahassee. Retrieved from https://floridadep.gov/sites/default/files/SLR-VA-tools-extended_1.pdf

FDEP (Florida Department of Environmental Protection). 2018. Florida Adaptation Planning Guidebook. Retrieved from https://floridadep.gov/sites/default/files/AdaptationPlanningGuidebook.pdf

FF (Florida Forever). 2019a. 2020 Florida Forever Priority List – ARC Recommended. December. Retrieved from http://publicfiles.dep.state.fl.us/DSL/FFWeb/ARC%20Recommended%20Florida%20Forever%20Priority%20List.pdf

FDEP (Florida Department of Environmental Protection). 2019a. Project GreenShores. Retrieved from https://floridadep.gov/rcp/aquatic-preserve/content/project-greenshores

FDEP (Florida Department of Environmental Protection). 2019b. Office of Resilience and Coastal Protection and Florida Resilient Coastlines Program. Retrieved from https://floridadep.gov/RCP and https://floridadep.gov/rcp/florida-resilient-coastlines-program

Feagin, R.A., Mukherjee, N., Shanker, K., Baird, A.H., Cinner, J., Kerr, A.M., Koedam, N., Sridhar, A., Arthur, R., Jayatissa, L.P., Lo Seen, D., Menon, M., Rodriguez, S., Shamsuddoha, M., and F. Dahdouh-Guebas. 2010. Shelter from the storm? Use and misuse of coastal vegetation bioshields for managing natural disasters. Conservation Letters, 3: 1-11.

Ferrario, F., Beck, M.W., Storlazzi, C.D., Micheli, F., Shepard, C.C. and L. Airoldi. 2014. The effectiveness of coral reefs for coastal hazard risk reduction and adaptation. Nature Communications, 5(1): 1-9.

FF (Florida Forever). 2019. 2019 Florida Forever Five-year Plan, Summary of Recommendations and Status as of December 2018. Division of State Lands Florida Department of Environmental Protection. May. Retrieved from http://publicfiles.dep.state.fl.us/DSL/FFWeb/Current%20Florida%20Forever%20Five-Year%20Plan.pdf

Florida Living Shorelines. 2020. Naval Support Activity. Retrieved from http://floridalivingshorelines.com/project/820/

Florida Statutes. 2018. Chapter 259 Land Acquisitions for Conservation or Recreation. Title XVIII Public Lands and Property. The Florida Senate. Retrieved from https://www.flsenate.gov/Laws/Statutes/2018/Chapter259

FNAI (Florida Natural Areas Inventory). 2010. Guide to the natural communities of Florida: 2010 edition. Florida Natural Areas Inventory, Tallahassee.

FNAI (Florida Natural Areas Inventory). 2018. Florida Forever Project Ranking Support Analyses Documentation. Florida Natural Areas Inventory. Tallahassee, FL. Retrieved from https://www.fnai.org/PDF/FF_RSA_Report_Nov2018.pdf

FNAI (Florida Natural Areas Inventory). 2020. Summary of Florida Conservation Lands. Retrieved from https://www.fnai.org/PDF/Maacres_202002_FCL_plus_LTF.pdf

Guannel, G., Arkema, K., Ruggiero, P. and G. Verutes. 2016. The power of three: coral reefs, seagrasses and mangroves protect coastal regions and increase their resilience. PloS one, 11(7).

Hallegatte, S., Shah, A., Lempert, R., Brown, C. and S. Gill. 2012. Investment Decision Making Under Deep Uncertainty, Application to Climate Change. Policy Research Working Paper 6193. The World Bank, Sustainable Development Network, Office of the Chief Economist, September. https://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-6193

LaFever, D.H., Lopez, R.R., Feagin, R.A. and N.J. Silvy. 2007. Predicting the impacts of future sea-level rise on an endangered lagomorph. Environmental Management, 40: 430-437.

Liu, H., Zhang, K., Li, Y. and L. Xie. 2013. Numerical study of the sensitivity of mangroves in reducing storm surge and flooding to hurricane characteristics in southern Florida. Continental Shelf Research, 64: 51-65.

Mcleod, E., Chmura, G.L., Bouillon, S., Salm, R., Björk, M., Duarte, C.M., Lovelock, C.E., Schlesinger, W.H. and B.R. Silliman. 2011. A blueprint for blue carbon: toward an improved understanding of the role of vegetated coastal habitats in sequestering CO2. Frontiers in Ecology and the Environment, 9(10): 552–560.

Miller, J.K., Rella, A., Williams, A. and E. Sproule. 2015. Living Shorelines Engineering Guidelines. Prepared for: New Jersey Department of Environmental Protection. Retrieved from http://floridalivingshorelines.com/wp-content/uploads/2015/04/New-Jersey-LivingShorelinesEngineeringGuidelines.pdf

Moss, R.H., Avery, S., Baja, K., Burkett, M., Chischilly, A.M., Dell, J., Fleming, P.A., Geil, K., Jacobs, K. Jones, A., Knowlton, K. Koh, J., Lemos, M.C., Melillo, J., Pandya, R., Richmond, T.C., Scarlett, L., Snyder, J. Stults, M., Waple, A., Whitehead, J., Zarrilli, D., Fox, J., Ganguly, A., Joppa, A., Julius, S., Kirshen, P. Kreutter, R., McGovern, A., Meyer, R., Neumann, J., Solecki, W.,Smith, J., Tissot, P., Yohe, G. and R. Zimmerman. 2019. Evaluating knowl¬edge to support climate action: A framework for sustained assessment. Weather, Climate, and Society, 11: 465-487. Retrieved from https://doi.org/10.1175/WCAS-D-18-0134.1

Moss, R. H., Lynn Scarlett, P., Kenney, M.A., Kunreuther, H., Lempert, R., Manning, J. and B. K. Williams. 2014. Decision support: Connecting science, risk perception, and decisions. In Melillo, J.M., Richmond, T.C. and G.W. Yohe (Eds.), Climate Change Impacts in the United States: The Third National Climate Assessment, U.S. Global Change Research Program, 620–647. Retrieved from https://data.globalchange.gov/report/nca3/chapter/decisionsupport

Neumann, J.E., Emanuel, K., Ravela, S., Ludwig, L., Kirshen, P., Bosma, K. and J. Martinich. 2015. Joint effects of storm surge and sea-level rise on U.S. Coasts: New economic estimates of impacts, adaptation, and benefits of mitigation policy. Climatic Change, 129(1–2): 337–349. Retrieved from https://doi.org/10.1007/s10584-014-1304-z

NOAA (National Oceanic and Atmospheric Administration). 2015. Guidance for Considering the Use of Living Shorelines. Retrieved from https://www.habitatblueprint.noaa.gov/wp-content/uploads/2018/01/NOAA-Guidance-for-Considering-the-Use-of-Living-Shorelines_2015.pdf

Reguero, B.G., Beck, M.W., Bresch, D.N., Calil, J. and I. Meliane. 2018. Comparing the cost effectiveness of nature-based and coastal adaptation: A case study from the Gulf Coast of the United

States. PLoS ONE, 13(4): e0192132.

RESTORE Council. 2018. Observational Data Plan (ODP) Draft Interim Guidance. https://restorethegulf.gov/sites/default/files/20180713_DraftInterimGuidanceObservationalDataPlan_508Compliant.docx

Ross, M.S., O'Brien, J.J. and L. da Silveira Lobo Sternberg. 1994. Sea-level rise and the reduction in pine forests in the Florida Keys. Ecological Applications, 4(1): 144-156.

Shepard C., Majka, D., Brody, S., Highfield, W. and J. Fargione. 2016. Protecting Open Space & Ourselves: Reducing Flood Risk in the Gulf of Mexico Through Strategic Land Conservation. Washington D.C.: The Nature Conservancy. Retrieved from https://www.conservationgateway.org/ConservationPractices/Marine/crr/library/Documents/TNC_open_spaces_2016.pdf

Strzepek, K., Yohe, G., Neumann, J., and B. Boehlert. 2010. Characterizing Changes in Drought Risk for the United States from Climate Change. Environmental Research Letters no. 5:044012. doi: 10.1088/1748-9326/5/4/044012.

Stys, B., Foster, T., Fuentes, M.M.P.B., Glazer, B., Karish, K., Montero, N. and J.S. Reece. 2017. Climate Change Impacts on Florida's Biodiversity and Ecology. Chapter 12 in Chassignet, E. P., Jones, J. W., Misra, V., & J. Obeysekera (Eds.), Florida's climate: Changes, variations, & impacts. Gainesville, FL: Florida Climate Institute.

Sweet, W.V., Kopp, R.E., Weaver, C.P., Obeysekera, J., Horton, R.M., Thieler, E.R. and C. Zervas. 2017. Global and Regional Sea Level Rise Scenarios for the United States. NOAA Technical Report, NOS CO-OPS 083.

Taylor Engineering, Inc. 2019. City of Punta Gorda Adaptation Plan Update. Prepared for: City of Punta Gorda. Retrieved from http://www.ci.punta-gorda.fl.us/government/city-manager/climate-adaptation-plan

Tewksbury, J.J., Levey, D.J., Haddad, N.M., Sargent, S., Orrock, J.L., Weldon, A., Danielson, B.J., Brinkerhoff, J., Damschen, E.I. and P. Townsend. 2002. Corridors affect plants, animals, and their interactions in fragmented landscapes. Proceedings of the National Academy of Sciences, 99(20): 12923-12926.

Thatcher, C.A., Brock, J.C. and E.A. Pendleton. 2013. Economic vulnerability to sea-level rise along the northern US Gulf Coast. Journal of Coastal Research, 63(sp1), pp.234-243.

USGCRP (U.S. Global Change Research Program). 2018. Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II. Reidmiller, D.R., Avery, C.W., Easterling, D.R., Kunkel, K.E., Lewis, K.L.M., Maycock, T.K. and B.C. Stewart (Eds.). Washington, D.C.: United States Global Change Research Program. Accessed 3/19/2020. Retrieved from http://dx.doi.org/10.7930/NCA4.2018

World Bank. 2018. Nature-based Solutions for Disaster Risk Management. Washington, D.C.: World Bank Group (in association with PROFOR and the World Resources Institute).

Zhang, K., Liu, H., Li, Y., Xu, H., Shen, J. Rhome, J. and T.J. Smith. 2012. The role of mangroves in attenuating storm surges. Estuarine, Coastal and Shelf Science, 102–103: 11-23.

Budget

Project Budget Narrative:
The budget for this proposed program consists of $15,000,000, of which the majority (approximately 90%) would be spent on planning or implementation of projects or activities aimed at improving coastal resiliency. The total amount of funding requested as Category 1 is $6,000,000 and the total amount of funding requested as Category 2 is $9,000,000. The Category 1 funds would be spent on State of Florida program administration and project or activity specific Planning, E&D and permitting. It is assumed that vulnerability assessments would consider a planning activity. Program monitoring and adaptive management activities, and data management activities would also fall under Category 1. Category 2 funds would be used to implement projects or activities such as construction of living shorelines or land acquisition and would include project or activity specific monitoring and adaptive management activities, and data management activities. More detailed budgets will be developed at the project or activity level when projects or activities are selected for funding under this program, including an appropriate contingency. The percentages listed below apply to the entire $15,000,000 funding request.

Total FPL 3 Project/Program Budget Request:
$ 15,000,000.00

Estimated Percent Monitoring and Adaptive Management: 2 %
Estimated Percent Planning: 30 %
Estimated Percent Implementation: 60 %
Estimated Percent Project Management: 7 %
Estimated Percent Data Management: 1 %
Estimated Percent Contingency: 0 %

Is the Project Scalable?:
Yes

If yes, provide a short description regarding scalability.:
Yes, the program could be scaled to allow for more or less activities over a longer or shorter duration of time.

Environmental Compliance[1]

Environmental Requirement	Has the Requirement Been Addressed?	Compliance Notes (e.g.,title and date of document, permit number, weblink etc.)
National Environmental Policy Act	Yes	Section 4(d)(3) of Council NEPA Procedures applies to Category 1 funds for planning.
Endangered Species Act	N/A	Note not provided.
National Historic Preservation Act	N/A	Note not provided.
Magnuson -Stevens Act	N/A	Note not provided.
Fish and Wildlife Conservation Act	N/A	Note not provided.
Coastal Zone Management Act	N/A	Note not provided.
Coastal Barrier Resources Act	N/A	Note not provided.
Farmland Protection Policy Act	N/A	Note not provided.
Clean Water Act (Section 404)	N/A	Note not provided.
River and Harbors Act (Section 10)	N/A	Note not provided.
Marine Protection, Research and Sanctuaries Act	N/A	Note not provided.
Marine Mammal Protection Act	N/A	Note not provided.
National Marine Sanctuaries Act	N/A	Note not provided.
Migratory Bird Treaty Act	N/A	Note not provided.
Bald and Golden Eagle Protection Act	N/A	Note not provided.
Clean Air Act	N/A	Note not provided.
Other Applicable Environmental Compliance Laws or Regulations	N/A	Note not provided.

[1] Environmental Compliance document uploads available by request (restorecouncil@restorethegulf.gov).

Maps, Charts, Figures

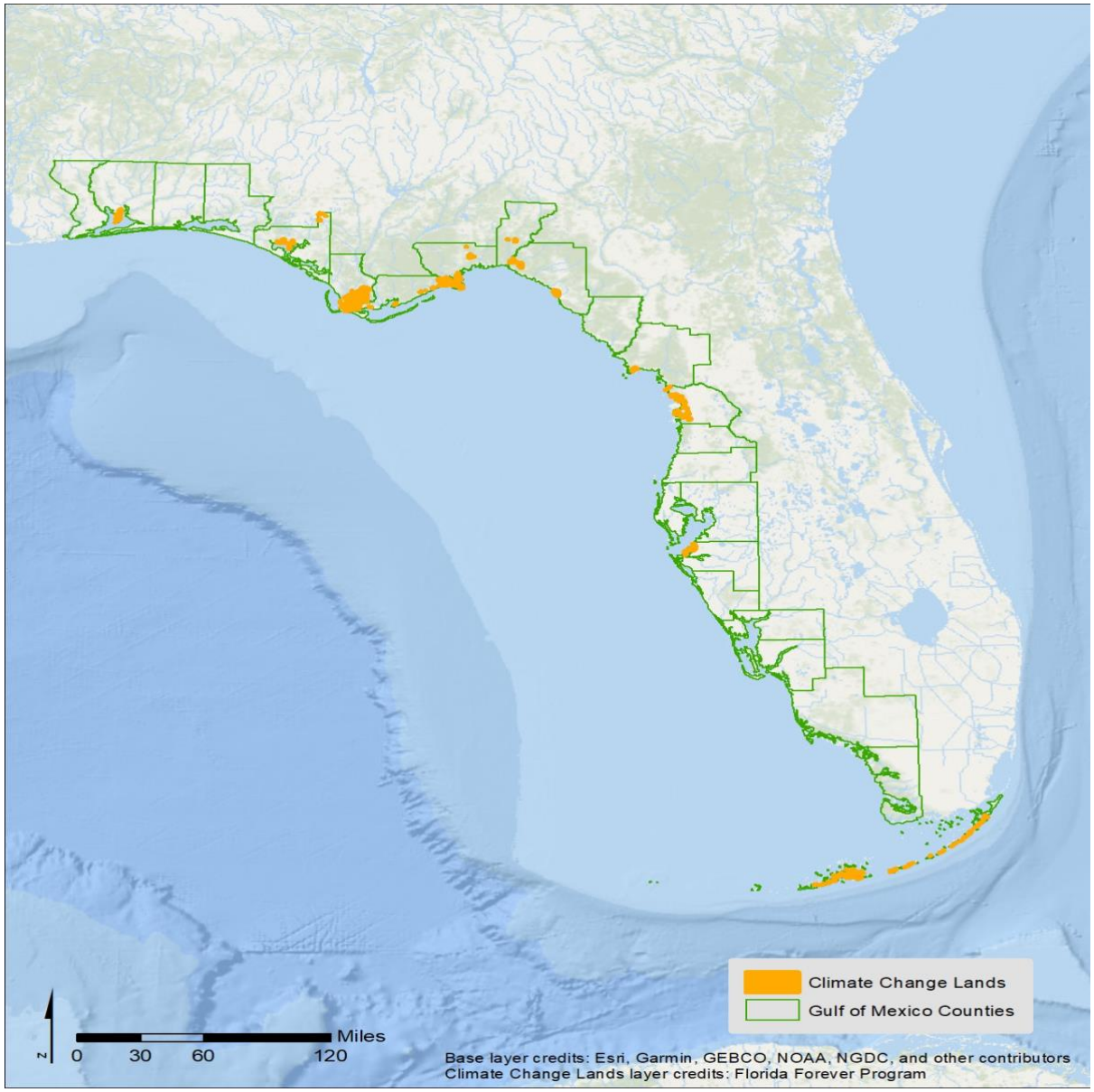

Figure 1 : Map illustrating the proposed extent of the Florida Gulf Coast Resiliency Program, including the 23 counties along the Florida Gulf of Mexico coastline. Areas for potential acquisition under this proposed program, identified as Climate Change Lands through the Florida Forever Program, are highlighted.

