EMERGENCY COASTAL RESILIENCE FUND

2019 REQUEST FOR PROPOSALS

Full Proposal Due Date: ***Tuesday, November 12th, 2019*** **by 11:59 p.m. EDT**

Applicant Webinars:

Coastal communities impacted by hurricanes Florence and Michael, and 2018 wildfires:
Wednesday, September 4, 2019 at 1:00-2:00 p.m. EDT

Coastal communities impacted by Typhoon Yutu:
Tuesday, September 10th 2019 at 6:30-7:30 p.m. EDT /
Wednesday, September 11th 2019 at 8:30-9:30 a.m. ChST

Additional webinar for those who were unable to attend due to Hurricane Dorian:
Wednesday, September 18, 2019 at 2:00-3:00 p.m. EDT

OVERVIEW

The National Fish and Wildlife Foundation (NFWF), in coordination with the National Oceanic and Atmospheric Administration (NOAA) as per the Supplemental Appropriations Act of 2019 (P.L. 116-20), is announcing the Emergency Coastal Resilience Fund to support projects that increase the resilience of coastal communities impacted by hurricanes Florence and Michael, Typhoon Yutu, and wildfires in 2018. The Emergency Coastal Resilience Fund will support projects that strengthen natural systems at a scale that will increase protection for communities and critical assets against the future impacts of storms, floods, and other natural hazards. These investments will enable communities to better withstand and recover more quickly from events, while also enhancing important habitats for fish and wildlife populations.

NFWF will award approximately $48 million in grants to create, expand, and restore natural systems and nature-based infrastructure to: (1) reduce the impacts of coastal storm surge, sea-level rise, wave velocity, flooding, debris flow, stormwater run-off, and other natural hazards on coastal communities; and (2) strengthen the ecological integrity and functionality of coastal ecosystems to protect communities and to enhance fish and wildlife and their associated habitats.

GEOGRAPHIC FOCUS

Areas impacted by hurricanes Florence and Michael, Typhoon Yutu, and 2018 wildfires

The Emergency Coastal Resilience Fund priority geographies are highlighted in the maps below. Eligible projects must be located within the outlined National Coastal Resilience Fund (NCRF) Coastal Areas *and* be within counties that received a federal disaster declaration as a result of Hurricanes Florence and Michael, Typhoon Yutu, or the wildfires of 2018. The Coastal Area

boundary is the same boundary used for NFWF's NCRF and is defined as coastal Hydrologic Unit Code (HUC) 8 watersheds that drain to the sea, plus any adjacent HUC 8 watersheds that are particularly low-lying or tidally influenced.

Additionally, projects located in counties that received a federal disaster declaration, but that are outside of the NCRF boundary, may be eligible if they can demonstrate a clear and distinct nexus to protecting a coastal community that is both within the NCRF boundary and within a county that received a federal disaster declaration (as described above). See Figures 1, 2, 3, and 4 below.

Note: Federally Declared Counties are based on information available from the Federal Emergency Management Agency (FEMA). Counties included received a Public Assistance designation. Maps updated 8/19/19 based on additional information from FEMA.

