**PROJECT IDENTIFICATION INFORMATION**

**Project #: \_\_\_\_\_\_\_\_\_\_\_\_\_** *(to be assigned by DOI staff)*

**Project Title:**

Decision Support for Hurricane Sandy Restoration and Future Conservation to Increase Resiliency of Tidal Wetland Habitats and Species in the Face of Storms and Sea Level Rise

**DOI Bureau: U.S. Fish and Wildlife Service (also includes work by USGS & NPS)**

**Point of Contact**

 **Name: Andrew Milliken**

 **Phone: 413-253-8269**

 **Email: andrew\_milliken@fws.gov**

**National Disaster Recovery Framework Recovery Support Functions** *(check all that apply):*

|  |  |
| --- | --- |
| \_\_\_ Community Planning and Capacity Building | \_\_\_ Housing  |
| \_\_\_ Economic Development | \_\_\_ Infrastructure Systems |
| \_\_\_ Health and Social Services  | \_X\_ Natural and Cultural Resources |

**Geographic Scope:** *(as relevant, include unit names, cities, states, congressional districts, Stafford Area, and project locations)*

Tidal regions of states affected by Hurricane Sandy including NY (Cong. Districts 1,2,3,4,5,6,7,8,9,12,13,14), NJ (2,3,4,6) CT (2,3,4), RI (1,2), DE(1), MD(1,2,3,5), MA (4,5,6,7,8,9), VA (1,2,3,4), NH (1) and ME (1,2). All these tidal regions are within the Hurricane Sandy Stafford Area.

**Project Summary** *(1-2 sentences)*

Coordinated effort by Landscape Conservation Cooperative (LCC) partners to integrate existing data, models and tools with foundational data and impact assessments to guide decisions about where to conduct tidal marsh restoration, conservation and management to sustain ecological values, ecosystem services, habitat suitability and resiliency of tidal marshes and marsh species in the face of storm impacts, sea level rise and other stressors.

**Total Requested Funding: $ 2,200,000**

**PROJECT PROPOSAL NARRATIVE**

Please describe the following: Project goals, project summary, project benefits, definition of project success and plan to assess results, time schedule including milestones, budget summary, project team and qualifications, including institutional capacity. *(limited to 2 pages, single spaced)*

Hurricane Sandy had a major impact on tidal marshes and their ability to provide ecological functions and provide coupled human-natural system resilience including flood abatement. An integrated approach through the North Atlantic LCC is proposed for developing and delivering information and tools needed to guide conservation decisions in response to the hurricane and to increase resiliency of tidal marshes to future storms, sea level rise and other stressors.

**Goals**

**(1)** Compile and summarize initial results of assessments of impacts of Hurricane Sandy on tidal marshes and marsh-dependent species. **(2)** Compile regionally-consistent spatial data including elevation, tidal, restrictions, ditches, and hardened structures. **(3)** Monitor and assess the effectiveness of tidal wetland restorations completed in response to Hurricane Sandy for increasing resiliency of marshes and marsh species to future storms and sea level rise and use this information to develop best management practices for future restorations and prioritize locations with the highest likelihood of success. **(4)** Develop models for understanding future impacts of sea level rise and storms on tidal marshes along with other stressors such as urban growth to address critical management decisions for increasing resiliency through marsh restoration, management and protection at regional and local scales. **(5)** Incorporate models for sea-level rise and storms into the North Atlantic Landscape Conservation Cooperative (LCC) modeling framework "Designing Sustainable Landscapes" throughout the Northeast Region in combination with other predicted effects of climate change, urban growth, conservation and management on tidal wetlands and adjacent uplands to understand combined habitat and species impacts and thereby guide decision making across a number of goals. **(6)** Provide decision support tools, maps, models and monitoring results available to decision makers at scales and formats needed and provide capacity to work with partners to use this information at the regional, state and local level.

**Summary**

Decisions on allocation of resources for tidal wetland restoration efforts in response to Hurricane Sandy impacts and future allocation of resources for wetland conservation efforts need to be guided by an understanding of which actions at which sites in the North Atlantic will be the most likely to increase the persistence of these marsh systems and the services they provide such as flood abatement, wildlife and fisheries habitat and recreation. This project would implement a coordinated effort to increase persistence of tidal marshes among many partners: Atlantic Coast LCCs, FWS, USGS, NPS, Climate Science Centers, NOAA, regional ocean partnerships, states, universities, and NGOs. The work would integrate existing monitoring results, models and tools with foundational data and impact assessments and deliver that information to guide decisions about where to conduct tidal marsh restoration, conservation and management to sustain ecological values (habitat suitability, connectivity and resiliency) and ecosystem services. Initial focus will be on tidal wetlands in New York and New Jersey including National Wildlife Refuges and National Parks most impacted by Hurricane Sandy but will be applied to other coastal states most impacted. This project would integrate and deliver results from existing DOI and NOAA sea level rise and wetland response models, wildlife habitat suitability projects, LCC decision support projects; resiliency approaches by The Nature Conservancy and ongoing efforts to deliver information to states and communities through LCC, NOAA and the regional ocean partnerships. This project also depends upon, complements, utilizes and integrates foundational data, impact assessments and modeling being completed (immediate needs) or proposed by USGS for DOI resiliency funding including Wetland Physical Change Assessment, Estuarine Assessment, Wetland Ecosystem Functions and Processes, Bird Responses and Vulnerability and Forecasting Ecological Impacts of Storms.