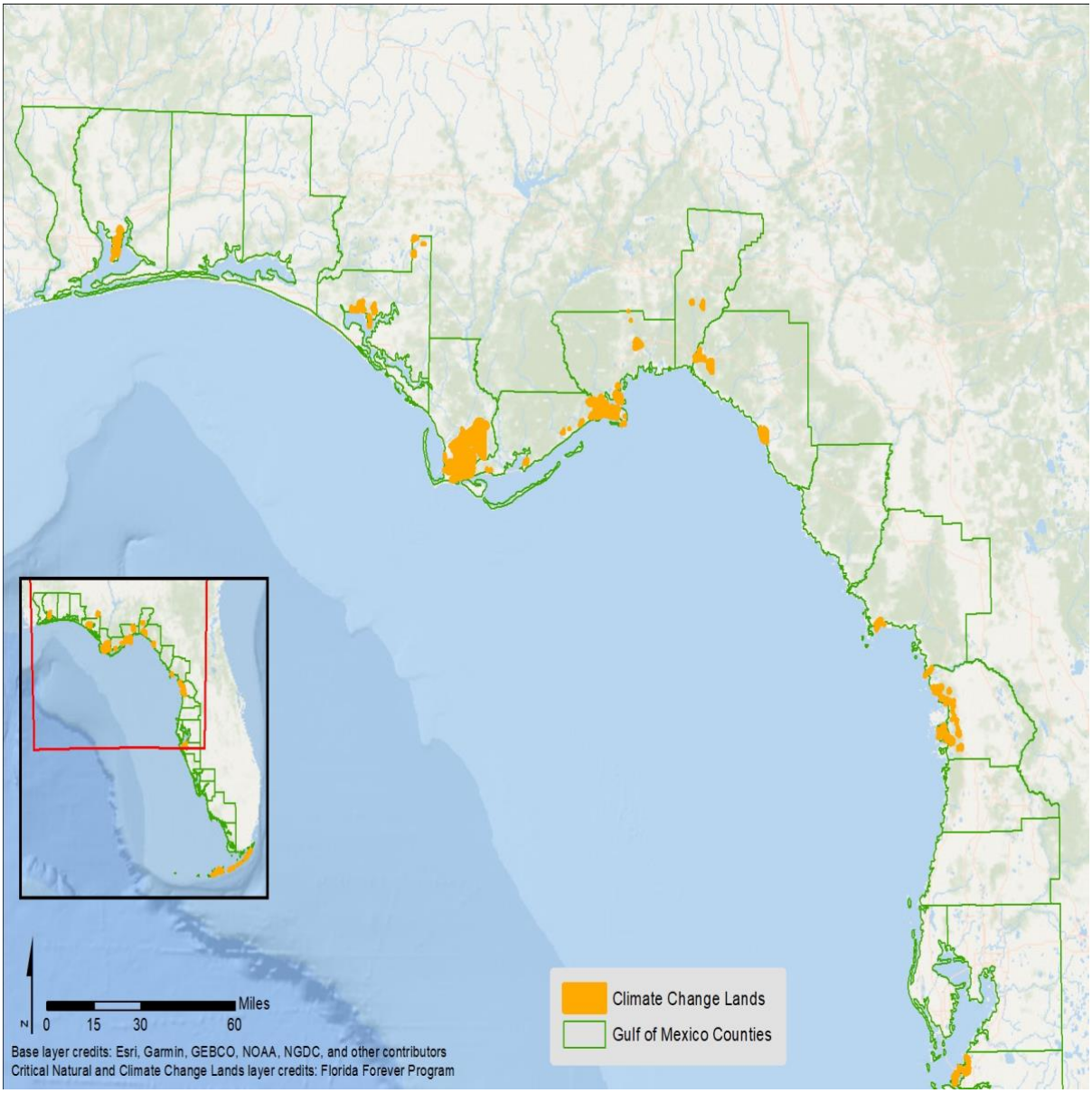

Figure 2 : Map illustrating a closer view of the northern extent of the Florida Gulf Coast Resiliency Program and identified Climate Change Lands for northern Florida and the Panhandle.

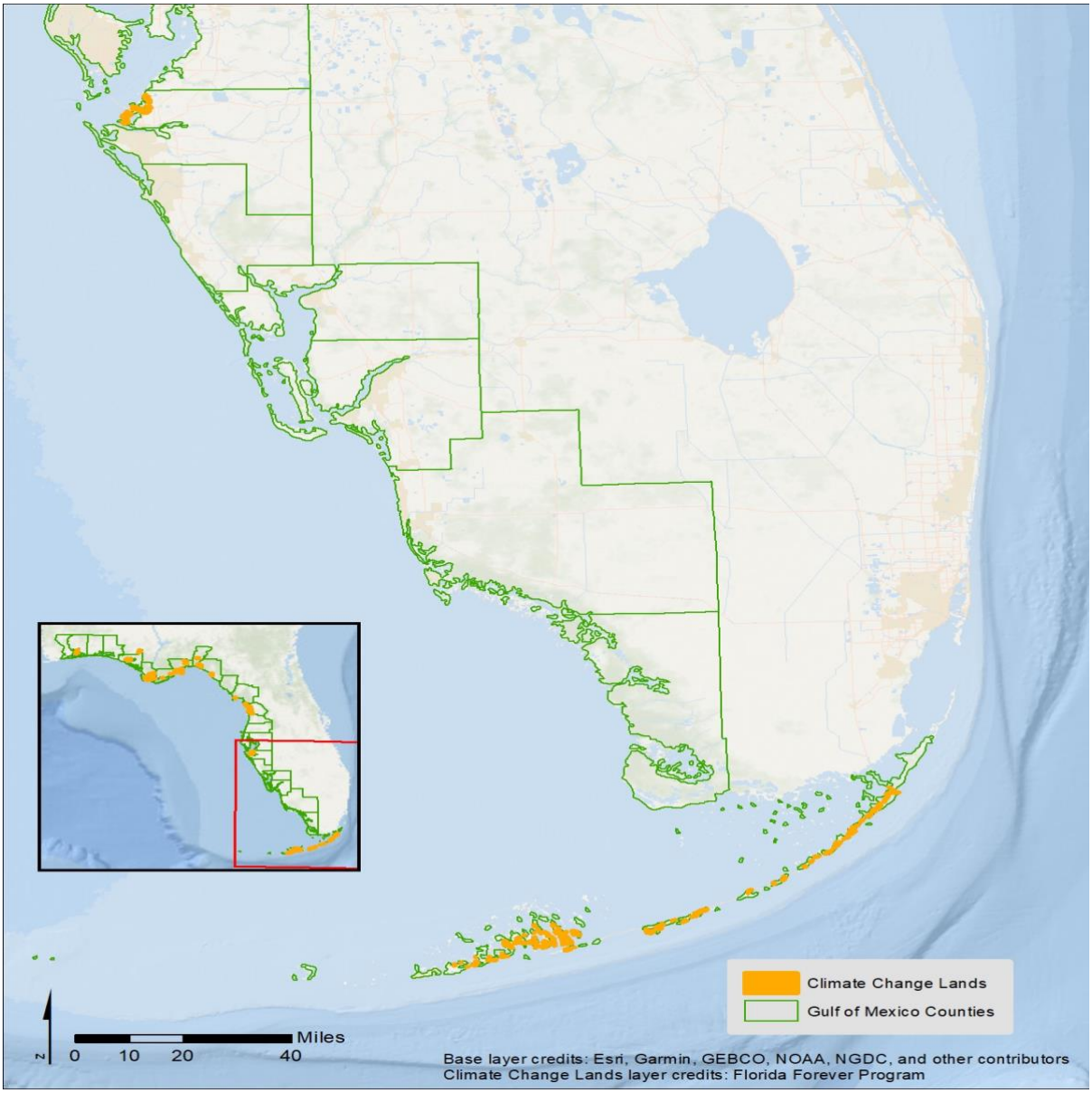

Figure 3 : Map illustrating a closer view of the southern extent of the Florida Gulf Coast Resiliency Program and identified Climate Change Lands for southern Florida and the Keys.

RESTORE Council FPL 3 Proposal Document

General Information

Proposal Sponsor:
State of Florida Department of Environmental Protection

Title:
Florida Gulf Coast Resiliency Program

Project Abstract:
Florida, through the Department of Environmental Protection (FDEP), is requesting $15 million of Council-Selected Restoration Component funding for the proposed Florida Gulf Coast Resiliency Program, which includes planning and implementation activities to identify vulnerabilities and implement sustainable solutions to improve coastal resiliency. Category 1 funds would be used for planning, design, and environmental compliance; Category 2 funds would be used for implementation and monitoring. Program activities include vulnerability assessments aimed at identifying strategies to improve resiliency; living shorelines to protect against erosion and reduce wave energy; and coastal and submerged lands management and acquisition activities to protect habitats that enhance resiliency. FDEP would partner with the Florida Forever Program (FF) to identify acquisitions and with the Office of Resilience and Coastal Protection on vulnerability assessments and submerged lands management activities. Program duration is expected to be 10 years.

Developing strategies to address resiliency is critical to Florida's ability to adapt to a changing coastline. This program would result in significant benefits such as resiliency improvements, protections against wave energy and storm surge, habitat protection (e.g., marshes, mangroves, seagrass, coral, and oyster reefs), sustaining healthy wildlife populations, water quality benefits, recreation and tourism opportunities, and fisheries benefits.

FPL Category: Cat 1: Planning/ Cat2: Planning, Implementation

Activity Type: Program

Program: Florida Coastal Resiliency Program

Co-sponsoring Agency(ies): N/A

Is this a construction project?
No

RESTORE Act Priority Criteria:
(II) Large-scale projects and programs that are projected to substantially contribute to restoring and protecting the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast ecosystem.

(IV) Projects that restore long-term resiliency of the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands most impacted by the Deepwater Horizon oil spill.

Priority Criteria Justification:
The Florida Gulf Coast Resiliency Program includes a suite of intrinsically-linked activities aimed at improving coastal communities' resiliency to climate change and changing environmental conditions. Program activities would include identifying risks and vulnerabilities, implementing solutions, and protecting and managing lands to mitigate effects of climate change. The program meets the large-scale and restore long-term resiliency priority criteria.

This program is designed to result in large-scale environmental benefits, particularly in relation to the needs of Florida's coastal communities. Florida is especially susceptible to the effects of climate change, specifically sea level rise. Program activities such as vulnerability assessments would identify areas most susceptible to the effects of climate change and identify strategies to counteract those effects. Program activities would also include projects to improve resiliency, such as planning and implementing living shorelines that protect coastal areas against erosion and acquiring and managing lands, including offshore submerged lands that mitigate effects of climate change (e.g., sequester carbon, protect against flooding and sea level rise). These activities would result in significant environmental benefits to coastal communities, identifying those communities most at risk for future planning and improving protection against erosion, coastal flooding, and storm surge.

Program activities would help restore long-term resiliency of natural resources most impacted by the Deepwater Horizon oil spill by protecting and enhancing coastal communities and resources that were impacted by the spill. Coastal land protection of marshes, mangroves, seagrass, coral, and oyster beds will help improve coastal community resiliency by protecting communities against sea level rise and storm surge; and improve ecosystem resiliency and sustainability by providing opportunities for coastal wetland migration.

Project Duration (in years): 10

Goals

Primary Comprehensive Plan Goal:
Enhance Community Resilience

Primary Comprehensive Plan Objective:
Promote Community Resilience

Secondary Comprehensive Plan Objectives:
N/A

Secondary Comprehensive Plan Goals:
N/A

PF Restoration Technique(s):
Create, restore, and enhance coastal wetlands, islands, shorelines and headlands: Protect natural shorelines
Improve science-based decision-making processes: Develop tools for planning and evaluation
Protect and conserve coastal, estuarine, and riparian habitats: Land acquisition

Location

Location:
Florida coastlines and estuaries along the Gulf of Mexico.

HUC8 Watershed(s):
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Florida Panhandle Coastal(Perdido Bay)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Choctawhatchee(Upper Choctawhatchee)
South Atlantic-Gulf Region(Southern Florida) - Southern Florida(Everglades)
South Atlantic-Gulf Region(Southern Florida) - Southern Florida(Florida Bay-Florida Keys)
South Atlantic-Gulf Region(Southern Florida) - Southern Florida(Big Cypress Swamp)
South Atlantic-Gulf Region(Southern Florida) - Southern Florida(Caloosahatchee)
South Atlantic-Gulf Region(Southern Florida) - Southern Florida(Florida Southeast Coast)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Peace(Peace)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Peace(Myakka)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Peace(Charlotte Harbor)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Sarasota Bay)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Manatee)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Little Manatee)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Alafia)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Hillsborough)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Tampa Bay)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Crystal-Pithlachascotee)
South Atlantic-Gulf Region(Peace-Tampa Bay) - Tampa Bay(Withlacoochee)
South Atlantic-Gulf Region(Suwannee) - Aucilla-Waccasassa(Waccasassa)
South Atlantic-Gulf Region(Suwannee) - Aucilla-Waccasassa(Econfina-Steinhatchee)
South Atlantic-Gulf Region(Suwannee) - Suwannee(Lower Suwannee)
South Atlantic-Gulf Region(Ochlockonee) - Ochlockonee(Lower Ochlockonee)
South Atlantic-Gulf Region(Apalachicola) - Apalachicola(Apalachicola)
South Atlantic-Gulf Region(Apalachicola) - Apalachicola(New)
South Atlantic-Gulf Region(Apalachicola) - Apalachicola(Apalachicola Bay)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Florida Panhandle Coastal(St. Andrew-St. Joseph Bays)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Florida Panhandle Coastal(Choctawhatchee Bay)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Florida Panhandle Coastal(Pensacola Bay)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Florida Panhandle Coastal(Yellow)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Florida Panhandle Coastal(Blackwater)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Choctawhatchee(Lower Choctawhatchee)
South Atlantic-Gulf Region(Choctawhatchee-Escambia) - Escambia(Escambia)
South Atlantic-Gulf Region(Suwannee) - Aucilla-Waccasassa(Aucilla)
South Atlantic-Gulf Region(Ochlockonee) - Ochlockonee(Apalachee Bay-St. Marks)

State(s):
Florida

County/Parish(es):

FL - Escambia
FL - Pasco
FL - Pinellas
FL - Charlotte
FL - Citrus
FL - Collier
FL - Dixie
FL - Franklin
FL - Sarasota
FL - Taylor
FL - Wakulla
FL - Bay
FL - Gulf
FL - Santa Rosa
FL - Walton
FL - Hernando
FL - Hillsborough
FL - Jefferson
FL - Lee
FL - Levy
FL - Manatee
FL - Monroe
FL - Okaloosa

Congressional District(s):

FL - 14
FL - 15
FL - 26
FL - 11
FL - 13
FL - 16
FL - 5
FL - 12
FL - 1
FL - 19
FL - 25
FL - 2
FL - 17

Narratives

Introduction and Overview:

The Florida Gulf Coast Resiliency Program includes planning and implementation activities to identify risks and vulnerabilities and implement sustainable solutions to improve coastal resiliency to the effects of climate change, extreme weather, coastal inundation, and other stressors. Increasing community resilience is a priority for Florida where coastal communities and habitats are at significant risk to rising sea levels (FDEP 2018). The program would consist of a suite of intrinsically linked activities that in combination result in significant improvements in resiliency. Activities may include: vulnerability assessments, living shorelines, and land acquisition and management. All program activities would occur within the 23 counties along the Florida Gulf of Mexico coastline and would address similar environmental stressors resulting from climate change, rising sea levels, and increasing intensity of storms.

FDEP would evaluate proposals submitted by the public and select those that fulfill the program purpose (e.g., enhance resiliency in vulnerable communities, protect natural resources, sustain healthy ecosystems, and allow communities to adapt to changing conditions). The proposed program, at the requested funding level, would enable FDEP to fund critical projects that would make significant, measurable improvements to the long-term resiliency of natural resources, fisheries, marine and wildlife habitats, beaches, and coastal habitats.