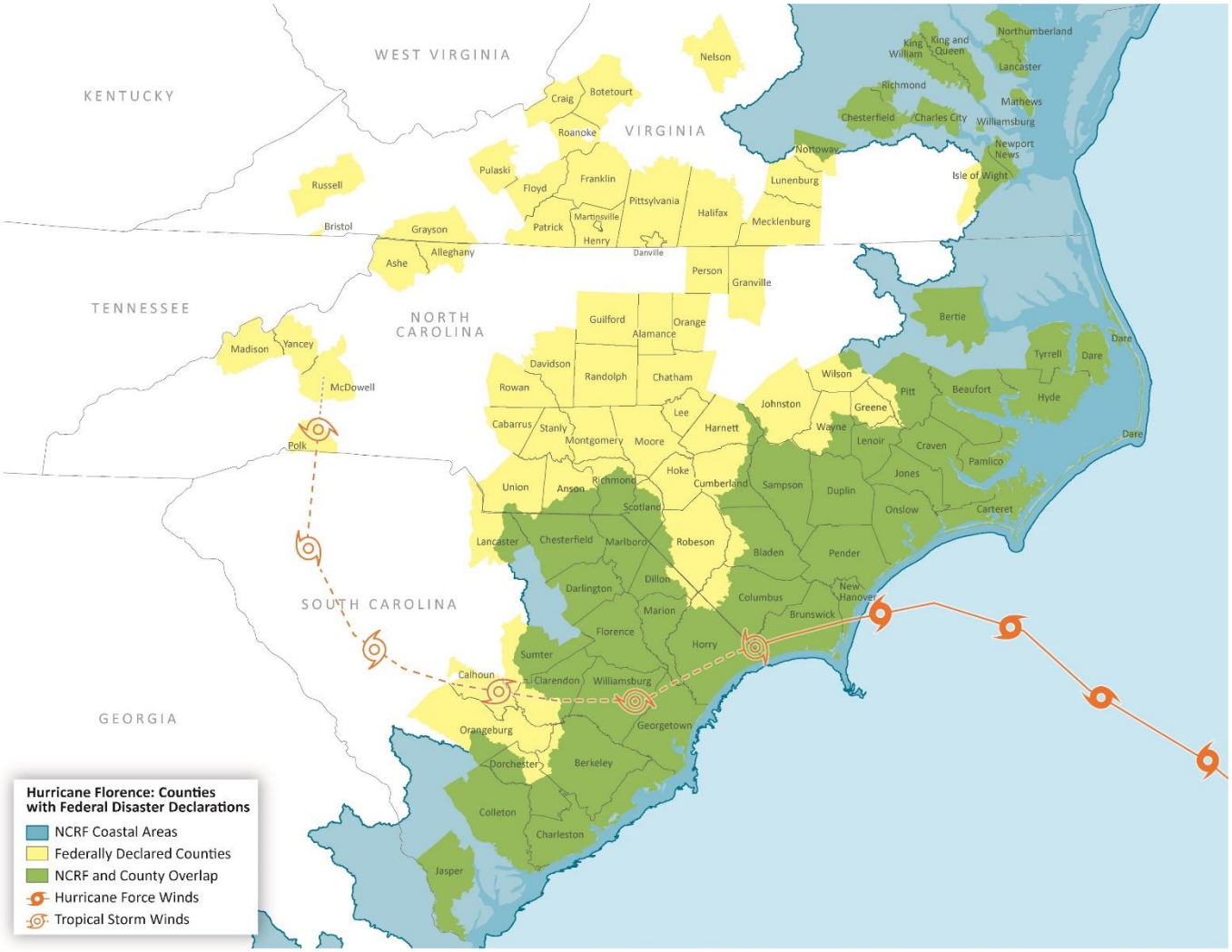

Figure 1 - Hurricane Florence: All projects must be in a Federally Declared County. Those projects in declared counties that do not fall within the NRCF coastal area (shaded yellow) must clearly demonstrate how they benefit communities within the coastal area (shaded green).