**Benefits**

This project will play a critical role in responding to Hurricane Sandy and adapting to future storms by facilitating the implementation of the most effective marsh restoration and conservation efforts in the locations with the greatest potential for success. Not only will this conserve tidal marshes themselves, but

also the fish and wildlife species they support and their associated ecosystem services including flood abatement and other economic and recreational benefits. By bringing together many partners and

**Project Proposal Narrative** *(continued)*

delivering information tools and training, the project will increase management effectiveness, avoid redundancy, and improve efficiency across the public and private sectors. It will allow the application of lessons learned by assessing the impact of Hurricane Sandy and the effectiveness of restoration projects.

**Definition of Project Success and Plan to Assess Results**

Project success will be defined by:

* Completion of decision support models for tidal wetlands and tidal wetland species that is used DOI and other partners for decisions on future wetland management, restoration and protection;
* A coordinated monitoring program that evaluates and determines the effectiveness of marsh restoration in increasing persistence and resiliency of tidal marsh habitats and species; and
* Availability and use of these results and tools by partners at regional, state and local scales.

Results will be assessed by the technical project team, a decision-makers team and peer reviews.

**Time Schedule including Milestones**

Year 1: Complete summary of initial assessments of impacts of Hurricane Sandy on tidal marshes; complete review of the state of the science of existing tidal marsh response modeling and tidal marsh species habitat modeling; complete compilation of regionally-consistent spatial data on marshes; initiate additional modeling efforts; establish monitoring protocols, network and sites; and initiate pre-restoration monitoring.

Year 2: Complete pre-restoration monitoring; continue refinement and development of response modeling and species-habitat modeling; incorporate initial models into decision framework; and set up science delivery network for coastal communities.

Year 3: Refine and complete response modeling and species-habitat models; incorporate models into decision framework; incorporate information into LCC, CSC and NOAA data portals, initiate post-restoration monitoring, deliver science through workshops, training and delivery network.

**Budget Summary**

|  |  |
| --- | --- |
| Review and summary of initial results of assessments of tidal marsh impacts and compile consistent regional spatial data | $250,000 |
| Decision support models and incorporation into decision model framework (not including proposed USGS modeling components) | $450,000 |
| Monitoring and assessment of effectiveness of restoration for marsh resiliency | $575,000 |
| Delivery of results to partners and communities via information management, workshops, training and capacity building | $725,000 |
| Overall coordination, facilitation, partner travel | $200,000 |
| Totals | $2,200,000 |

**Project Team** (providing technical expertise on marshes, monitoring, modeling and decision support)

Andrew Milliken, North Atlantic LCC Coordinator; Susan Adamowicz, NWR Coastal Biologist, Chuck Frost Biometrician, Inventory and Monitoring Program, USFWS

Mary Ratnaswamy, USGS Director, Northeast Climate Science Center (CSC), Richard Palmer, University Director Northeast CSC, University of Massachusetts, Radley Horton, Columbia University/CSC, Linda Deegan, Marine Biological Laboratory/CSC, Kevin McGarigal and Casey Brown, UMass/Northeast CSC

Rob Thieler, Coastal Geologist, Woods Hole Coastal and Marine Science Center, Matthew Anderson, Senior Science Advisor for Environments, U.S. Geological Survey

Amanda Babson, Coastal Landscape Adaptation Coordinator, National Park Service

Adam Whelchel and Mark Anderson, The Nature Conservancy

Darlene Finch and Adrianne Harrison, NOAA Coastal Services Center*.*

The North Atlantic LCC partnership includes federal and state agencies, tribes and NGOs facilitated by DOI. The LCC partnership provides the forum to ensure that the project is meeting the needs of a broad set of partners. LCC staff will provide the institutional capacity to oversee the fiscal and technical aspects of the project as well as coordinating this project with other relevant projects. The Climate Science Center will coordinate closely on relevant research conducted by the CSC and CSC investigators will contribute specified project tasks related to decision support, marsh ecology and sea level rise models.