Goals/Objectives: This program meets the Enhance Community Resilience Comprehensive Plan goal and the Promote Community Resilience objective. The program would increase the capacity of communities to adapt to short-term changes, such as increased flood risks or storm surge, and long-term changes, such as rising sea levels, by: identifying strategies to address resiliency, which is critical to Florida's ability to adapt to a changing coastline; creating living shorelines to reduce erosion, wave energy, and protect against storms; and acquiring and managing lands in critical areas that will allow habitats and species to adapt or migrate in response to changing climate and coastlines.

Commitments: The proposed program illustrates Florida's commitment to science-based decision-making. Vulnerability assessments allow ecological, social, and economic information to be viewed alongside sea level rise and storm surge scenarios to assist in resiliency planning. These efforts allow FDEP to identify science-based strategies to counteract the effects of climate change. For land acquisitions, FDEP would leverage the FF priority list targeting the Climate Change Lands category (FF 2019a); FF utilizes a science-based evaluation process where parcels are ranked based on environmental conditions that include protection of coastal habitat and mitigation of effects of sea level rise.

FDEP is committed to public engagement, inclusion, and transparency. Stakeholders were engaged in the development of this proposal through numerous meetings with local entities and the public will have the opportunity to propose program activities. Vulnerability assessments and implementation of resiliency strategies will have required public engagement elements, particularly targeting vulnerable populations in the community. Products of all program activities will be required to be posted on a publicly available website by the grantee.

The program would leverage resources and partnerships to identify and implement activities. When evaluating activities, FDEP will consider whether the project leverages other funding sources. For land acquisitions, the program will coordinate with FF to identify projects. FDEP will also coordinate with local entities to identify projects and program activities; as well as FDEP's Office of Resilience and Coastal Protection (ORCP), which has identified communities that need a vulnerability assessment. Finally, illustrating Florida's commitment to coordinating resources and partnerships,

delivering results, and relying on the best available science, Florida's Governor appointed the first Chief Resilience Officer (CRO) in August 2019. The CRO is tasked with preparing for the environmental, physical, and economic impacts of sea level rise and will work with ORCP to execute this program.

Environmental Benefits: Much of the Florida coast is developed and approximately 80 percent of Florida's population live within 10 miles of the coast (FDEP 2018). Due to low elevations, coastal communities and habitats are at significant risk from the effects of climate change, especially rising sea levels and flooding (FDEP 2018). The proposed program would result in significant environmental benefits to coastal communities by increasing coastal resiliency, specifically through implementation of vulnerability assessments, living shorelines, and conservation or increased protection of natural areas, including offshore submerged lands and riparian buffers.

Efforts to assess a community's vulnerability to projected climate change-related short and long-term changes have become increasingly valuable for planning and implementing appropriate strategies for mitigation and adaptation. Vulnerability assessments help identify communities at risk by evaluating the range and magnitude of impacts based on various scenarios (e.g., sea level rise, temperatures, frequency and duration of fires, drought, and extreme weather events). Understanding what makes a community most vulnerable to climate change allows resource managers to plan and implement corrective measures to mitigate threats (FDEO 2015, FDEP 2018, Stys et al. 2017).

Coastal habitats such as barrier islands, marsh, mangroves, seagrass, oyster reefs, and coral reefs intrinsically reduce wave energy and erosion, protecting coastal communities from storm surge and sea level rise (Beck et al. 2018, Boutwell and Westra 2016, Ferrario et al. 2014, Guannel et al. 2016, Liu et al. 2013, USGCRP 2018). Natural vegetation and networks of connected wetlands stabilize shorelines by trapping sediments and filtering excess nutrients from urban runoff, while providing essential habitat for commercially valuable species. Living shorelines enhance shoreline stabilization and coastal protection against sea level rise and increasing storm surge (Bilkovic and Mitchell 2017).

Acquisition, conservation, and regulatory protection of natural areas, including unique, imperiled, and ecologically valuable habitats (e.g., riparian buffers, wildlife corridors, submerged lands), promotes coastal resiliency and strengthens natural resources. Protecting large areas of natural lands preserves the ecosystems that reduce wave energy and erosion. Land conservation protects native biodiversity and ecosystem function, promotes connectivity, increasing genetic diversity and species fitness, and allows for migration or adaptation as climate change induces shifts in species' range of distribution (Damschen et al. 2019, DeFreese 1995, Tewksbury et al. 2002). Land conservation enhances water resource protection by reducing impervious surfaces, allowing water to filter naturally, reducing flooding, and improving water quantity and quality (Shepard et al. 2016).

Environmental Stressors: Comprehensive resource management and planning efforts, such as FF, Florida Gulf Environmental Benefit Fund Restoration Strategy, Basin Management Action Plans, Aquatic preserve Management Plans, and others have identified stressors and threats to Florida's natural resources including habitat loss and fragmentation, and effects of climate change such as sea level rise. This proposed program would directly address habitat loss and fragmentation through acquisitions and land management protections, and address the effects of climate change by constructing living shorelines to reduce wave energy and storm surge and protect coastal lands to enhance resiliency and sustainability.

Costs: $15,000,000. Funds requested for this program will leverage resources from FF. Category 1 funds would be used for planning, design, and environmental compliance; Category 2 funds would be used for implementation and monitoring.

Timeline: The duration of program planning and implementation is expected to be 10 years. Land acquisitions identified from the FF priority list could begin as funding is received; lands would be maintained in perpetuity.

Partners: FDEP would partner with FF to leverage FF's science-based approach to conservation and streamline the land acquisition process. Other program partners include the FDEP ORCP on submerged lands stewardship activities and vulnerability assessments. ORCP has awarded more than $4 million over the last two years to prepare coastal communities for the effects of rising sea levels, flooding, and erosion.

FPL 3 Planning Framework: This proposed program is consistent with the Protect and Conserve Coastal, Estuarine, and Riparian Habitats priority approach identified in the FPL 3 planning framework. The primary goal and objective of this program is to improve coastal resiliency, through techniques such as living shorelines and coastal habitat protection. Identifying strategies to improve coastal resiliency will help ensure Florida's coastal communities are able to adapt to the effects of climate change by conserving Florida's natural resources, reducing wave energy, protecting against storm surge, and providing opportunities for species and habitat migration.

Proposed Methods:

The proposed Florida Gulf Coast Resiliency Program consists of a suite of intrinsically linked conservation activities designed to identify risks and vulnerabilities and implement sustainable solutions to improve coastal community resiliency to the effects of climate change, extreme weather, coastal inundation, and other environmental stressors. This program could include various activities such as vulnerability assessments; planning, design, and construction of living shorelines (where needed and viable); acquiring and managing lands for conservation; as well as other activities that improve coastal resiliency such as habitat restoration (e.g., oyster reef, marsh, beach and dune, floodplain, mangrove, coastal forest, coral reef), or restoring flowways to sustain marsh vegetation. As such, the program would rely on a range of methods for the various activities. The methods FDEP would utilize to select projects or activities under this program (i.e., decision criteria) and a description of methods for some of the activities is provided below.

Project or activity selection criteria. The goal of this proposed program is to enhance and promote community resilience by increasing the capacity of Florida's coastal communities to adapt to short- and long-term changes such as increased flood risks, storm surge, and rising sea levels. The objectives of the proposed program are to identify communities most vulnerable to the effects of climate change and their resources which are most at risk; identify strategies to address coastal resiliency; and to implement sustainable solutions to improve coastal resiliency, such as constructing living shorelines to reduce wave energy which protects against storms, or acquiring and managing coastal lands, offshore submerged lands, urban riparian buffers, flowways or other habitats that would help mitigate the effects of climate change.

Program activities would be selected from proposals submitted by the public. FDEP would utilize an approach similar to the Deepwater Horizon natural resource damage assessment project portals and issue a public notice to solicit proposals. The notice would clearly describe the goal and objectives of the program and the types of activities that would be considered.

In selecting program activities from submitted project proposals, FDEP would screen and evaluate

each proposal to ensure it meets the goal and objective of the program. If a proposal meets the screening criteria, FDEP would evaluate the proposal further according to the evaluation criteria. FDEP would then select program activities based on the extent to which the proposals meet the evaluation criteria and those that are likely to benefit coastal community resilience most cost-effectively. Proposals that meet all of the initial screening and evaluation criteria would be further evaluated within the framework outlined below for each of the three project types included in this program.

Screening criteria

1) Does the proposal have sufficient information to allow for screening and evaluation?
2) Is the project proposal consistent with the program goal and objective?
3) Is the proposed project feasible (i.e., has not already been completed, does not conflict with any State or Federal regulations, etc.).

Evaluation criteria

1) Extent to which the project proposal is cost-effective (i.e., reasonable and comparable to other equivalent activities; low cost compared to likely benefits).
2) Extent to which the project proposal is supported by the local community.
3) Extent to which the project proposal leverages other funding sources (including in-kind services).
4) Extent to which the project proposal provides benefits to multiple communities and/or multiple natural resources.
5) Extent to which the project proposal meets the goal and objective of the program.
6) Proposed project location (i.e., whether it is located in an area that is vulnerable to current and future risks including flooding, storm surge, erosion, or rising sea levels).
7) Sustainability and/or likelihood of long-term success of the proposed project.

Vulnerability assessments. Vulnerability assessments would be conducted specifically to identify sensitive areas (i.e., communities and resources at risk) and assist in resiliency planning for sea level rise and storm surge scenarios. Proposals to conduct vulnerability assessments would be prioritized for coastal areas where hazard evaluations and adaptation planning have not been previously conducted, or where the largest concentration of people and property are at risk. Butler et al. (2016) found that only 49 percent of coastal counties in Florida had conducted some form of hazard assessment or developed some type of plan for sea level rise. Vulnerability assessments will follow guidance outlined in the Florida Adaptation Planning Guidebook (FDEP 2018) and the Sea-Level Rise Vulnerability Assessment Tools and Resources (FDEO 2015), among others. Vulnerability assessments may include an exposure analysis, a sensitivity analysis, an assessment of adaptive capacity, and selection of focus area for adaptation strategies (FDEO 2015, FDEP 2018). Ultimately, the results of any vulnerability assessments conducted may be used to inform living shoreline and land acquisition project selection, by prioritizing those projects that will improve coastal resiliency in areas deemed to be the most vulnerable or with high adaptive capacity. Participation of stakeholders in the vulnerability assessments will be required when possible.

Living shorelines. Living shoreline proposals may be considered independent of any specific vulnerability assessment or they may be prioritized based on the results of a vulnerability assessment conducted. For any living shoreline proposals selected, FDEP would require a professional services contractor to conduct site investigations, complete necessary engineering and design, and regulatory compliance. Any professional services agreement would be drafted and executed in accordance with Florida laws and regulations. The selected professional services contractor would be required to conduct site visits as necessary, develop designs, construction drawings as applicable, and determine the necessary permits required to complete the project.

Upon receipt of all needed approvals an Invitation to Bid for construction would be issued in accordance with Florida State procurement laws.

Land acquisition and management. Land acquisition or management proposals may be considered independent of any specific vulnerability assessment or they may be prioritized based on the results of a vulnerability assessment conducted. Land acquisitions may be suggested by the public through project proposals or identified through the FF priority list which is updated annually (FF 2019a). Florida may consider lands for acquisition from the Climate Change Lands category on the FF priority list, or other parcels that drain to the Gulf of Mexico which may help strengthen coastal resiliency or mitigate the effects of climate change including coastal salt marshes, mangroves, oyster reefs, riparian buffers, or flowways. Once selected, FDEP would follow the land acquisition procedures outlined in the Florida Statutes, Chapter 259, Land Acquisitions for Conservation or Recreation (Section 259.105, F.S.). FDEP's Division of State Lands and its acquisition partners would contract an appraisal of land from an independent private sector appraiser to estimate market value, negotiate with owners to buy the land, conduct any required due diligence such as site environmental assessments, and complete the acquisition. Lands acquired would be titled to the State, a county, or local government and protected in perpetuity. Land management proposals could include seagrass, coral reef, marsh, and mangrove restoration activities along with other types of stewardship activities identified in land management plans.

Environmental Benefits:

Florida has approximately 1,350 miles of coastline including diverse habitats such as beaches, dunes, estuaries, and more than 10 million acres of wetlands (Beaver 2006, Dahl 2005, FNAI 2010). Much of Florida's coast is developed and approximately 80 percent of the population live within 10 miles of the coast (FDEP 2018). Due to the State's low elevations, coastal communities are at significant risk from the direct and indirect effects of climate change, especially rising sea levels, extreme weather, storm surge, flooding, and erosion (FDEP 2018). Conserving coastal lands can enhance community and ecosystem resiliency to both direct and indirect impacts of climate change (USGCRP 2018). The proposed program would result in significant environmental benefits to coastal communities by increasing community resiliency through vulnerability assessments, living shorelines, and land conservation and management.

As impacts from climate change increase, efforts to assess a community's vulnerability are increasingly valuable for planning and implementing appropriate mitigation and adaptation strategies. Vulnerability assessments help identify those areas most at risk and evaluate the potential range and magnitude of impacts based on various scenarios (e.g., increasing sea levels, temperature, frequency and duration of fires, drought, or extreme weather). Understanding what makes a community most vulnerable to climate change allows resource managers to plan and implement corrective measures to mitigate future threats. Previous regional vulnerability assessments have integrated projected sea level rise with socioeconomic data to identify locations that might be most vulnerable (Emrich et al. 2014, Thatcher et al. 2013), helping communities effectively distribute limited resources.

An understanding of the adverse effects of hardened shorelines and the value of natural shorelines for coastal protection has led to a reprioritization of coastal management policy (Bilkovic and Mitchell 2017, Reguero et al. 2018). Natural communities such as barrier islands, marsh, mangroves, seagrass beds, oyster reefs, and coral reefs intrinsically reduce wave energy and erosion, protecting coastal communities from storm surge and sea level rise (Beck et al. 2018, Boutwell and Westra 2016, Ferrario et al. 2014, Guannel et al. 2016, Liu et al. 2013, USGCRP 2018). Wetland presence has been shown to be negatively correlated with economic damages following hurricanes and storm surge (Boutwell and Westra 2016), providing further evidence that wetlands increase community

resilience. Natural vegetation and networks of connected wetlands further stabilize shorelines by trapping sediments and filtering excess nutrients from urban runoff. Living shorelines are constructed to enhance shoreline stabilization and coastal protection to climate change impacts. A review of restoration projects following Hurricane Sandy found that living shorelines were five to eight times more cost-effective than stone revetments for erosion control (Abt Associates 2019).

Florida ranks in the top three states nationally where existing coastal habitat is expected to defend the greatest number of people and property from sea level rise (Arkema et al. 2013). It is estimated that preserving and restoring coastal habitats in the U.S. could reduce the impacts of sea level rise on people and their property by half (Arkema et al. 2013). Conservation of natural lands in Florida, including unique, imperiled, and ecologically valuable habitat (e.g., riparian buffers, wildlife corridors), promotes coastal resiliency. Protecting large areas of natural lands directly protects the communities by reducing wave energy and shoreline erosion and reducing the impacts of future development. Land acquisition conserves native biodiversity, ecosystem function, promotes connectivity, increasing genetic diversity and species fitness, and allows for migration as climate change induces shifts in species' distribution ranges (Damschen et al. 2019, DeFreese 1995, Tewksbury et al. 2002). Conservation of riparian buffers and natural flowways can help mitigate floods and protect coastal communities susceptible to flood risk (World Bank 2018).

Acquisition or management of coastal areas can protect against "coastal squeeze," when rising sea levels coupled with urban barriers prevent marsh from migrating to higher elevations (Borchert et al. 2018). Vegetated coastal habitats (e.g., marsh, mangrove, seagrass) contribute one- to two-orders of magnitude greater carbon sequestration per unit area compared to terrestrial forests (Mcleod et al. 2011). Thus, conserving and protecting these coastal ecosystems will contribute positively to offsetting increased atmospheric carbon dioxide that contributes to climate change. Finally, land conservation enhances water resource protection and management, reducing impervious surfaces, allowing water to filter naturally, and reducing flooding (Shepard et al. 2016).

Metrics:

Metric Title: RES003: Community Resilience - # of residential, commercial, and public facilities benefiting: Community Resilience
Target: TBD
Narrative: Florida proposes this as a program-wide metric to evaluate the success of the program. Program success would be determined as the number of residential, commercial, and public facilities benefited by the program, as applicable. Because specific projects or activities have not been identified as of yet under the program, a target value or range of values cannot be proposed, as it would be purely speculative. As projects or activities are selected for funding a range of values for this program metric can be proposed at that time. Each project or activity funded under this program may not be captured by this metric. Additional metrics would be determined to capture the benefits of each technique utilized under this program; specifically, each project or activity selected under the program would have specific metrics aimed at evaluating the success of the individual project or activity.