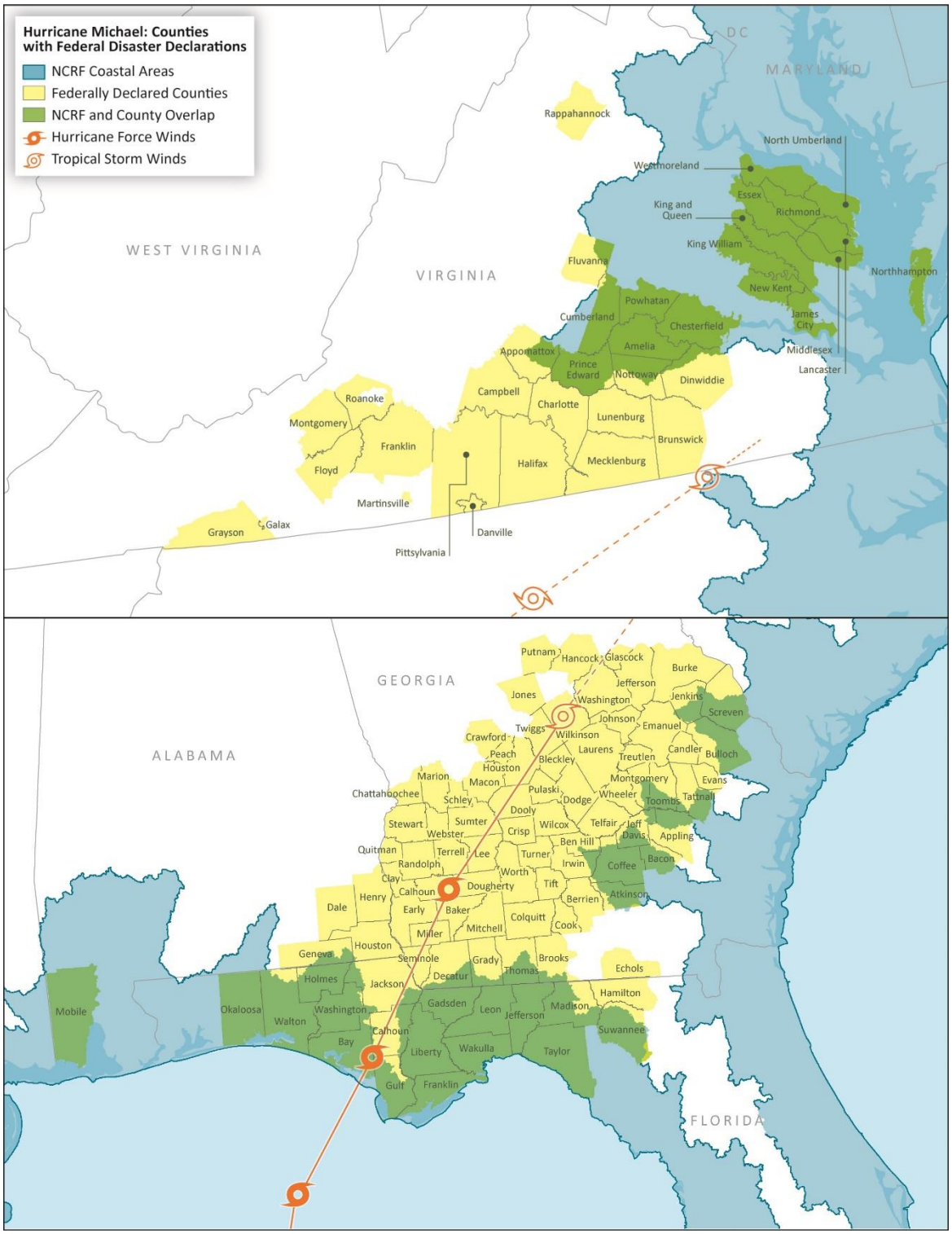

Figure 2 - Hurricane Michael: All projects must be in a Federally Declared County. Those projects in declared counties that do not fall within the NRCF coastal area (shaded yellow) must clearly demonstrate how they benefit communities within the coastal area (shaded green).