**PROJECT IDENTIFICATION INFORMATION**

**Project #: \_\_\_\_\_\_\_\_\_\_\_\_\_** *(to be assigned by DOI staff)*

**Project Title:**

Decision Support for Hurricane Sandy Restoration and Future Conservation to Increase Resiliency of Beach Habitats and Beach-Dependent Species in the Face of Storms and Sea Level Rise

**DOI Bureau: U.S. Fish and Wildlife Service**

**Point of Contact**

 **Name: Andrew Milliken**

 **Phone: 413-253-8269**

 **Email: andrew\_milliken@fws.gov**

**National Disaster Recovery Framework Recovery Support Functions** *(check all that apply):*

|  |  |
| --- | --- |
| \_\_\_ Community Planning and Capacity Building | \_\_\_ Housing  |
| \_\_\_ Economic Development | \_\_\_ Infrastructure Systems |
| \_\_\_ Health and Social Services  | \_X\_ Natural and Cultural Resources |

**Geographic Scope:** *(as relevant, include unit names, cities, states, congressional districts, Stafford Area, and project locations)*

Coastal beaches of states affected by Hurricane Sandy including NY (Cong. Districts 1,2,3,4,5,6,7,8,9,12,13,14), NJ (2,3,4,6) CT (2,3,4), RI (1,2), DE(1), MD(1,2,3,5), MA (4,5,6,7,8,9), VA (1,2,3,4), NH (1) and ME (1,2). All these coastal beaches are within the Hurricane Sandy Stafford Area.

**Project Summary** *(1-2 sentences)*

Coordinated effort by Landscape Conservation Cooperative (LCC) partners to integrate existing data, models and tools with foundational data and assessments of both the impacts of Hurricane Sandy and the immediate response to guide decisions about where to conduct what beach restoration, management and conservation actions to sustain ecological function, habitat suitability for wildlife and ecosystem services including flood abatement in the face of storm impacts and sea level rise.

**Total Requested Funding: $** 1,750,000

**PROJECT PROPOSAL NARRATIVE**

Please describe the following: Project goals, project summary, project benefits, definition of project success and plan to assess results, time schedule including milestones, budget summary, project team and qualifications, including institutional capacity. *(limited to 2 pages, single spaced)*

**Goals**

**(1)** Integrate existing information and models and develop decision support tools for understanding future impacts of sea level rise and storms on coastal beaches that can be used to make critical management decisions for increasing resiliency and habitat suitability through beach restoration, management and protection at regional and local scales. **(2)** Incorporate models of beach response to sea-level rise and storms into the North Atlantic LCC modeling framework along with other predicted effects of climate change, urban growth and conservation to understand combined habitat impacts and guide decision making across a number of disciplines. **(3)** Assess the effectiveness of beach nourishment and other stabilization activities completed in response to Hurricane Sandy for increasing resiliency of beach habitats to future storms and sea level rise and sustaining beach-dependent wildlife species and use this assessment to refine best management practices for future restorations and prioritize approaches and locations with the highest likelihood of success. **(4)** Collect and model beach-nesting bird location and habitat data on and adjacent to key coastal National Wildlife Refuges from Maine to Virginia to provide finer-scale projections of habitat changes. **(5)** Make decision support tools, maps and monitoring results easily available to decision makers at scales and formats needed through the LCC data portal; work with partners to translate and use information at the regional, state and local level and enhance existing capacity to work with communities.

**Summary**

Coordinated effort through the LCCs working with DOI Bureaus, Climate Science Centers (CSCs), coastal states, tribes, NGOs and university partners to integrate existing monitoring results, models and tools with foundational data and impact assessments to guide decisions about where to conduct beach restoration, conservation and management to sustain ecological values, ecosystem services and habitat suitability of beaches in the face of storm impacts and sea level rise in the Hurricane Sandy region. This includes integration and expansion of results from an ongoing sea level rise modeling project being conducted by USGS Coastal Geology Program, Virginia Tech, and other State, Federal, and NGO partners to couple predictive models of sea level rise, beach geomorphology, and habitat for piping plovers. These decision support models will be expanded from Maryland and Virginia to include New Jersey, New York and other states impacted by the Hurricane. Data from past and ongoing studies of beach stabilization projects will be incorporated to inform near-term resiliency projects as well as longer-term planning for conservation of sensitive habitats in the face of sea level rise and storms. The project focuses on sustaining integrity of coastal beaches, ecosystem services provided by these beaches including flood abatement and persistence of sensitive beach species. The threatened piping plover will serve as a surrogate species for habitat modeling, but implications for oystercatchers, least terns, black skimmers, sea beach amaranth (federally-threatened plant), northeastern beach tiger beetle (federally threatened insect), red knot (candidate for ESA listing), and other migrating shorebirds will be addressed in depth. Partners include LCCs, CSCs, USGS, NPS, NWRs, States, Universities, NGOs and the Atlantic Coast Piping Plover Recovery Group. This project also depends upon, complements, utilizes and integrates foundational data, impact assessments and modeling being completed (immediate needs) or proposed by USGS for DOI mitigation funding including *Bird Responses and Vulnerability, Forecasting Ecological Impacts of Storms, Impacts and Vulnerability of Coastal Beaches, Fire Island,* and *Assateague* projects.