Metric Title: HR012: Shoreline protection - Miles of living shoreline installed: Habitat Restoration
Target: TBD
Narrative: Florida proposes this as a project or activity metric. The project or activity metrics may be adjusted as needed once projects or activities are funded. Metrics may be added, removed, or replaced as appropriate at the project work plan application stage. Once a project or activity is selected a target value will be established. Project or activity success would be determined as the number of miles of living shoreline installed. The purpose of this metric would be to verify that the

living shoreline had been completed according to plans and designs. The outcome would be an increase in miles of living shoreline.

Metric Title: HC001: Conservation easements - Acres protected under easement: Habitat Conservation
Target: TBD
Narrative: Florida proposes this as a project or activity metric. The project or activity metrics may be adjusted as needed once projects or activities are funded. Metrics may be added, removed, or replaced as appropriate at the project work plan application stage. Once a project or activity is selected a target value will be established. Project or activity success would be determined as the total number of acres protected under a conservation easement. The purpose of this metric would be to verify that the conservation easement has been acquired and recorded in property records. The performance measure would be an executed and recorded conservation easement agreement. Upon receipt of the executed and recorded agreement, this metric would be complete. The outcome would be an increase in acres protected under easement, and lands would be conserved in perpetuity.

Metric Title: HC003: Land acquisition - Acres acquired in fee: Habitat Conservation
Target: TBD
Narrative: Florida proposes this as a project or activity metric. The project or activity metrics may be adjusted as needed once projects or activities are funded. Metrics may be added, removed, or replaced as appropriate at the project work plan application stage. Once a project or activity is selected a target value will be established. Project or activity success would be determined as the total number of acres acquired in fee. The purpose of this metric would be to verify that acquisition has been completed, and the performance measure would be an executed and recorded deed. Upon transfer of the parcel to Government ownership, this metric would be complete. The outcome would be an increase in protected acres.

Metric Title: HM006: Habitat management and stewardship - Acres under improved management: Habitat Management
Target: TBD
Narrative: Florida proposes this as a project or activity metric. The project or activity metrics may be adjusted as needed once projects or activities are funded. Metrics may be added, removed, or replaced as appropriate at the project work plan application stage. The purpose of this metric is to verify that the acreage acquired or placed under conservation easement is being managed for conservation purposes. Once a project or activity is selected a target value will be established. The performance measure would be a management plan for parcels acquired under fee simple or a recorded conservation easement agreement with appropriate conservation language. The outcome would be an increase in acres under improved management practices.

Metric Title: PRM010: Research - # studies used to inform mgmt.: Planning, Research, Monitoring
Target: TBD
Narrative: Florida proposes this as a project or activity metric. The project or activity metrics may be adjusted as needed once projects or activities are funded. Metrics may be added, removed, or replaced as appropriate at the project work plan application stage. Once a project or activity is selected a target value will be established. Project or activity success would be evaluated and determined as the number of vulnerability assessments completed and used to inform management over the duration of the program. The purpose of this metric would be to verify that the vulnerability assessment has been completed, and the performance measure would be a completed vulnerability assessment report.

Risk and Uncertainties:

Florida's coastal communities are at significant risk from the effects of climate change, especially rising sea levels and temperatures, flooding, storm surge, erosion, and drought (Emrich et al. 2014, EPA 2017, FDEP 2018, Neumann et al. 2015, Strzepek et al. 2010). Florida has demonstrated a commitment to coastal resiliency and adaptation planning. In 2009, the first Climate Leadership Summit was convened by Broward, Miami-Dade, Monroe, and Palm Beach Counties. Since that time, FDEP, in coordination with other State and Federal partners, has developed guidance on adaptation planning and vulnerability assessments (FDEO 2015, FDEP 2018). FDEP has funded approximately 60 projects that produced vulnerability assessments for more than 20 communities. In 2019, the Governor appointed the first CRO to help prepare for the impacts of sea level rise in partnership with FDEP. Based on FDEP's experience, and the technical assistance available, there is a strong likelihood of success for executing the climate resiliency activities proposed in this program. Nevertheless, both short- and long-term risks and uncertainties are inherent in planning and implementing this program. There are also risks associated with climate change and uncertainties with climate change projections, both of which require careful consideration in planning for the long-term success of the program. This program will promote long-term coastal resiliency in each activity through an adaptive management approach and site-specific consideration of local and regional risks and uncertainties.

Near-term risks and uncertainties associated with this program are related to planning and implementing program activities (e.g., vulnerability assessments, living shorelines, or acquisitions). Risks include the uncertainty in project budget estimates and potential cost overruns. These risks can be mitigated through careful cost estimation, including reasonable contingencies, effective planning and design, third-party oversight, and adaptive management. Climate change science remains a source of public debate, thus public controversy is another near-term risk for this program that can be minimized through public engagement and transparency. Entities receiving funding would be required to document strong operation and management capabilities and financial resources to assure long-term project success.

While FDEP has successfully funded vulnerability assessments, funded and implemented living shoreline projects, and conserved natural areas, there may be unexpected issues that arise. In planning living shorelines, unknown aspects of current site conditions, changing conditions, and unanticipated changes to a project's scale can alter plans. For land acquisition projects, near-term risks and uncertainties include the continued availability of properties, the successful negotiation of sales with landowners, and the cost of the land. These can be mitigated through thoughtful discussion with landowners, quality appraisals, and due diligence.

Long-term risks and uncertainties for this program are primarily associated with the uncertainty in making projections of future climate change scenarios for project implementation and design and the potential impact of climate change on the success and sustainability of program activities.

Climate change is projected to have a number of potential impacts in Florida, including but not limited to rising sea levels, warming air and water temperatures, increased frequency and magnitude of extreme weather events, storm surge, floods, drought, wildfires, increased erosion, and increases in invasive species. Florida is especially susceptible to sea level rise due to the overall low elevations and subtle topography (Emrich et al. 2014). Emrich et al. (2014) evaluated potential climate change impacts in Florida using a range of available models. Despite the uncertainties associated with model predictions, the risk associated with sea level rise is clear; every coastal county in Florida was found to be at risk for storm surge and 12 counties had residents at extreme risk to the lowest prediction of sea level rise investigated. As cited in Stys et al. (2017), 25 percent of 1,200 species tracked by the FNAI are expected to lose more than half of their current habitat area due to sea level rise.

Vulnerability assessments rely on the selection and application of appropriate climate change projections. A range of future scenarios currently exist. Climate change modeling and decision support tools would be used to develop scenarios of future conditions, in the development of vulnerability assessments, but also during planning of living shorelines and identification of lands for acquisition. The current state-of-the-art approaches for climate change vulnerability and resilience/adaptation assessments, recognizing the significant uncertainty in projections of climate and sea level rise, includes just such an assessment of robust results across multiple scenarios (Chambwera et al. 2014, Moss et al. 2019). In general, resilience practitioners indicate that a common challenge is that action plans are stalling at the implementation stage, and in cases where uncertainty is considerable, project implementation is often structured as an iterative adaptive process (see Moss et al. 2014). This has led to an interest in alternative risk-based decision-analysis frameworks for adaptation, such as robust decision-making (Hallegatte et al. 2012), multicriteria analyses, or qualitative risk matrix calibrations when data are scarce. For this proposed program, ensuring robustness of the projected outcomes of project applications across multiple climate scenarios is one way to limit the risk associated with climate science uncertainty.

Assessing the long-term success of living shorelines and land acquisition projects in sustaining climate resiliency may depend on future climate projections. During project planning, accounting for future sea level rise in determining the appropriate depth for a living shoreline will help to effectively reduce wave energy for shoreline protection. Also, for land acquisition, the success of conservation for coastal resiliency depends on the appropriate consideration of climate change impacts on those lands in the future. The sections below summarize some of the risks and uncertainties associated with climate change as well as the risks and uncertainties associated with the program activities and the long-term success of the program. A source for U.S. sea level rise and storm surge scenarios is the U.S. Global Change Research Program's Climate Change Science Report, which includes six sea level rise trajectories for the contiguous U.S. and storm surge return period exceedance curves at all Florida tide gauge locations (Sweet et al. 2017, USGCRP 2017).

Conservation and management of coastal habitats that provide a natural buffer to storm surge (e.g., marshes, mangroves, submerged aquatic vegetation, oyster reef, coral reef, and barrier islands) will increase Florida's resiliency to climate change (Beck et al. 2018, Boutwell and Westra 2016, Ferrario et al. 2014, Guannel et al. 2016, Liu et al. 2013, USGCRP 2018). Projects that conserve habitat corridors, riparian buffers, and natural flowways can sequester carbon, promote population and habitat connectivity, and provide protection against floods and storm surge. However, the degree to which individual conservation lands achieve connectivity is uncertain. The effectiveness of a corridor depends on a variety of factors (e.g., size and shape of the patches connected by the corridor, distance between patches) and may be difficult to quantify (Tewksbury et al. 2002). Mcleod et al. (2011) outline some of the uncertainties associated with the mechanisms that control carbon sequestration; however, there is no doubt that conserving and protecting these vegetated coastal ecosystems will contribute positively to offsetting increased atmospheric carbon dioxide that contributes to climate change.

Despite the risks and uncertainties associated with climate change and future scenarios, the proposed program would identify areas most at risk for climate change-induced hazards and implement projects that improve coastal community's resiliency through careful future planning, identifying effective strategies, and conserving habitats that protect against the effects of climate change. While some risks and uncertainties exist for the long-term success of program activities, these may be mitigated through monitoring and adaptive management. Ultimately, any remaining risks and uncertainties would be offset by the long-term environmental benefits of the program.

Other sources of long-term risk include a range of factors beyond the control of FDEP and program applicants, and include the trajectory and timing of population change and infrastructure development in project areas (which can in turn affect measures of resilience of physical assets and indicators of socioeconomic factors); the impact of natural disasters beyond the range of historical or projected science; or other site-specific factors. While some aspects of these long-term risks could be addressed through scenario analysis and assurances that project performance is robust to these uncertainties, we expect that program applicants would address these factors qualitatively.

Monitoring and Adaptive Management:

Program-wide monitoring for RES003, Community Resilience - # of residential, commercial, and public facilities benefiting would occur for the duration of the program, if applicable to all projects or activities. Program success would be tracked as the number of residential, commercial, and public facilities benefiting under this program; the total number benefitting would be verified using associated program implementation documents.

FDEP will utilize a monitoring and adaptive management framework consistent with the Deepwater Horizon NRDA MAM Manual guidelines (DWH Trustees 2019) and the RESTORE Interim Observational Data Plan (ODP) Guidance (2018). The program would be adaptively managed to ensure the greatest benefits are achieved. For example, as new information on climate change and sea level rise becomes available, the information would be incorporated into planning and implementing vulnerability assessments and living shorelines. Project reports would be utilized to document applicable lessons learned to allow for improvements to be incorporated into future activities.

Project or activity monitoring including the metrics, duration, performance criteria, and adaptive management activities, would vary depending on the technique implemented in each project or activity. FDEP would require the development of adaptive management plans for all funded projects or activities to ensure long-term success.

Monitoring for HR012 - Miles of living shoreline installed would be conducted using surveys or aerial imagery, consistent with methods outlined in the NRDA MAM Manual (DWH Trustees 2019) and ODP Guidance (RESTORE 2018).

Monitoring for HC001: Conservation easements - Acres protected under easement and HC003: Land acquisition - Acres acquired in fee would take place following acquisition and acres would be verified by survey or aerial imagery, consistent with methods in the NRDA MAM Manual (DWH Trustees 2019) and ODP Guidance (RESTORE 2018).

Monitoring for HM006: Improved management practices – Acres under improved management would be used to verify the number of acres and would include review of a management plan for parcels acquired under fee simple or a recorded conservation easement agreement with appropriate conservation language.

Monitoring for PRM010: Research - # studies used to inform management would be used to track the completion of vulnerability assessments funded; the number of studies would be tracked for the duration of the program.

Data Management:

FDEP would develop an ODP and Data Management Plan detailing how data will be collected and managed at the time a project or activity is selected. FDEP would provide a publicly accessible

central location to access relevant data.

Depending on the project technique, the following types of data would be collected: number, type, and location of vulnerability assessments conducted; planning and engineering data and miles of living shoreline installed; acreage acquired, location, and property information. For any partnerships with FF, property information will be made available on the FDEP Oculus site. Information on any FF activities are available at http://www.dep.state.fl.us/lands/FFplan_county.htm.

To the extent any environmental data are collected, field personnel would utilize standardized datasheets. Handwritten data will be transcribed into standard digital format or scanned to PDF. Transcribed data will be verified and validated prior to being released. After any identified errors are addressed, data would be considered QA/QC'd. Spatial data collected will have properly documented FGDC/ISO metadata, a data dictionary that defines codes and fields used in the dataset, or a Readme file describing how data was collected, QA/QC procedures, and other information such as relationships to other data, origin, usage, and format. FDEP would utilize the RESTORE MEtadata Records Library and Information Network for metadata records creation.

Collaboration:

FDEP collaborated with numerous State, regional, and local entities and stakeholders to develop and refine this program proposal. Meetings were held with local governments, Water Management Districts, National Estuary Programs (NEP), non-governmental organizations (NGO), Florida's RESTORE Act Center of Excellence (COE), and other RESTORE Council members. At these meetings, NGOs, local entities, State agencies, and NEPs reiterated their support for funding coastal resiliency projects, especially living shorelines and land acquisition.

FDEP also intends to coordinate with FDEP's ORCP which has already identified approximately 120 Florida communities that need a vulnerability assessment to measure the impacts of sea level rise and identify resources at risk. ORCP has awarded more than $4 million in the last two years to prepare coastal communities for the effects of rising sea levels, including coastal flooding, erosion and ecosystem changes.

Public Engagement, Outreach, and Education:

FDEP collaborated with the public and local entities to develop this program proposal through numerous meetings with local governments, Water Management Districts, NEPs, NOGs, and Florida's COE. FDEP will continue to collaborate with local entities and the public for their assistance in identifying potential program projects and activities. The public will have the opportunity to nominate projects through submitting proposals for funding as activities under this program. Prior to finalizing project screening and selection criteria, FDEP would hold a webinar to solicit and consider public comment and have similar public engagement opportunities associated with draft project lists.

This proposed program would partner with FF to streamline the process of identifying potential lands for acquisition, which incorporates additional opportunities for public engagement, outreach, and education. FF promotes land acquisition on behalf of the public, in part to improve public land management and increase public access to natural areas and public engagement is a critical component of the selection process. Acquisition projects may be nominated by Federal, State and local government agencies, conservation organizations, or private citizens. ARC meetings are publicly noticed, and the public is encouraged to provide comment on the projects. Nonprofit organizations may play a role in helping acquire conservation lands. They advocate for parcels to be placed onto the FF priority list and can act as intermediaries with owners, including assisting them with tax and

estate planning issues. FF has previously collaborated with The Nature Conservancy, the Trust for Public Land, and The Conservation Fund. In addition to providing opportunities for the public to participate in the site selection and land acquisition process, FF provides education and outreach to ensure the public has knowledge of the accessibility of public lands. A publicly available database and mobile application are available to provide the public with information on the location, types of recreational opportunities, access points, facilities, amenities, and restrictions for public lands in Florida (Section 259.105, F.S.).

Leveraging:

Funds: TBD
Type: Bldg on Others
Status: Proposed
Source Type: State
Description: The proposed Florida Gulf Coast Resiliency Program would leverage funds and resources from the Office of Resiliency and Coastal Protection (ORCP) and the Florida Resilient Coastlines Program. The proposed Florida Gulf Coast Resiliency Program would leverage the knowledge and resources of the ORCP when identifying program activities. The ORCP which works to prepare Florida's coastal communities for current and future effects of rising sea levels, coastal flooding, erosion, and ecosystem changes and has identified communities in need of a vulnerability assessment (FDEP 2019).

Funds: TBD
Type: Bldg on Others
Status: Proposed
Source Type: State
Description: The proposed Florida Gulf Coast Resiliency Program would leverage funds and resources from FF, including leveraging the FF priority list to help identify land acquisitions that might be implemented as part of this program. The FF priority list includes parcels ranked by the ARC as well as parcels in the Climate Change Lands category that when protected would help to improve coastal resiliency.