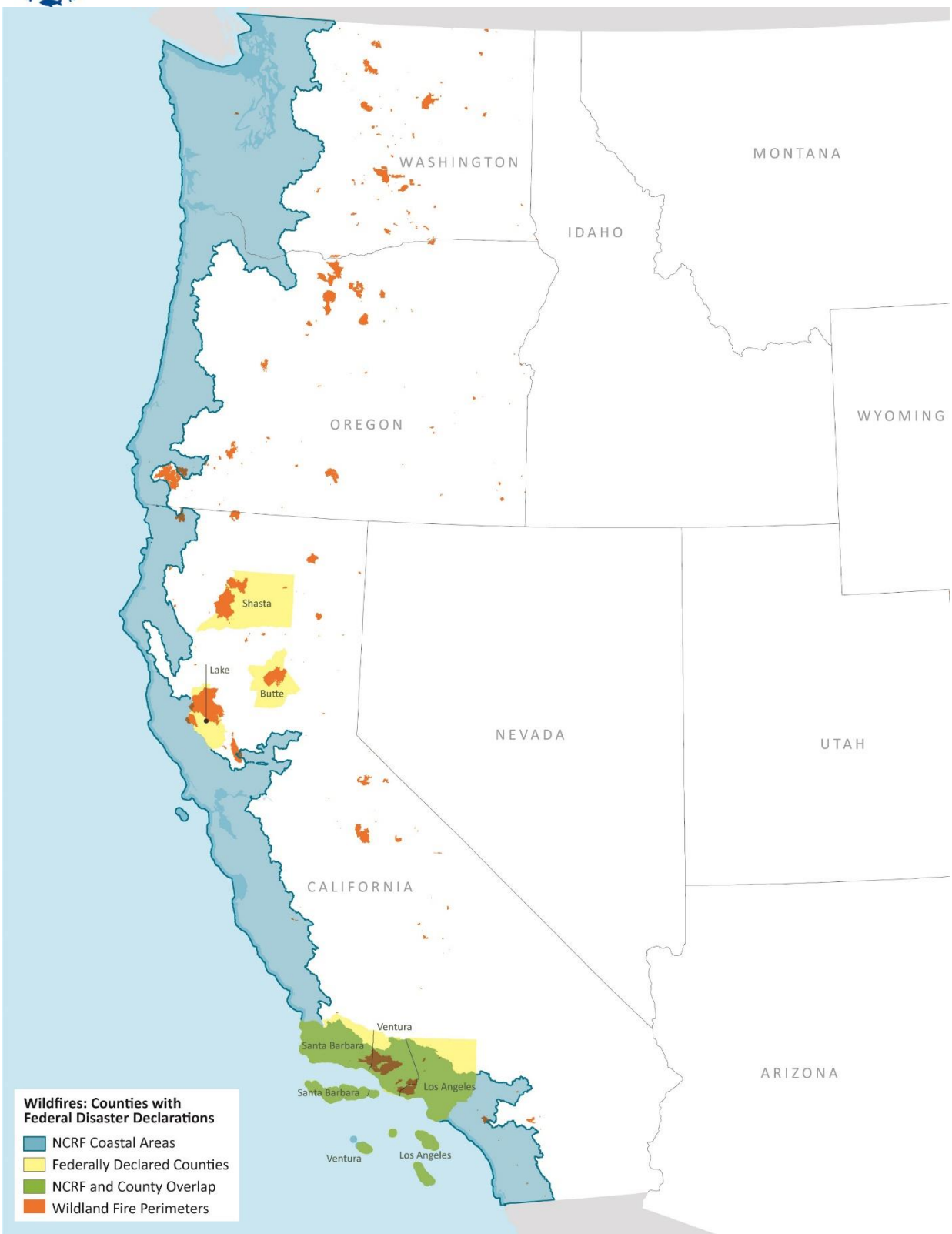

Figure 3 - 2018 Wildfires: All projects must be in a Federally Declared County. Those projects in declared counties that do not fall within the NRCF coastal area (shaded yellow) must clearly demonstrate how they benefit communities within the coastal area (shaded green).

Areas impacted by Typhoon Yutu

All islands that are part of the Commonwealth of the Northern Mariana Islands and that were declared a federal disaster as a result of Typhoon Yutu are eligible to apply. This includes the municipalities of Saipan, Tinian, Rota, and the Northern Islands. See Figure 4 below.

Figure 4 – Typhoon Yutu: Projects must be in Federally Declared Counties on the map above.

PROGRAM PRIORITIES

The Emergency Coastal Resilience Fund will focus on increasing resilience of coastal communities within the above described geographies. This program will prioritize natural resource restoration projects that provide dual benefits – both benefit for human community resilience and benefits for fish and wildlife. The program will capitalize on existing state,

regional, and local plans, disaster mitigation plans, and landscape-level information to inform where projects and activities will address regional circumstances, needs, and priorities to best protect communities and ecosystems from future disasters.

Contiguous areas of natural habitat, such as coastal marshes and wetlands, forests, rivers and streams, dune and beach systems, oyster and coral reefs -- maintained at a significant enough size for the habitat type -- provide communities with enhanced protection and buffering from the growing impacts of sea-level rise, changing flood patterns, increased frequency and intensity of storms, and other environmental stressors. NFWF has identified natural areas where restoration would improve ecosystem and resilience as "Resilience Hubs[1]" and has developed the Coastal Resilience Evaluation and Siting Tool (CREST) to help visualize these areas. CREST is a resource available to applicants within coastal areas of the contiguous U.S., but projects are not required to be located in an area identified by NFWF as a Resilience Hub to be eligible for consideration for this competition.

All proposals must clearly describe how projects will support achieving the overall goals of the Emergency Coastal Resilience Fund, including both:

- Relative benefit to coastal communities from reducing the impact of future storms and associated natural hazards (e.g. coastal storm surge, sea-level rise, wave velocity, flooding, debris flow, stormwater run-off) to properties, community infrastructure (such as schools and municipal buildings), assets of economic importance, and health and safety assets (such as hospitals, evacuation routes, utilities and fire and rescue response); and
- Anticipated enhancement of the ecological integrity and functionality of ecosystems to enhance fish and wildlife and their habitats.