**Benefits**

Decisions on allocation of resources for coastal beach restoration efforts in response to Hurricane Sandy impacts and future allocation of resources for barrier beach conservation efforts need to be guided by an understanding of which actions at which sites will be the most likely to increase the persistence of these habitats and species as well as resulting in ecosystem services such as flood abatement and recreation. An integrated decision support effort through the LCCs that brings existing partners and science together with planned additional resiliency science will reduce redundancy and increase the effectiveness of conservation actions. It will allow for efficient allocation of limited resources including staff time and funding. It will allow managers to make decisions with regional context about where coastal beaches and beach species are most likely to persist under current and predicted future conditions. It will allow the application of lessons learned by assessing the effectiveness of Sandy response projects.

**Project Proposal Narrative** *(continued)*

**Definition of Project Success and Plan to Assess Results**

Project success will be defined by:

* Completion of decision support models for coastal beaches that are used for decisions by DOI, other federal agencies, states and communities on future beach management and restoration;
* Coordination of a monitoring program to evaluate the effectiveness of beach restoration and management in increasing persistence and resiliency of beach habitats and species; and
* Availability and use of these results and tools by partners at regional, state and local scales.

Results will be assessed by the technical project team, a decision-makers team and peer reviews.

**Time Schedule Including Milestones**

Year 1: Populate decision models with species and habitat data from past and ongoing studies and from remote sensing. Collect and incorporate data on species distribution and habitat at sites where beach stabilization is ongoing or imminent. Extend recent inventory of inlet and beach modifications to the Northeast using consistent methods to provide a comprehensive assessment of baseline conditions.

Year 2: Continue data collection in areas where beach stabilization is planned, ongoing, or recently completed; continue refinement and development of response modeling and piping plover and other species-habitat models; initial incorporation of models into LCC decision framework, set-up network to deliver information and tools to coastal states and communities.

Year 3: Complete refinement and development of response modeling and species-habitat models, incorporate final models into decision framework, incorporate information into data portal, initiate post-restoration monitoring, deliver information and tools through workshops, training and delivery network.

Budget Summary

|  |  |
| --- | --- |
| Expand geographic scope of existing geomorphology and piping plover models to New York and New Jersey, assemble regionally consistent spatial data on beaches and incorporate into decision support models | $550,000 |
| Assess effects of beach stabilization projects in New York and New Jersey | $550,000 |
| Collect beach-nesting bird location and habitat data on and adjacent to key coastal national wildlife refuges from Maine to Virginia and incorporate into finer-scale projections. | $200,000 |
| Deliver results to partners via information management, workshops, training and capacity building | $350,000 |
| Overall coordination, facilitation, partner travel | $100,000 |
| Totals | $1,750,000 |

Project Team (providing technical expertise on beaches, monitoring, modeling and decision support)

Andrew Milliken, North Atlantic LCC Coordinator; Anne Hecht, Piping Plover Recovery Coordinator, Steven Papa, Endangered Species Program, U.S. Fish and Wildlife Service

Mary Ratnaswamy, Director, Northeast Climate Science Center, U.S. Geological Survey, Radley Horton, Columbia University and Northeast Climate Science Center

Rob Thieler, Coastal Geologist, Woods Hole Coastal and Marine Science Center, and

Matthew Anderson, Senior Science Advisor for Environments, U.S. Geological Survey

Amanda Babson, Coastal Landscape Adaptation Coordinator, National Park Service

James Fraser, Virginia Tech; Brooke Maslo, Rutgers University; Todd Pover, Conserve Wildlife NJ

Darlene Finch and Adrianne Harrison, NOAA Coastal Services Center*.*

The North Atlantic LCC partnership includes federal and state agencies, tribes and NGOs facilitated by DOI. The LCC partnership provides the forum to ensure that the project is meeting the needs of a broad set of partners. LCC staff will provide the institutional capacity to oversee the fiscal and technical aspects of the project as well as coordinating this project with other relevant projects. The Climate Science Center will coordinate closely on relevant research conducted by the CSC network, and Northeast CSC investigators will contribute specified project tasks related to decision support and sea level rise models.

The Atlantic Coast Piping Plover Recovery Group is a broad-based partnership including more than 50 State wildlife agencies, National Wildlife Refuges, National Park Service units, and NGOs that have been actively collaborating for more than 25 years.