Environmental Compliance:
As per the RESTORE FPL 3 Proposal Submission Guidelines, this program includes Category 1 funds for living shorelines planning and design and vulnerability assessments, which do not involve any construction or ground-breaking activities. Implementation is currently proposed for Category 2. Florida may work with other Council members to secure a categorical exclusion for National Environmental Policy Act requirements for land acquisition projects and activities implemented under this proposed program

Bibliography:

Abt Associates. 2019. Evaluation of Hurricane Sandy Coastal Resilience Program. Prepared for National Fish and Wildlife Foundation (NFWF) and U.S. Department of the Interior (DOI). Abt Associates, Rockville, MD.

Arkema, K.K., Guannel, G., Verutes. G., Wood, S.A., Guerry, A., Ruckelshaus, M., Kareiva, P., Lacayo, M. and J.M. Silver. 2013. Coastal habitats shield people and property from sea-level rise and storms. Nature Climate Change, 3: 913–918.

Beaver, J.C. 2006. U.S. international borders: Brief facts. Library of Congress Washington DC Congressional Research Service.

Beck, M.W., Losado, I.J., Menedez, P., Reguero, B.G., Diaz-Simal, P. and F. Fernandez. 2018. The global flood protection savings provided by coral reefs. Nature Communications, 9: 2186.

Bilkovic, D.M. and M.M. Mitchell. 2017. Designing Living Shorelines Salt Marsh Ecosystems to Promote Coastal Resilience, Chapter 15 in Bilkovic, D.M., Mitchell, M., LaPeyre, M., & J. Toft (Eds.), Living Shorelines: The Science and Management of Nature-Based Coastal Protection, CRC Press.

Borchert, S.M., Osland, M.J., Enwright, N.M. and K.T. Griffith. 2018. Coastal wetland adaptation to sea level rise: Quantifying potential for landward migration and coastal squeeze. Journal of Applied Ecology, 55: 2876-2887.

Boutwell, J.L. and J.V. Westra. 2016. The role of wetlands for mitigating economic damage from hurricanes. Journal of the American Water Resources Association, 52(6): 1472-1481.

Butler, W.H., Deyle, R.E. and C. Mutnansky. 2016. Low-regrets incrementalism: Land use planning adaptation to accelerating sea level rise in Florida's coastal communities. Journal of Planning Education & Research, 1: 9–10.

Chambwera, M., Heal, G., Dubeux, C., Hallegatte, S., Leclerc, L., Markandya, A., McCarl, B.A., Mechler, R. and J.E. Neumann. 2014. Economics of adaptation. In Field, C.B., Barros, V.R., Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Bilir, T.E., Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma,B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, S.R. and L.L. White (Eds.). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 945-977.

Dahl, T.E. 2005. Florida's wetlands: an update on status and trends 1985 to 1996. U.S. Fish and Wildlife Service, Washington D.C. Retrieved from https://www.fws.gov/wetlands/Documents/Floridas-Wetlands-An-Update-on-Status-and-Trends-1985-to-1996.pdf

Damschen, E. I., Brudvig, L. A., Burt, M. A., Fletcher, R. J., Haddad, N. M., Levey, D. J., Orrock, J.L., Resasco, J. and J.J. Tewksbury. 2019. Ongoing accumulation of plant diversity through habitat connectivity in an 18-year experiment. Science, 365(6460): 1478–1480.

DeFreese, D.E. 1995. Land acquisition: a tool for biological diversity protection in the Indian River Lagoon, Florida. Bulletin of Marine Science 57(1): 14-27.

DWH Trustees (Deepwater Horizon Natural Resource Damage Assessment Trustees). 2019.

Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0. Originally released in December 2017, Updated August 2019. Retrieved from https://www.gulfspillrestoration.noaa.gov/sites/default/files/2019-08%20MAM_Manual_FULL_Updated%202019.pdf

Emrich, C.T., Morath, D.P., Bowser, G.C. and R. Reeve. 2014. Climate-sensitive hazards in Florida: Identifying and Prioritizing Threats to Build Resilience against Climate Effects. Hazards and Vulnerability Research Institute. EPA 430-F-16-011.

EPA (U.S. Environmental Protection Agency). 2017. Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A technical report for the Fourth National Climate Assessment. U.S. Environmental Protection Agency, EPA 430-R-17-001. Chapter 15: Coastal Property.

FDEO (Florida Department of Economic Opportunity). 2015. Sea level Rise Vulnerability Assessment Tools and Resources: A Guide for Florida's Local Governments. Tallahassee. Retrieved from https://floridadep.gov/sites/default/files/SLR-VA-tools-extended_1.pdf

FDEP (Florida Department of Environmental Protection). 2019. Office of Resilience and Coastal Protection and Florida Resilient Coastlines Program. Retrieved from https://floridadep.gov/RCP and https://floridadep.gov/rcp/florida-resilient-coastlines-program

FDEP (Florida Department of Environmental Protection). 2018. Florida Adaptation Planning Guidebook. Retrieved from https://floridadep.gov/sites/default/files/AdaptationPlanningGuidebook.pdf

FF (Florida Forever). 2019a. 2020 Florida Forever Priority List – ARC Recommended. December. Retrieved from http://publicfiles.dep.state.fl.us/DSL/FFWeb/ARC%20Recommended%20Florida%20Forever%20Priority%20List.pdf

FF (Florida Forever). 2019b. 2019 Florida Forever Five-year Plan, Summary of Recommendations and Status as of December 2018. Division of State Lands Florida Department of Environmental Protection. May. Retrieved from http://publicfiles.dep.state.fl.us/DSL/FFWeb/Current%20Florida%20Forever%20Five-Year%20Plan.pdf

Florida Statutes. 2018. Chapter 259 Land Acquisitions for Conservation or Recreation. Title XVIII Public Lands and Property. The Florida Senate. Retrieved from https://www.flsenate.gov/Laws/Statutes/2018/Chapter259

FNAI (Florida Natural Areas Inventory). 2010. Guide to the natural communities of Florida: 2010 edition. Florida Natural Areas Inventory, Tallahassee.

Hallegatte, S., Shah, A., Lempert, R., Brown, C. and S. Gill. 2012. Investment Decision Making Under Deep Uncertainty, Application to Climate Change. Policy Research Working Paper 6193. The World Bank, Sustainable Development Network, Office of the Chief Economist, September. https://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-6193

Mcleod, E., Chmura, G.L., Bouillon, S., Salm, R., Björk, M., Duarte, C.M., Lovelock, C.E., Schlesinger, W.H. and B.R. Silliman. 2011. A blueprint for blue carbon: toward an improved understanding of the role of vegetated coastal habitats in sequestering CO2. Frontiers in Ecology and the Environment, 9(10): 552–560.

Moss, R.H., Avery, S., Baja, K., Burkett, M., Chischilly, A.M., Dell, J., Fleming, P.A., Geil, K., Jacobs, K. Jones, A., Knowlton, K. Koh, J., Lemos, M.C., Melillo, J., Pandya, R., Richmond, T.C., Scarlett, L., Snyder, J. Stults, M., Waple, A., Whitehead, J., Zarrilli, D., Fox, J., Ganguly, A., Joppa, A., Julius, S., Kirshen, P. Kreutter, R., McGovern, A., Meyer, R., Neumann, J., Solecki, W.,Smith, J., Tissot, P., Yohe, G. and R. Zimmerman. 2019. Evaluating knowl¬edge to support climate action: A framework for sustained assessment. Weather, Climate, and Society, 11: 465-487. Retrieved from https://doi.org/10.1175/WCAS-D-18-0134.1

Moss, R. H., Lynn Scarlett, P., Kenney, M.A., Kunreuther, H., Lempert, R., Manning, J. and B. K. Williams. 2014. Decision support: Connecting science, risk perception, and decisions. In Melillo, J.M., Richmond, T.C. and G.W. Yohe (Eds.), Climate Change Impacts in the United States: The Third National Climate Assessment, U.S. Global Change Research Program, 620–647. Retrieved from https://data.globalchange.gov/report/nca3/chapter/decisionsupport

Neumann, J.E., Emanuel, K., Ravela, S., Ludwig, L., Kirshen, P., Bosma, K. and J. Martinich. 2015. Joint effects of storm surge and sea-level rise on U.S. Coasts: New economic estimates of impacts, adaptation, and benefits of mitigation policy. Climatic Change, 129(1–2): 337–349. Retrieved from https://doi.org/10.1007/s10584-014-1304-z

Reguero, B.G., Beck, M.W., Bresch, D.N., Calil, J. and I. Meliane. 2018. Comparing the cost effectiveness of nature-based and coastal adaptation: A case study from the Gulf Coast of the United States. PLoS ONE, 13(4): e0192132.

RESTORE Council. 2018. Observational Data Plan (ODP) Draft Interim Guidance. https://restorethegulf.gov/sites/default/files/20180713_DraftInterimGuidanceObservationalDataPlan_508Compliant.docx

Shepard C., Majka, D., Brody, S., Highfield, W. and J. Fargione. 2016. Protecting Open Space & Ourselves: Reducing Flood Risk in the Gulf of Mexico Through Strategic Land Conservation. Washington D.C.: The Nature Conservancy. Retrieved from https://www.conservationgateway.org/ConservationPractices/Marine/crr/library/Documents/TNC_open_spaces_2016.pdf

Stys, B., Foster, T., Fuentes, M.M.P.B., Glazer, B., Karish, K., Montero, N. and J.S. Reece. 2017. Climate Change Impacts on Florida's Biodiversity and Ecology. Chapter 12 in Chassignet, E. P., Jones, J. W., Misra, V., & J. Obeysekera (Eds.), Florida's climate: Changes, variations, & impacts. Gainesville, FL: Florida Climate Institute.

Sweet, W.V., Kopp, R.E., Weaver, C.P., Obeysekera, J., Horton, R.M., Thieler, E.R. and C. Zervas. 2017. Global and Regional Sea Level Rise Scenarios for the United States. NOAA Technical Report, NOS CO-OPS 083.

Tewksbury, J.J., Levey, D.J., Haddad, N.M., Sargent, S., Orrock, J.L., Weldon, A., Danielson, B.J., Brinkerhoff, J., Damschen, E.I. and P. Townsend. 2002. Corridors affect plants, animals, and their interactions in fragmented landscapes. Proceedings of the National Academy of Sciences,99(20): 12923-12926.

Thatcher, C.A., Brock, J.C. and E.A. Pendleton. 2013. Economic vulnerability to sea-level rise along the northern US Gulf Coast. Journal of Coastal Research, 63(sp1), pp.234-243.

USGCRP (U.S. Global Change Research Program). 2018. Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II. Reidmiller, D.R., Avery, C.W., Easterling, D.R., Kunkel, K.E., Lewis, K.L.M., Maycock, T.K. and B.C. Stewart (Eds.). Washington, D.C.: United States Global Change Research Program. Accessed 3/19/2020. Retrieved from http://dx.doi.org/10.7930/NCA4.2018

World Bank. 2018. Nature-based Solutions for Disaster Risk Management. Washington, D.C.: World Bank Group (in association with PROFOR and the World Resources Institute).

Budget

Project Budget Narrative:
The budget for this proposed program consists of $15,000,000, of which the majority (approximately 90%) would be spent on planning or implementation of projects or activities aimed at improving coastal resiliency. The total amount of funding requested as Category 1 is $4,500,000 and the total amount of funding requested as Category 2 is $10,500,000. The Category 1 funds would be spent on State of Florida program administration and project or activity specific Planning, E&D and permitting. It is assumed that vulnerability assessments would consider a planning activity. Program monitoring and adaptive management activities, and data management activities would also fall under Category 1. Category 2 funds would be used to implement projects or activities such as construction of living shorelines or land acquisition and would include project or activity specific monitoring and adaptive management activities, and data management activities. More detailed budgets will be developed at the project or activity level when projects or activities are selected for funding under this program, including an appropriate contingency. The percentages listed below apply to the entire $15,000,000 funding request.

Total FPL 3 Project/Program Budget Request:
$ 15,000,000.00

Estimated Percent Monitoring and Adaptive Management: 2 %
Estimated Percent Planning: 20 %
Estimated Percent Implementation: 70 %
Estimated Percent Project Management: 7 %
Estimated Percent Data Management: 1 %
Estimated Percent Contingency: 0 %

Is the Project Scalable?
Yes

If yes, provide a short description regarding scalability.:
Yes, the program could be scaled to allow for more or less activities over a longer or shorter duration of time.

Environmental Compliance[1]

Environmental Requirement	Has the Requirement Been Addressed?	Compliance Notes (e.g.,title and date of document, permit number, weblink etc.)
National Environmental Policy Act	Yes	Section 4(d)(3) of Council NEPA Procedures applies to Category 1 funds for planning.
Endangered Species Act	N/A	Note not provided.
National Historic Preservation Act	N/A	Note not provided.
Magnuson-Stevens Act	N/A	Note not provided.
Fish and Wildlife Conservation Act	N/A	Note not provided.
Coastal Zone Management Act	N/A	Note not provided.
Coastal Barrier Resources Act	N/A	Note not provided.
Farmland Protection Policy Act	N/A	Note not provided.
Clean Water Act (Section 404)	N/A	Note not provided.
River and Harbors Act (Section 10)	N/A	Note not provided.
Marine Protection, Research and Sanctuaries Act	N/A	Note not provided.
Marine Mammal Protection Act	N/A	Note not provided.
National Marine Sanctuaries Act	N/A	Note not provided.
Migratory Bird Treaty Act	N/A	Note not provided.
Bald and Golden Eagle Protection Act	N/A	Note not provided.
Clean Air Act	N/A	Note not provided.
Other Applicable Environmental Compliance Laws or Regulations	N/A	Note not provided.

[1] Environmental Compliance document uploads available by request (restorecouncil@restorethegulf.gov).

Maps, Charts, Figures

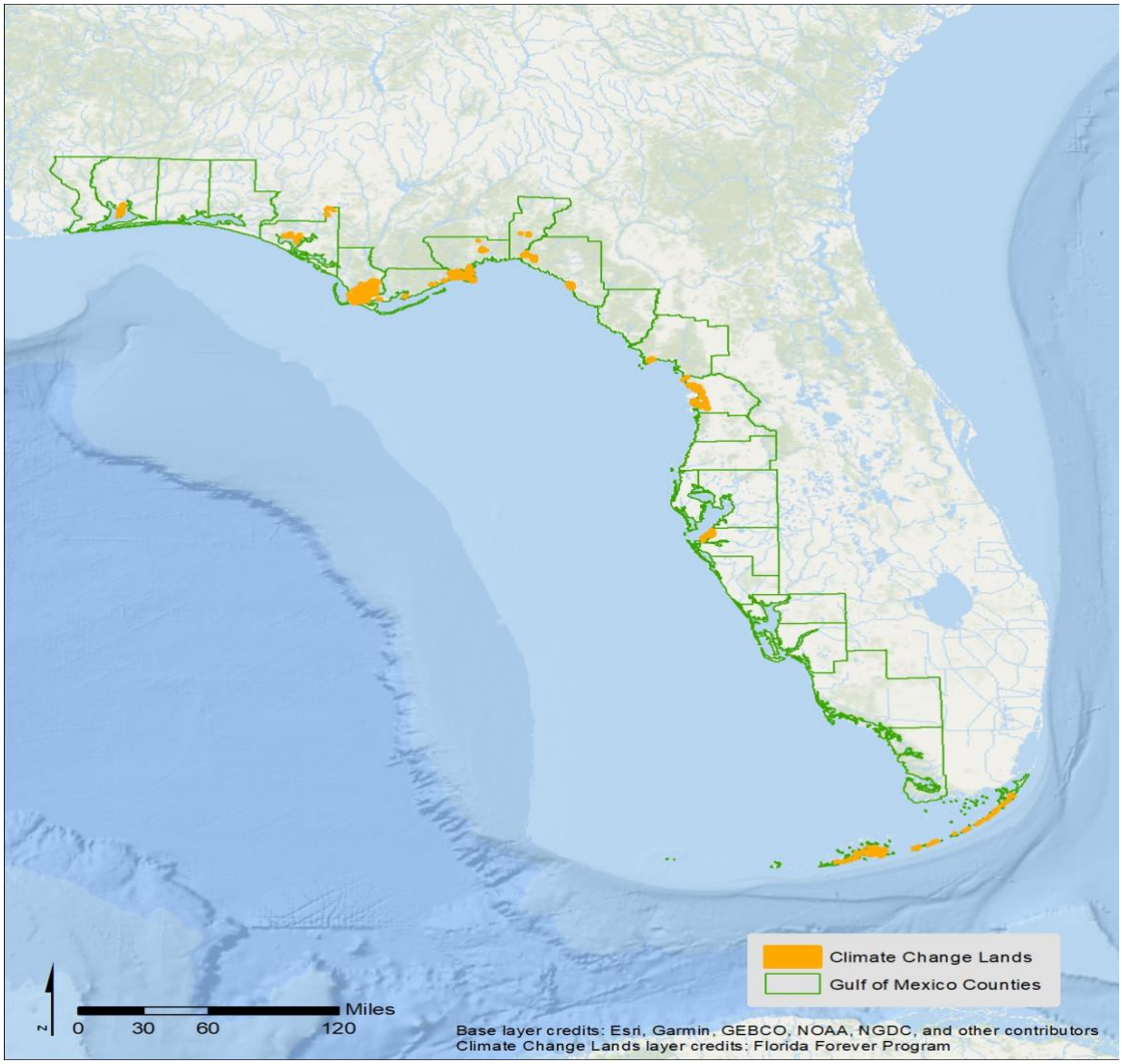

Figure 1: Map illustrating the proposed extent of the Florida Gulf Coast Resiliency Program, including the 23 counties along the Florida Gulf of Mexico coastline. Areas for potential acquisition under this proposed program, identified as Climate Change Lands through the Florida Forever Program, are highlighted.