Proposals will be considered that support the following funding priorities:

1) Building Coastal Resilience through Restoration and Enhancement

Due to the emergency nature of these funds, the Emergency Coastal Resilience Fund will primarily fund projects that are ready for on-the-ground implementation and provide the most accelerated and comprehensive outcomes to protect communities. Eligible projects include ecosystem restoration projects and the construction of natural, nature-based, and green-gray (hybrid) infrastructure, where tangible community resilience and conservation outcomes can be measured. Projects may include, but are not limited to, marsh, beach and dune restoration, living shorelines, stream restoration, including aquatic connectivity projects that reduce flood risk, and innovative stormwater management. Acquisition of land and conservation easements are not eligible activities (although they may be part of the match; see OMB Uniform Guidance for more information).

Projects should be able to be completed within three years from the start of the grant and should include at least one year of monitoring. There is no minimum or maximum limit to the size of

[1] More about NFWF's Coastal Resilience Assessment and "Resilience Hubs" can be found at https://www.nfwf.org/coastalresilience/Pages/regional-coastal-resilience-assessment.aspx.

grants. Grant requests should be appropriate to the scale of the project, and most projects are expected to range between $1,000,000 to $3,000,000, but some may cost more than this range.

Projects proposed should be prioritized, or address a specific threat and location that has been prioritized, ideally through a formal planning process that addresses coastal resilience. Priority will be given to projects that have completed all necessary designs and engineering planning for implementation, and demonstrate an understanding of the permits and other approvals necessary for implementation. Projects that have secured all necessary permits will receive higher priority for funding.

If necessary, a small amount of engineering and design may be included in order to make the project shovel-ready within 12-18 months of award. In this case, projects must have clear milestones and indicate how substantial progress will be made in construction of the project within two years of the start of the grant. Funding for the grant may be phased to require review and approval of final project design before proceeding with the implementation of the project.

Proposals should explain how key partners and stakeholders (e.g., local government leaders, federal, state, territorial, or tribal regulatory and/or resource agencies) have been or will be involved in the project design, permitting, and implementation process. Applicants are encouraged to provide letters of commitment to demonstrate the importance of the project to the community and ecosystem resilience needs.

Projects may be conducted on state, tribal, or local government lands, or on private lands where there is a demonstrated commitment to the protection of those lands for conservation purposes. Given the scale of coastal resilience needs, projects that consider the larger landscape and involve multiple landowners and/or partners and jurisdictions, as appropriate, are encouraged.

2) Addressing Barriers to Coastal Resilience

While this program is primarily focused on implementation projects, in limited instances this program may consider projects that advance community planning and technical assistance to address barriers and increase the capacity of eligible communities to implement projects where there is a demonstrated need in an affected geography. Proposals under this funding priority will ideally have previously prioritized and identified a location for which increased resilience and risk reduction is the goal, but for which specific sites or approaches are still under consideration to determine the most appropriate project to achieve resilience goals.

There is no minimum or maximum limit on the size of this type of grant request. Grants are expected to average around $125,000-$250,000, depending upon the scale and scope of the project. Eligible activities under this activity are those necessary to address barriers to implementation. Examples include: conducting rigorous evaluations of potential project sites, assessing alternatives for restoration and protection activities, determining site-specific characteristics that influence project and activity success, assessing potential improvements in risk reduction, gathering critically-needed baseline data to inform project implementation, applying existing decision-support tools to inform project design and site selection, conducting cost-benefit analyses, selecting the most

appropriate natural or nature-based feature for a site, preparing preliminary project designs, and engaging key stakeholders in prioritization.

Proposals should clearly articulate how the location has been prioritized and how the specific site(s) selected will address key barriers to implementation of a resilience project. This should include connections to relevant local, state, or national-level resilience plans, where they exist.

Proposals should explain the roles that key partners and stakeholders (e.g., local government leaders, federal, state, territorial, or tribal regulatory and/or resource agencies) will play. Partners and stakeholders should be meaningfully engaged, from the beginning and throughout the project, to ensure broad utility of the work and enhance likelihood of successful eventual implementation. Applicants should provide letters of commitment to demonstrate that the intended project is a priority and has the support and expert engagement needed to succeed.