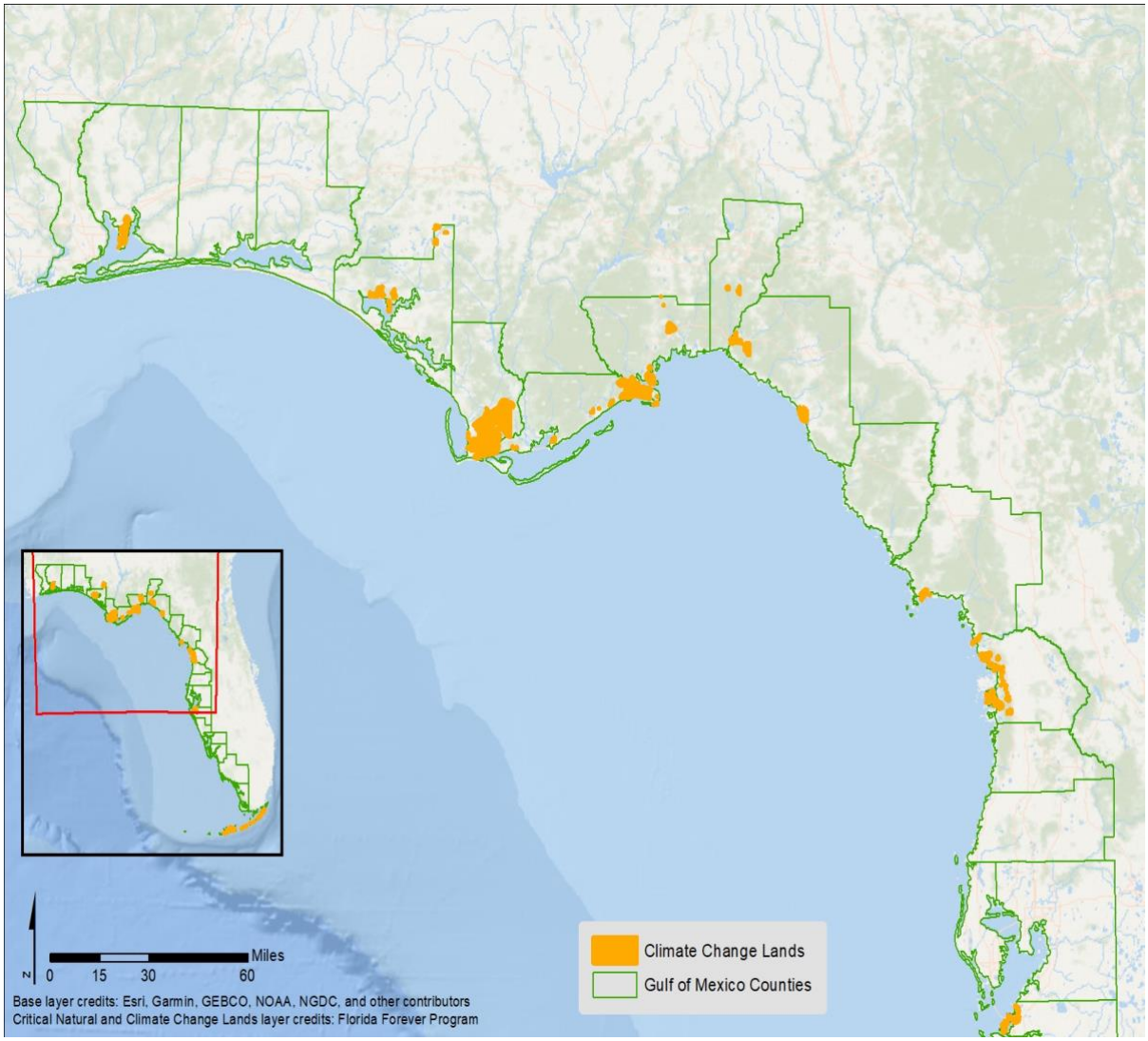

Figure 2: Map illustrating a closer view of the northern extent of the Florida Gulf Coast Resiliency Program and identified Climate Change Lands for northern Florida and the Panhandle.

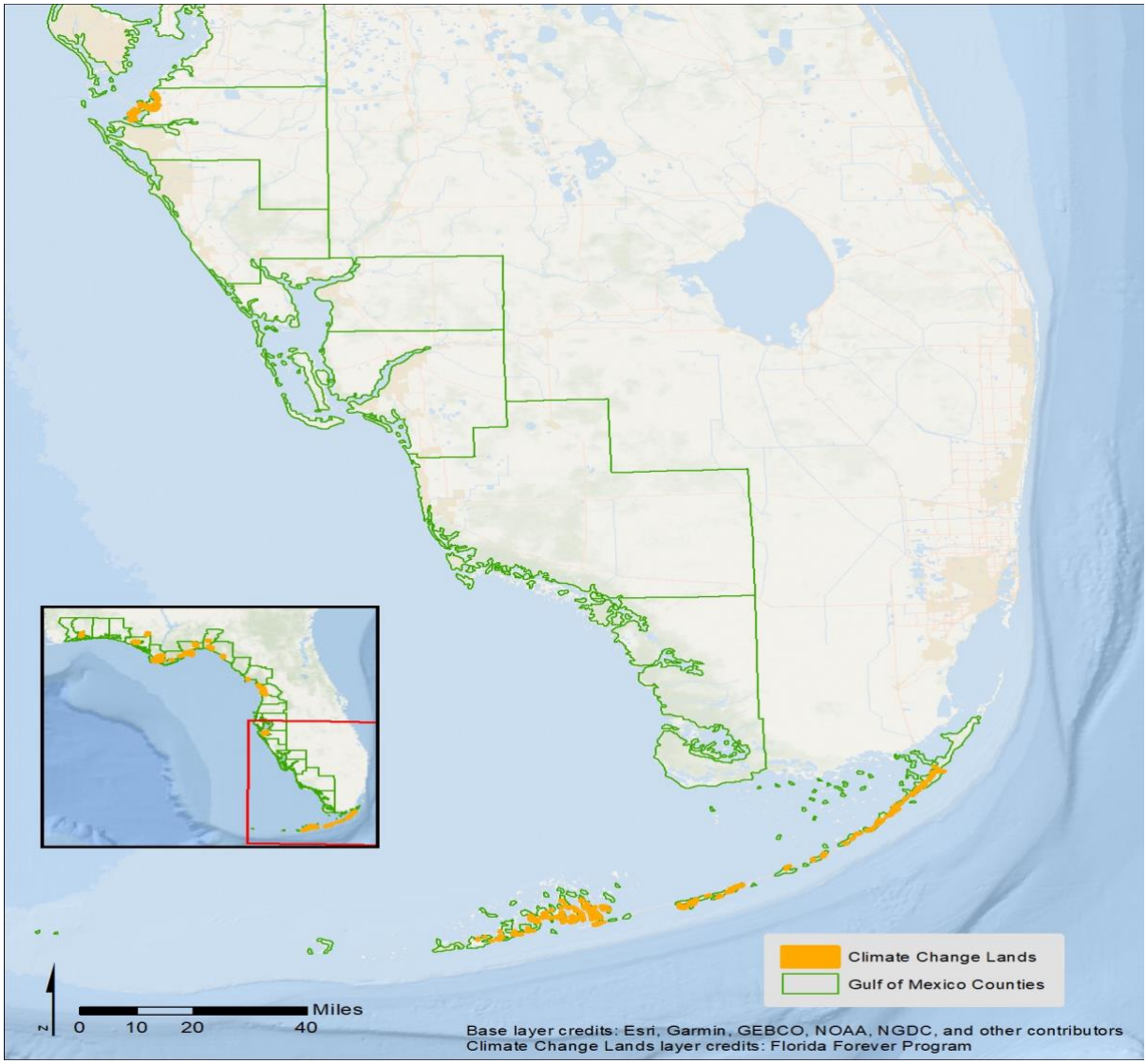

Figure 3: Map illustrating a closer view of the southern extent of the Florida Gulf Coast Resiliency Program and identified Climate Change Lands for southern Florida and the Keys.

FPL 3b Internal Staff Review of Proposal Submitted 4/24/2020

Project/Program	Florida Gulf Coast Resiliency Program		
Primary POC	Heather Young	Sponsor	Florida
EC Reviewer	Heather Young	Co-Sponsor	

1. Is/Are the selected Priority Criteria supported by information in the proposal?	Yes
Notes	

2. Does the proposal meet the RESTORE Act geographic eligibility requirement?	Yes
Notes	

3. Are the Comprehensive Plan primary goal and primary objective supported by information in the proposal?	Yes
Notes	

4. Planning Framework: If the proposal is designed to align with the Planning Framework, does the proposal support the selected priority approaches, priority techniques, and/or geographic area?	Yes
Notes	

5. Does the proposal align with the applicable RESTORE Council definition of project or program?	Yes
Notes	

6. Does the budget narrative adequately describe the costs associated with the proposed activity?	More information needed
Notes	Any changes resulting from movement of activities proposed for Category 2 to Category 1 as described in the Environmental Compliance comments below would also require changes in the budget narrative. Since a portion of the requested funding would be put toward construction (e.g., implementation of living shorelines), Council staff recommend the sponsor revise the answer to the question "Is this a construction project?", from "no" to "yes".

7. Are there any recommended revisions to the selected leveraged funding categories?			No

Notes	

8. Have three external BAS reviews been completed?	More information needed
Notes	Please see the external BAS review comments, and external reviews summary attached with these review comments.

9. Have appropriate metrics been proposed to support all primary and secondary goals?	More information needed
Notes	The primary goal is supported by the proposed metrics. However, because bringing land under improved management has been incorporated into the descriptions of RESTORE Council metrics HC001 and HC003 (i.e., "acres protected under easement" and "acres acquired in fee"), Council staff suggest that metric "HM006 - Acres under improved management" is redundant and can be removed. If this proposal is included in FPL 3b, an application for funding will be submitted by the sponsor. At that time, the supporting measures selected for each metric should track changes that can be quantified to support the primary goal "Enhance community resilience," such as reduction in erosion rate and/or reduction in vulnerability.

10. Environmental compliance: If FPL Category 1 has been selected for the implementation component of the project or program, does the proposal include environmental compliance documentation that fully supports the selection of Category 1?	More information needed
Notes	The sponsor is seeking funding approval (FPL Category 1) for some of the planning components of this program. Some planning is also proposed as Category 2 along with all of the implementation components. It would be helpful to explain what planning components are proposed as Category 2 to help determine whether they could be approved as Category 1 instead. Subsequent FPL amendment(s) will be needed to approve implementation funding for this program. At that time, the sponsor would need to provide evidence of compliance with all environmental laws applicable to funding approval for the given project(s). The sponsor indicates they may work with other Council members to utilize a member's CE for NEPA land acquisition projects associated with the Resiliency Program.

11. Geospatial Compliance: Have the appropriate geospatial files and associated metadata been submitted along with a map of the proposed project/program area?	Yes
Notes	

FPL 3b BAS Review Summary – Florida Gulf Coast Resiliency Program

May 2020

Overall, the external Best Available Science reviews for the Florida Gulf Coast Resiliency Program proposal are positive. Reviewers agree that the proposal is based on science that uses peer-reviewed data that directly pertains to the Gulf Coast Region, and that the "proposal and methods reflect well on an understanding of resilience and interconnectedness based both on knowledge of Florida's Gulf Coast and information from the cited references" (Reviewer 2).

Reviewers 1 and 2 also agree that the proposal is based on science that maximizes the quality, objectivity, and integrity of information. To further strengthen the proposal, Reviewer 3 suggests including more details about science-based decision-making in the Florida Forever program's process for land-selection and the implementation of living shorelines, as well as clarifying language describing sea level rise, storm surge, and waves throughout the proposal. Reviewer 3 also indicates that the key benefit of natural habitat restoration is long-term resiliency to sea level rise, suggesting that statements on the ecosystem service of storm surge and the ability of these natural systems to reduce it should be hedged or reduced.

All Reviewers agree that the proposal is supported by recent, relevant, and accurately-cited literature. Reviewer 3 does suggest including literature to support information about the vulnerability assessments described on p. 8, and also provided the following peer-reviewed citation suggestions for other elements of the proposal: Michael Ross's papers on sea level rise and vegetated habitats; Keqi Zhang's papers on storm surge and vegetated habitats; and Lafever et al. 2007 for wildlife-dependent land resiliency against sea level rise/storms in FL.

The proposal has clearly defined goals and objectives and measures of success that clearly align with these goals/objectives (all reviewers). The methods proposed are also clearly described and justified (all reviewers). Reviewer 3 does reiterate that justification of methods could be further strengthened through bolstered description of the Florida Forever program and living shorelines selection criteria mentioned above.

Reviewers 1 and 3 agree that the proposal identifies the likely environmental benefits of the proposed activity, but suggest more upfront justification that this program is needed to counteract current losses or impacts (Reviewer 3). Reviewer 2 also suggests clarifying the connection between environmental metrics and outcomes related to increased resilience.

The proposal does a good job of detailing metrics that are clearly related to successful implementation (Reviewer 2), but Reviewers 1 and 2 do suggest providing a more in-depth discussion of the monitoring and data management strategy. This could include clarifying the connection between environmental metrics and outcomes related to increased resilience, as suggested by Reviewer 2 above. Reviewer 1 also points out that more information is needed to describe how monitoring of PRM010 (# of research studies) will be used to track the completion of vulnerability assessments.

All reviewers felt the proposal has evaluated the risks and uncertainties in achieving its objectives over time, and is based on science that documents the risks and uncertainties in the scientific basis for such programs. Reviewer 3 notes that the discussion of vulnerability to potential long-term environmental risks was well-done. Reviewers also generally agreed that the potential short-term implementation risks and uncertainties have been addressed, however, Reviewer 1 points out that no socioeconomic risks were discussed, and that while some strategies to mitigate short-term risks are discussed, there is no mitigation plan per se. It should be noted, however, that detailed mitigation plans are not required at the FPL proposal stage.

Reviewers 1 and 3 agree that the project partners have adequate demonstrated experience to carry out the program successfully. Reviewer 2 notes that while the proposal includes knowledge gained from experience in other locations, more information is needed to explain if Florida has carried out activities such as those described in the proposal.

Reviewers 1 and 2 indicate a need for more specific evaluation of past successes and failures of similar efforts, including reference to similar work from other areas of the Gulf Coast, as applicable (Reviewer 2), and more formal evaluation of outcomes from FDEP work that have led to implementation of actions aimed at reducing vulnerability (Reviewer 1). Reviewer 3 suggests the role of the Chief Resiliency Officer in the decision-making process be clarified.

In final comments, Reviewer 2 reiterates that this proposal should further clarify “what outcomes in terms of the Gulf Coast environment are intended to benefit from this work..”, while also highlighting the proposal’s “emphasis on involving stakeholders” and “focus on sensitive areas, communities and resources at risk, areas where previous adaptation has not been conducted before and/or where the most people and property are at risk.”

FDEP Summary Response to FPL 3b BAS Review Comments (May 2020) on Florida Gulf Coast Resiliency Program Proposal

Florida Department of Environmental Protection (FDEP) was pleased to receive overall positive external Best Available Science (BAS) reviews for this Florida Gulf Coast Resiliency Program proposal. In general, the BAS reviewers noted where additional detail or clarification would strengthen the proposal, such as details on the science-based decision-making process for living shoreline implementation and clarification on the benefits of the program in regard to sea level rise, storm surge, and waves. With the increase in character limits permitted in this last phase of the proposal process, we have revised the proposal where needed to address comments on clarity and detail.

Science-based decision-making. **All of the reviewers agreed that the proposal is based on relevant peer-reviewed data and that the methods reflect a strong understanding of resilience, are clearly described, and are justified. Reviewers 1 and 2 agreed that the proposal is based on science that maximizes the quality, objectivity, and integrity of information. Reviewer 3 suggested including additional details on the science-based decision-making process utilized by the Florida Forever program for selecting land for conservation and the implementation of living shorelines.** We have added a description to the proposal of the Florida Forever program science-based process for ranking parcels for land protection as well as a citation for additional details. We have also added text on the science-based decision-making process for living shorelines, noting that proposal evaluations will consider factors such as ecological resources present and adjacent land use.

Sea level rise, storm surge, and waves. **Reviewer 3 suggested that the language describing sea level rise, storm surge, and waves be clarified throughout the proposal, in particular with regard to the benefits of natural habitat restoration being primarily for long-term resiliency to sea level rise (rather than storm surge)**. We concur and have de-emphasized the benefits of natural habitat conservation to storm surge. Further, we have revised the proposal by adding text clarifying the impacts of sea level rise, referencing the additional literature sources recommended by Reviewer 3 (LaFever et al. 2007, Ross et al. 1994); text noting that coastal vegetation attenuates short-period wave energy but may be less effective in reducing impacts of storm surge (Feagin et al. 2010); and, text clarifying the benefits of natural communities for sea level rise and in some cases, storm surge (Zhang et al. 2012).

Literature to support vulnerability assessments. **Reviewer 3 suggested including literature to support information on vulnerability assessments**. As noted in the proposal, vulnerability assessments will follow guidance outlined in the Florida Adaptation Planning Guidebook (FDEP 2018) and the Sea-Level Rise Vulnerability Assessment Tools and Resources (FDEO 2015), among others. We have clarified that a science-based process would be followed for vulnerability assessments and also added reference to previous local and regional assessments and methods relied upon.

Justification for program. **Reviewers 1 and 3 agreed that the proposal identifies the likely environmental benefits of the program, but Reviewer 3 suggested adding further justification for the program and why it is needed to counteract current losses or impacts**. As noted in the proposal, 80 percent of Florida's population live within 10 miles of the coast and due to low elevations, coastal communities and habitats are at significant risk from the effects of climate change (FDEP 2018). As such, this proposal to improve coastal resiliency is critical to counteract the current impacts of climate change including sea level rise and flooding. We have also added text further clarifying that any vulnerability

assessments conducted under this program will focus on areas where vulnerability of coastal communities has not yet been evaluated and will help identify where sensitive resources and communities are most at risk.

Metrics, outcomes, monitoring. **Reviewer 2 noted that the metrics identified are well defined and relate to the successful implementation of the program. Reviewers 1 and 2 suggested providing additional discussion on the monitoring and data management strategy, and Reviewer 2 suggested clarifying the connection between environmental metrics and outcomes related to increased resilience**. We agree that the metrics identified in the proposal are focused on measuring the outcomes of the overall program (i.e., successful implementation of the program). Additional environmental metrics, tied to benefits and outcomes related to increased resiliency, will be identified at the time projects or program activities are selected and planned. Further, monitoring and data management plans will also be developed at the time projects or program activities are selected.

Finally, **Reviewer 1 noted that more information was needed to describe how monitoring of PRM010 will be used to track the completion of vulnerability assessments**. Metrics are selected from a provided list. This metric was identified because it could be used to verify and track completed vulnerability assessment. We have added language to clarify that this metric would be used to both verify and track the completion of vulnerability assessments through documentation of completed assessments through completion of assessment reports.

Risks, uncertainties, and mitigation. **The Reviewers agreed that the discussion included short-term implementation risks and uncertainties, and Reviewer 3 noted that the discussion of vulnerability to long-term environmental risks was well done. However, Reviewer 1 noted that no socioeconomic risks were discussed**. In response, we included a summary of potential near-term and long-term socioeconomic risks associated with these project types. Minor, temporary socioeconomic risks may result from construction of living shorelines, and long-term socioeconomic risks may result from land acquisition; however, these risks are expected to be offset by the long-term socioeconomic benefits from increased coastal resiliency. Further, Florida's Payment in Lieu of Taxes (PILT) program provides for payments to counties with low populations where land is acquired for conservation to help offset the lost tax revenue. **Reviewer 1 also noted that there was no mitigation plan discussed.** Mitigation plans are not required at the FPL proposal stage. As such, Florida will consider a mitigation plan when projects or program activities are selected.

Florida's experience carrying out similar activities. **Reviewers 1 and 3 agreed that the proposal adequately demonstrated Florida's experience necessary to carry out the program successfully. Reviewer 2 noted that more information is needed to explain if Florida has carried out activities such as those described in the proposal, and Reviewers 1 and 2 indicated a need for more specific evaluations of past successes and failures of similar efforts**. In response, we have added examples of similar projects Florida has successfully completed including living shoreline projects and information on Florida's experience with vulnerability assessments. However, an evaluation of past successes and failures of similar efforts is outside the scope of the development of this proposal. Further, the experience and knowledge of FDEP personnel, particularly those from the Office of Resilience and Coastal Protection, has been incorporated into the proposal and will be leveraged during implementation of the proposed program.

Chief Resiliency Officer. **Reviewer 3 suggested the role of the Chief Resiliency Officer in the decision-making process be clarified**. We have clarified the language regarding the role of the Chief Resiliency Officer, which would be to coordinate with FDEP in the execution of this program, as needed. The Chief Resiliency Officer would not be directly involved in project selection but would focus on coordinating efforts with regard to activities conducted as part of this program to increase resiliency.

Clarification of outcomes and emphasis on stakeholders and communities at most risk. **Reviewer 2 noted that the proposal should further clarify the intended outcomes and benefits, while emphasizing stakeholder involvement and a focus on communities that are most at risk or where vulnerability assessments have not been conducted previously**. As noted in the proposal, there are a suite of intended outcomes and benefits of the proposed program including the identification of risks and vulnerabilities, as well as the identification and implementation of sustainable solutions aimed at improving coastal and community resiliency. Stakeholder involvement is very important to Florida, and the public will have the opportunity to propose projects for implementation as part of this program. Vulnerability assessments and implementation of resiliency strategies will have required public engagement elements, particularly targeting vulnerable populations in the community. Finally, as noted above, we have added text further clarifying that the program will focus on areas where vulnerability of coastal communities has not yet been evaluated and where sensitive resources and communities are identified to be most at risk.

Gulf Coast Ecosystem Restoration Council

FPL 3b Internal Best Available Science Review Panel Summary

July 2020

Introduction

On Tuesday, June 30, and Wednesday July 1, 2020 the RESTORE Council convened the Funded Priorities List (FPL) 3b Internal Best Available Science (BAS) Review Panel. The purpose of this internal panel was to use Council member-agency expertise to address external BAS review comments provided for FPL 3b submitted project/program proposals, and potentially identify project/program synergies not identified prior to proposal submission. The ultimate goal of the panel was to provide Council members with substantive best available science content to inform their decision-making.

The internal panel was convened via webinar with representatives from each of the Council's eleven member agencies present. Each BAS Panel member was provided the following:

1) Full FPL 3b proposals
2) 3 external BAS reviews for each proposal
3) Summary of external BAS reviews for each proposal
4) Proposal Sponsor's response to the BAS reviews summary
5) Any proposed revisions to the proposal

Proposal sponsors provided a brief synopsis of their proposal to the panel, a summary of comments made in external reviews, and discussed their proposed response to the external reviews. Council staff then solicited feedback from the panel on the proposal sponsor's presentation of comments and responses to those comments, and any additional BAS concerns. Council staff also solicited feedback on any existing or future synergies with other Gulf restoration activities. The proceedings of the meeting for this proposal are summarized below.

Sponsor: Florida

FL Gulf Coast Resilience Program

Feedback from the panel on the proposal sponsor's presentation of comments and responses to those comments, and any additional BAS concerns:

Site selection: Additional details are needed on the science-based decision-making process used to select project sites.

- The BAS panel agrees that Florida has appropriately addressed this comment.

Program benefits: Clarify language describing sea level rise, storm surge, and waves throughout the proposal, in particular with regard to how natural habitat restoration promotes long-term resiliency to sea level rise (rather than storm surge).

- The BAS panel agrees that Florida has appropriately addressed this comment.

References: Include literature to support information on vulnerability assessments.

- The BAS panel agrees that Florida has appropriately addressed this comment.

Justification: Add further justification for the program and why it is needed to counteract current losses or impacts.

- The BAS panel agrees that Florida has appropriately addressed this comment.

Metrics, outcomes, and data management: Add more information on the monitoring and data management strategy, clarifying the connection between environmental metrics and outcomes related to increased resilience, and use of PRM010 to track vulnerability assessments.

- The BAS panel agrees that Florida has appropriately addressed this comment.

Risks: No socioeconomic risks were discussed.

- The BAS panel agrees that Florida has appropriately addressed this comment.

Past experience: More information is needed on Florida's experience with the proposed activities, as well as an evaluation of past successes and failures of similar efforts, and the role of the Chief Resiliency Officer in the decision-making process.

- The BAS panel agrees that Florida has appropriately addressed this comment.

Program benefits: Clarify the intended outcomes and benefits, while emphasizing stakeholder involvement and a focus on communities that are most at risk or where vulnerability assessments have not been conducted previously.

- The BAS panel agrees that Florida has appropriately addressed this comment.

Other: Will other lands be considered for land acquisition under this program?

- Florida's response: Yes, lands other than Florida Forever Climate Change Lands meeting the program's selection criteria would be considered for acquisition.

Panel comments on existing or future synergies with proposed activity:
The proposed program has potential for synergy with the proposed Perdido Water Quality Improvement and Vulnerability Assessment program.

SCIENCE EVALUATION

Bucket 2: Comprehensive Plan Component

Proposal Title: Florida Gulf Coast Resiliency Program
Location (If Applicable): Florida
Council Member Bureau or Agency: State of Florida Department of Environmental Protection
Type of Funding Requested: Planning / Implementation

Reviewed by: Reviewer 1
Date of Review: 4/28/2020

Best Available Science:

These 4 factors/elements help frame the reviewer's answers to A, B and C found in next section:

Question 1.	
Have the proposal objectives, including proposed methods, been justified using peer reviewed and/or publicly available information?	Yes
Comments:	
Click here to enter text.	

Question 2.	
If information supporting the proposal does not directly pertain to the Gulf Coast region, are the proposal's methods reasonably supported and adaptable to that geographic area?	Yes
Comments:	
The authors note that the low-lying topography and coastal population density of FL puts the state at greater risk than demonstrated by data from other locales.	

Question 3.	
Are the literature sources used to support the proposal accurately and completely cited? Are the literature sources represented in a fair and unbiased manner?	Yes
Comments:	
Sources cited are very current.	

Question 4.	
Does the proposal evaluate uncertainties and risks in achieving its objectives over time? (e.g., is there an uncertainty or risk in the near- and/or long-term that the project/program will be obsolete or not function as planned?)	Yes
Comments:	
Click here to enter text.	

Based on the answers to the previous 4 questions, and *giving deference to the sponsor to provide within reason the use of best available science,* the following three questions can be answered:

Question A	
Has the applicant provided reasonable justification that the proposal is based on science that uses peer- reviewed and publicly available data?	Yes
Comments:	
Click here to enter text.	

Question B	
Has the applicant provided reasonable justification that the proposal is based on science that maximizes the quality, objectivity, and integrity of information (including, as applicable, statistical information)?	Yes
Comments:	
Click here to enter text.	

Question C	
Has the applicant provided reasonable justification that the proposal is based on science that clearly documents and communicates risks and uncertainties in the scientific basis for such projects/programs?	Yes
Comments:	
Click here to enter text.	

Science Context Evaluation:

Question A	
Has the project/program sponsor or project partners demonstrated experience in implementing a project/program similar to the one being proposed?	Yes
Comments:	
The FDEP has funded 60 projects that have produced vulnerability assessments in 20 communities, living shoreline projects, and conserved natural areas. Proposed collaboration with Florida Forever in land acquisition will provide ample experience to achieve this goal.	

Question B	
Does the project/program have clearly defined goals objectives?	Yes
Comments:	
Click here to enter text.	

Question C	
Has the proposal provided a clear description of the methods proposed, and appropriate justification for why the method is being selected (e.g., scientifically sound; cost-effectiveness)?	Yes
Comments:	
Click here to enter text.	

Question D	
Does the project/program identify the likely environmental benefits of the proposed activity? Where applicable, does the application discuss those benefits in reference to one or more underlying environmental stressors identified by best available science and/or regional plans?	Yes
Comments:	
Click here to enter text.	

Question E	
Does the project/program have measures of success (i.e., metrics) that align with the primary Comprehensive Plan goal(s)/objectives? (Captures the statistical information requirement as defined by RESTORE Act)	Yes
Comments:	
Click here to enter text.	

Question F	
Does the proposal discuss the project/program's vulnerability to potential long-term environmental risks (i.e., climate, pollution, changing land use)? (Captures risk measures as defined under best available science by the RESTORE Act)	Yes
Comments:	
Click here to enter text.	

Question G	
Does the project/program consider other applicable short-term implementation risks and scientific uncertainties? Such risks may include the potential for unanticipated adverse environmental and/or socio-economic impacts from project implementation. Is there a mitigation plan in place to address these risks? Any relevant scientific uncertainties and/or data gaps should also be discussed. (Captures risk measures as defined under best available science by the RESTORE Act)	Need more information
Comments:	
Various short-term risks associated with adverse environmental conditions were presented, but no socio-economic risks were discussed. There are a number of proposed strategies to mitigate short-term risks, but no mitigation plan per se.	

Question H	
Does the project/program consider recent and/or relevant information in discussing the elements above?	Yes
Comments:	
Click here to enter text.	

Question I	
Has the project/program evaluated past successes and failures of similar efforts? (Captures the communication of risks and uncertainties in the scientific basis for such projects as defined by the RESTORE Act)	Need more information
Comments:	
The answer to Question A in this section demonstrates FDEP experience with proposed activities, but no formal evaluation was presented that weighs attempts versus outcomes. For example, out of the 60 projects that have produced vulnerability assessments, how many of these led to the implementation of actions aimed at reducing vulnerability? Maybe this is beyond the scope of this question. On p.13, it is noted that action plans commonly stall at the implementation stage, and strategies to reduce this are proposed.	

Question J	
Has the project/program identified a monitoring and data management strategy that will support project measures of success (i.e., metrics). If so, is appropriate best available science justification provided? If applicable, how is adaptive management informed by the performance criteria? (Captures statistical information requirement a defined by the RESTORE Act)	Yes
Comments:	
New data on climate change and project reports will be used in adaptive management (p.14). Adaptive management plans will be required for all funded projects. It is not clear how, in the monitoring of PRM010, the # of research studies will be used to track the completion of vulberability assessments. How are these connected?	

Please summarize any additional information needed below:
Click here to enter text.

SCIENCE EVALUATION

Bucket 2: Comprehensive Plan Component

Proposal Title: Florida Gulf Coast Resiliency Program
Location (If Applicable): Florida
Council Member Bureau or Agency: State of Florida Department of Environmental Protection
Type of Funding Requested: Planning / Implementation

Reviewed by: Reviewer 2
Date of Review: 05/08/2020

Best Available Science:

These 4 factors/elements help frame the reviewer's answers to A, B and C found in next section:

Question 1.	
Have the proposal objectives, including proposed methods, been justified using peer reviewed and/or publicly available information?	Yes
Comments:	
Well-formed objectives and methods that lean heavily on a strong mix of peer-reviewed and publicly available information that combines refereed literature and government reports. Good mix of sources that touch on issues related to climate change at a global scale, at a scale related to the Gulf ecosystem, and at a scale directly applicable to Florida's Gulf Coast. Proposal and methods reflect well on an understanding of resilience and interconnectedness based both on knowledge of Florida's Gulf Coast and information from the cited references.	

Question 2.	
If information supporting the proposal does not directly pertain to the Gulf Coast region, are the proposal's methods reasonably supported and adaptable to that geographic area?	Yes
Comments:	
Information that does not directly pertain to the Gulf Coast region has been buttressed well by information that does directly pertain to Florida's Gulf Coast region. This makes for a stronger proposal because of the links between local actions and impacts nested within the larger scale of climate change at a global level.	