Most *Addressing Barriers to Coastal Resilience* projects are expected to be completed within 12-18 months from the start of the grant. Applicants are encouraged to contact Suzanne Sessine at Suzanne.sessine@nfwf.org to discuss ahead of submitting a proposal.

PROJECT METRICS

To gauge progress on individual grants and to ensure greater consistency of project data provided by multiple grants, the Emergency Coastal Resilience Fund has a list of metrics in Easygrants (NFWF's grant tracking system) for applicants to choose from for reporting. We ask that applicants select only the most relevant metrics from this list for their project (all possible program metrics are shown in the table below). For restoration metrics, please only represent one acre/mile in one metric; do not include under several metrics. If you are enhancing a floodplain that is also considered a wetland, just select the most relevant habitat. If you think an applicable metric has not been provided, please contact Suzanne Sessine (suzanne.sessine@nfwf.org) to discuss acceptable alternatives.

In addition to the project metrics listed below, NFWF has developed additional ecological indicators to better assess the projects' impacts on resilience. Applicants proposing projects for either Marsh/Living Shoreline restoration, Beach/Dune restoration, or Floodplain restoration are required to incorporate minimum standards for monitoring, to include baseline monitoring and monitoring for at least one year post construction. Funding may be included in the project budget to cover these minimum monitoring requirements. Please refer to Appendices A-C for the monitoring guidance related to these specific restoration project types. The appendix includes a Project Monitoring Plan template provided which can be completed according to the category of restoration that you think is most appropriate. The completed document should be uploaded as 'Other' in the Uploads Section of the application.

To measure a project's impact on resilience, NFWF is also working on additional socio-economic indicators, such as the number of properties or miles of transportation infrastructure exposed to a flood event. NFWF may commission a third party to collect data consistently across the suite of funded resilience projects post-award. Awardees under this program may be

engaged during their period of performance or in the years following to support these monitoring efforts.

Project Activity	Recommended Metric	Additional Guidance
Coastal Resilience Restoration and Enhancement		
Floodplain Restoration	Habitat Restoration – Floodplain Restoration – Acres Restored	Enter the number of acres restored. In the notes, indicate the type(s) of flood plain habitat (i.e., coastal forest) restored and restoration method(s).
Beach and/or Dune Restoration	Habitat Restoration – Beach habitat quality improvements – Miles Restored	Enter the number of miles of beach or dune restored. In the notes, indicate restoration action(s) taken (e.g., beach renourishment, dune vegetation planting).
Marsh/Wetland Restoration	Habitat Restoration – Wetland Restoration – Acres Restored	Enter the total number of marsh or wetland acres restored. In the notes, indicate the type of wetland (e.g., freshwater woody wetland, salt marsh) and restoration method(s) used (e.g., invasive species removal, thin-layer dredge deposition).
Oyster or Coral Reef Restoration	Habitat Restoration – Marine Habitat Restoration – Acres Restored	Enter the number of acres of oyster or coral reef structures restored. In the notes, indicate the type of reef restored – oyster reef or coral reef.
Reforestation and Restoration of Forest Vegetation	Habitat Restoration - Land restoration - acres restored	Enter acres restored through replanting or revegetation to prevent debris flow from extreme storm events.
In-stream Restoration	Habitat Restoration – Instream Restoration – Miles Restored	Enter the number of miles of instream habitat restored. Note, this is in-stream restoration only. Stream miles opened should NOT be counted under this metric, rather use # miles of stream opened under Aquatic Connectivity Restoration if applicable.
Aquatic	Habitat Restoration – Fish Passage Improvements - # of fish passage barriers	Enter the number of fish passage barriers rectified and in the notes indicate the number of remaining barriers in the system.