Question 3.	
Are the literature sources used to support the proposal accurately and completely cited? Are the literature sources represented in a fair and unbiased manner?	Yes
Comments:	
Proposal is well-cited and literature is represented in a fair and unbiased manner.	

Question 4.	
Does the proposal evaluate uncertainties and risks in achieving its objectives over time? (e.g., is there an uncertainty or risk in the near- and/or long-term that the project/program will be obsolete or not function as planned?)	Yes
Comments:	
Good discussion of near-term and long-term uncertainties. Realization of changes in costs, locations, etc.; uncertainty of climate change modeling and potential impacts on Florida; and uncertainties that are out of control of Florida and beyond the scope of this project.	

Based on the answers to the previous 4 questions, and *giving deference to the sponsor to provide within reason the use of best available science,* the following three questions can be answered:

Question A	
Has the applicant provided reasonable justification that the proposal is based on science that uses peer- reviewed and publicly available data?	Yes
Comments:	
As noted above, this proposal does rely on a strong mix of data and literature that pertains directly to Flordia's Gulf Coast as well as the broader scale of global climate change. The proposal reflects a good attempt at stitching together this mix of scales to tackle something at a scale that can be implemented by Florida, provide a strong learning template for Florida, and result in successful outcomes.	

Question B	
Has the applicant provided reasonable justification that the proposal is based on science that maximizes the quality, objectivity, and integrity of information (including, as applicable, statistical information)?	Yes
Comments:	
Good integration of climate change modeling, sea level rise, vulnerability assessments, results of work in other areas related to climate impacts (i.e. Hurricane Sandy).	

Question C	
Has the applicant provided reasonable justification that the proposal is based on science that clearly documents and communicates risks and uncertainties in the scientific basis for such projects/programs?	Yes
Comments:	
Click here to enter text.	

Science Context Evaluation:

Question A	
Has the project/program sponsor or project partners demonstrated experience in implementing a project/program similar to the one being proposed?	Need more information
Comments:	
It is not clear to me from this proposal that Florida has undertaken this kind of work previously. The proposal is well-written and appears to be based both on a deep set of literature (peer-reviewed and government reports) as well as knowledge of experiences in other locatioins, but I got the sense this is a new approach for the State of Florida. If other activities like this have been carried out on the Florida Gulf Coast and this project represents a scaling-up and prioritization of the next stage of this work, I don't see that explanation in the proposal. I did not answer "No" here because I could just not be aware of prior experience in Florida with this kind of work (vulnerability assessments, acquiring land for living shorelines, etc.).	

Question B	
Does the project/program have clearly defined goals objectives?	Yes
Comments:	
At least for the planning and implementation aspects of this project (which is its basis), the proposal does provide clear goals and objectives that can be evaluated with specific metrics of success.	

Question C	
Has the proposal provided a clear description of the methods proposed, and appropriate justification for why the method is being selected (e.g., scientifically sound; cost-effectiveness)?	Yes
Comments:	
Clear methods provided, based on a strong understanding of methodology from the literature and details an awareness of the risks and uncertainties including changes in costs and locations.	

Question D	
Does the project/program identify the likely environmental benefits of the proposed activity? Where applicable, does the application discuss those benefits in reference to one or more underlying environmental stressors identified by best available science and/or regional plans?	Need more information
Comments:	
This is the one area where more information would be of benefit to me in evaluating this proposal. Very clear goals and objectives for implementation, with metrics that are clearly spelled out related to miles of shoreline installed, number of properties acquired, acres under management, # of studies, and other related metrics. But, why? There is no mention in the proposal of what the expected outcome of all those metrics is aside from a general theme of "increased resilience". The phrase "adaptive management" is used but that cannot be successfully implemented unless learning translates into changes in management or approach. Not sure if there are metrics related to what happens with storm surge, how to measure improvements in the Gulf ecosystem (species, function, etc.), or other environmental metrics. Just not a clear story told in this proposal as to why money will be spent on the Florida Gulf Coast in terms of what the successful outcomes are for the environment or how "improved resilience" will be measured. If just increasing acres or miles of shoreline habitat is assumed to be "good", the proposal should say that.	

Question E	
Does the project/program have measures of success (i.e., metrics) that align with the primary Comprehensive Plan goal(s)/objectives? (Captures the statistical information requirement as defined by RESTORE Act)	Yes
Comments:	
From the standpoint of implementation objectives and measures of success, yes. But as discussed in my response to Question D, it's not clear what specific contribution to the environment will be considered success and how that will be translated into the overall goals and objectives of the RESTORE Act and the Comprehensive Plan.	

Question F	
Does the proposal discuss the project/program's vulnerability to potential long-term environmental risks (i.e., climate, pollution, changing land use)? (Captures risk measures as defined under best available science by the RESTORE Act)	Yes
Comments:	

Click here to enter text.

Question G	
Does the project/program consider other applicable short-term implementation risks and scientific uncertainties? Such risks may include the potential for unanticipated adverse environmental and/or socio-economic impacts from project implementation. Is there a mitigation plan in place to address these risks? Any relevant scientific uncertainties and/or data gaps should also be discussed. (Captures risk measures as defined under best available science by the RESTORE Act)	Yes
Comments:	
Yes, good discussion of short-term and long-term risks, both those that can be mitigated by implementation of the project and also those that are beyond the control of this project and the State of Florida.	

Question H	
Does the project/program consider recent and/or relevant information in discussing the elements above?	Yes
Comments:	
Good reliance on literature that is recent and that pertains both to Florida's Gulf Coast and to the wider scale of global climate change, sea level rise, etc. Proposal touches on experience with climate disruptions and the response like from Hurricane Sandy.	

Question I	
Has the project/program evaluated past successes and failures of similar efforts? (Captures the communication of risks and uncertainties in the scientific basis for such projects as defined by the RESTORE Act)	Need more information
Comments:	

Good reference to other places and events like Hurrican Sandy but if this kind of work has been done in other states along the Gulf Coast I don't see reference to that in the proposal. Some kind of acknowledgement of previous similar efforts would be a helpful addition to the proposal and might provide recommendations for Florida to consider in terms of environmental metrics for measuring success.

Question J	
Has the project/program identified a monitoring and data management strategy that will support project measures of success (i.e., metrics). If so, is appropriate best available science justification provided? If applicable, how is adaptive management informed by the performance criteria? (Captures statistical information requirement a defined by the RESTORE Act)	Need more information
Comments:	
As mentioned previously, the proposal does a good job of identifying and detailing metrics that are clearly related to successful implementation, such as miles of shoreline, acres, and number of vulnerability assessments. It is clearly spelled out in the proposal how these metrics will be measured and what the success criterion is for each metric. This is not true for environmental metrics so it is not clear what the expectations are for this project to improve the environmental health of Florida's Gulf Coast or the Gulf generally. It is possible that is not the intent of this project and simply achieving metrics of implementation success constitute a successful project and directly apply to how this work is viewed under the RESTORE Act and the Comprehensive Plan. That is a perfectly acceptable approach and this proposal builds its case well for that approach. However, if the intent is to provide some specific benefits to the Gulf Coast environment, that detail is not provided. And, that kind of detail would be necessary to really make the case that adaptive management will be used to take learning from the project and change management as a result.	

Please summarize any additional information needed below:

Really like to see the emphasis on involving stakeholders – proposals from public, participating in vulnerability assessments, suggestions for land acquisitions, etc.

Good focus on sensitive areas, communities and resources at risk, areas where previous adaptation has not been conducted before and/or where the most people and property are at risk.

Land acquisition process looks good – uses appraisal, fair market value, negotiation with owners; solkid approach that is good alternative to eminent domain.

Just re-emphasizing my main concern about this proposal – strong on implementation and related metrics, but not clear what outcomes in terms of the Gulf Coast environment are intended to benefit from this work, how those outcomes would be measures, and how learning would be used to adjust. Without that kind of detail, this project is an approach to implementation but does not rise to the level of being able to implement a true adaptive management plan. There is a general discussion of the environmental benefits of coastal work like that described in the proposal but that general discussion is not moved into project-specific metrics or a discussion of how this specific work on Florida's Gulf Coast will contribute to improving those environmental metrics.

SCIENCE EVALUATION

Bucket 2: Comprehensive Plan Component

Proposal Title: Florida Gulf Coast Resiliency Program
Location (If Applicable): Florida
Council Member Bureau or Agency: State of Florida Department of Environmental Protection
Type of Funding Requested: Planning / Implementation

Reviewed by: Reviewer 3
Date of Review: May 11, 2020

Best Available Science:

These 4 factors/elements help frame the reviewer's answers to A, B and C found in next section:

Question 1.	
Have the proposal objectives, including proposed methods, been justified using peer reviewed and/or publicly available information?	Yes
Comments:	
There could be more discussion regarding the methods by which the living shorelines are science-based. See my comments under question B below.	

Question 2.	
If information supporting the proposal does not directly pertain to the Gulf Coast region, are the proposal's methods reasonably supported and adaptable to that geographic area?	Yes

Comments:

This question was not particularly applicable. Nearly all information was Florida-specific.

Question 3.	
Are the literature sources used to support the proposal accurately and completely cited? Are the literature sources represented in a fair and unbiased manner?	Yes

Comments:

Some missing key peer-reviewed literature on this subject for Florida would be: Michael Ross's papers on sea level rise and vegetated habitats; Keqi Zhang's papers on storm surge and vegetated habitats. Also, for wildlife-dependent land resiliency against sea level rise/storms in FL, Lafever et al. 2007.

Could be a little more peer-reviewed literature or reports cited about the vulnerability assessments on page 8 – usually, these are best done spatially, would be nice to hear a little more here.

I suggest reducing and hedging among all statements that wetlands reduce the impacts of storm surges. As an expert in this area, I believe that the literature touting this is weak. You just do not need to sell this idea for resiliency. 1. There are better ways to reduce storm surge that natural habitats – if that is the goal, we should just build a wall. The economic risk calculus will always go in that direction. 2. The benefit is the long term resiliency to sea level rise. Natural lands build elevation in response, whereas concrete does not. 3. There is some mixing among sea level rise and storm surges and waves in this proposal. Oyster reefs can reduce wave energy as can intertidal wetlands and mangroves. But storm surges, not very much really. 4. Just reduce the statements on storm surges. See Feagin et al. 2010 about how an emphasis like this can result in perverse economic incentives negatively against natural systems. Sell it based on the other ecosystem services like you have – carbon, coastal squeeze abatement, water filtration/ natural downstream running flood abatement, etc.

Question 4.

Does the proposal evaluate uncertainties and risks in achieving its objectives over time? (e.g., is there an uncertainty or risk in the near- and/or long-term that the project/program will be obsolete or not function as planned?)	Yes
Comments:	
The section on risks was well-done.	

Based on the answers to the previous 4 questions, and *giving deference to the sponsor to provide within reason the use of best available science,* the following three questions can be answered:

Question A	
Has the applicant provided reasonable justification that the proposal is based on science that uses peer- reviewed and publicly available data?	Yes
Comments:	
Yes, this is generally done. See question 3 comments above for specific suggestions about other peer-review literature that is relevant.	

Question B	
Has the applicant provided reasonable justification that the proposal is based on science that maximizes the quality, objectivity, and integrity of information (including, as applicable, statistical information)?	Need more information
Comments:	
Would like to hear a little more about the FF science-based evaluation process rankings for the selection of lands – more depth is needed to understand what this means exactly. The discussion about Living Shorelines – page 8 – The statement that these may be considered independent of the vulnerability assessments is a little worrisome. While I do not think their	

consideration necessarily fit into this other portion of the program, the spirit here is strangely worded. It reads that this element goes straight into contracting and engineering. Where is the science or prioritization/decision-making process? This needs to be fit within such a context a bit better. The worry is that this could be a contractor-driven money-making bonanza process without better science-based oversight. As an example of the better way to couch this, the next part Land acquisition and management on page 9 does a nice job of this. Set up some process for decision-making.

Also, while it is stated that no construction will be funded here, it appears that the design, engineering, and permitting process is taking place for living shoreline construction. Then, at the end of this section on page 9, it is stated that an Invitation to Bid will be made. Can this all be clarified further? Am I getting this right, as I am trying to surmise a bit here? What exactly is this proposal funding in terms of the living shoreline process? How are the potential project areas/needs of the State defined? By what process?

In my opinion, this is a critical piece of this proposal, but it is not very clear.

Question C	
Has the applicant provided reasonable justification that the proposal is based on science that clearly documents and communicates risks and uncertainties in the scientific basis for such projects/programs?	Yes
Comments:	
The section on risks is very well-done. The proposal correctly identifies public controversy over climate change as a risk – that is sad, but accurate – it is obvious to this science reviewer that the public needs to take this very seriously, particularly in Florida, lest its primary economic base will be degraded!	

Science Context Evaluation:

Question A	
Has the project/program sponsor or project partners demonstrated experience in implementing a project/program similar to the one being proposed?	Yes
Comments:	
The project sponsor is well-suited to manage. Would like to have heard more about the Chief Resiliency Officer though, and how much leverage/latitude s/he has in decision-making. Don't want to see politicization happening to the decision-making process. Please describe further in revisions for the future.	

Question B	
Does the project/program have clearly defined goals objectives?	Yes
Comments:	
Proposal's goals are clear.	

Question C	
Has the proposal provided a clear description of the methods proposed, and appropriate justification for why the method is being selected (e.g., scientifically sound; cost-effectiveness)?	Yes
Comments:	
Yes, generally. The FF needs to be better described. The living shorelines selection critieria process needs to be better described.	

Question D	
Does the project/program identify the likely environmental benefits of the proposed activity? Where applicable, does the application discuss those	Yes

benefits in reference to one or more underlying environmental stressors identified by best available science and/or regional plans?	

Comments:

The benefits are clearly outlined in terms of the ecosystem services provided. However, as mentioned above, the proposal needs to hedge on the storm surge literature and statements, in my scientific opinion.

The proposal could also more clearly state up top that these ecosystem services and habitats are currently being degraded at X rate, or make some statement as to what the problem is today without the funding.

Question E

Does the project/program have measures of success (i.e., metrics) that align with the primary Comprehensive Plan goal(s)/objectives? (Captures the statistical information requirement as defined by RESTORE Act)	Yes

Comments:

This is in the proposal.

Question F

Does the proposal discuss the project/program's vulnerability to potential long-term environmental risks (i.e., climate, pollution, changing land use)? (Captures risk measures as defined under best available science by the RESTORE Act)	Yes

Comments:

This section was well-done, as mentioned above.

Question G	
Does the project/program consider other applicable short-term implementation risks and scientific uncertainties? Such risks may include the potential for unanticipated adverse environmental and/or socio-economic impacts from project implementation. Is there a mitigation plan in place to address these risks? Any relevant scientific uncertainties and/or data gaps should also be discussed. (Captures risk measures as defined under best available science by the RESTORE Act)	Yes
Comments:	
Yes, this section was well-done, as mentioned above.	

Question H	
Does the project/program consider recent and/or relevant information in discussing the elements above?	Yes
Comments:	
Yes, this is based on recent science.	

Question I	
Has the project/program evaluated past successes and failures of similar efforts? (Captures the communication of risks and uncertainties in the scientific basis for such projects as defined by the RESTORE Act)	Yes
Comments:	
Yes, the responsible agency seems to have experience in this area. Specifically, the use of the FF program make sense here.	

Question J	
Has the project/program identified a monitoring and data management strategy that will support project measures of success (i.e., metrics). If so, is appropriate best available science justification provided? If applicable, how is adaptive management informed by the performance criteria? (Captures statistical information requirement a defined by the RESTORE Act)	Yes
Comments:	
This was discussed in the risk section, with good detail.	

Please summarize any additional information needed below:
Overall, for revision purposes, I see the following as useful: 1. Better description of CRO involvement/context, how this will not minimize science-based decision-making 2. Better description of FF science based ranking process 3. Better description of how living shoreline program is implemented, particularly to alleviate concerns that it will not be science based, but rather driven by money. Also, definition of what the money will be spent on, ie what parts of the scoping, planning, design, engineering, permitting construction process. Where do the funded activities start and stop? 4. Hedged statements on the ecosystem service of storm surge and the ability of these natural systems to reduce it. 5. More upfront justification that this program is needed to counteract current losses or some current impacts 6. The emphasis of this particular project could be more focused on the vulnerability assessments and living shorelines portion, and less on the land acquisition – the reason I say this is because there appears to be another similar proposal from the State of Florida Department of Environmental Protection that is focused on the latter and is more tightly focused on land acquisition. If this proposal is substantially different in that element, please specify how. If the emphasis shifts, then please make double-sure to more clearly outline the living shoreline decision processes.