Connectivity Restoration	rectified Habitat Restoration – Fish Passage Improvements – miles of stream opened	Enter the number of stream miles opened and, in the notes, those miles as a percentage of habitat available for restoration or reconnection.
Project Accomplishments Related to Addressing Barriers to Coastal Resilience		
Engineering and Design Plans Developed	Planning, Research, Monitoring – Restoration planning/design/permitting - # E&D plans developed	Enter the number of Engineering and Design plans developed to construction ready (100%). Generally, there will be one plan per project to be constructed.
Government Agency Participation and Engagement	Capacity, Outreach, Incentives – Outreach/Education/Technical Assistance - # of governmental entities participating	Enter the number of municipalities, local, state, and federal government entities participating in the project, and add the names of these institutions in the notes and their primary role.
Capacity Building	Capacity, Outreach, Incentives – Building Institutional Capacity - # of Individuals Reached by Outreach, Training, or Technical Assistance Activities Capacity, Outreach, Incentives – Volunteer participation - # of volunteer hours	Enter the number of people demonstrating a minimum level of knowledge, attitudes, or skills. This metric refers to people other than staff or FTEs. In the notes, please indicate the groups targeted by outreach efforts and how they engage. Enter the number of volunteer hours in this project

ELIGIBILITY

Eligible and Ineligible Entities

- Eligible applicants include non-profit 501(c) organizations, state and territorial government agencies, local governments, municipal governments, Native American tribal governments, or educational institutions. Tribal governments include all Native American tribal governments (both federally recognized tribes and those tribes that are not federally recognized).
- As this program will award grants of Federal financial assistance funds, applicants must be able to comply with the OMB guidance in subparts A through F of 2 CFR 200 (OMB Uniform Guidance).

- Ineligible applicants include federal agencies or employees of federal agencies, commercial (for-profit) organizations, foreign organizations, foreign public entities and unincorporated individuals.

Ineligible Uses of Grant Funds

- NFWF funds and matching contributions may not be used to support political advocacy, fundraising, lobbying, litigation, terrorist activities or Foreign Corrupt Practices Act violations.
- NFWF funds may not be used to support ongoing efforts to comply with legal requirements, including permit conditions, mitigation and settlement agreements. However, grant funds may be used to support projects that enhance or improve upon existing baseline compliance efforts.
- All projects must take place within the United States or territories or their respective waterways.

FUNDING AVAILABILITY AND MATCH

The Emergency Coastal Resilience Fund will award approximately $48 million in grants in 2020. While there is no minimum or maximum expected award amount, funding request amounts should be appropriate relative to the overall scale and impact of the project. Please contact Suzanne Sessine at Suzanne.sessine@nfwf.org with any questions about funding request amounts.

Project Period: All project dollars, NFWF award request and matching funds, must be secured and expended within the period of performance. The period of performance is the period of time in which all activities in the proposed scope of work occur and is defined by the start and end dates selected in the application. Projects should be able to be completed within 3 years of the start of the grant and should include at least one year of monitoring.

Match Requirement: A 1:1 non-federal match in cash and/or in-kind services is strongly encouraged, and projects providing match will be more competitive. However, due to the emergency nature of the funding and immediate need for project implementation, there may be limited instances where match can be reduced or waived. If providing a less than 1:1 match, please provide a justification in the full proposal narrative, and contact Suzanne Sessine at Suzanne.sessine@nfwf.org if you have any questions about matching funds.

Match can be any combination of in cash and/or in-kind goods and services and there is no priority given to higher cash percentages. Full information about NFWF matching fund requirements, including a description of acceptable sources of matching funds, is available at http://www.nfwf.org/whatwedo/grants/applicants/Pages/faqs.aspx.

Federal leverage: Applicants are encouraged to describe federal partner contributions as well in the proposal narrative. These contributions will not count toward the non-federal match described

above, but will help in understanding the amount of resources and partners contributing to the overall project.

EVALUATION CRITERIA

All proposals will be screened for relevance, accuracy, completeness and compliance with NFWF and funding source policies. Proposals will then be evaluated based on the extent to which they meet the following criteria.

Prioritized in Existing Plans – Project has been prioritized through a previous or existing planning process at the state, regional, or local level and demonstrates activities that support habitat and fish and wildlife restoration goals of NFWF and NOAA. Project complements and builds off other federal, state, tribal, and local conservation priorities that are consistent with the goals of this program and can clearly connect conservation and coastal community resilience actions.

Technical Merit – Project is technically sound and feasible, and the proposal sets forth a clear, logical and achievable work plan and timeline. Project engages appropriate technical experts throughout project planning, design and implementation to ensure activities are technically-sound and feasible.

Cost-Effectiveness – Project includes a cost-effective budget that balances performance risk and efficient use of funds. Cost-effectiveness evaluation may include, but is not limited to, an assessment of either or both direct and indirect costs in the proposed budget. The federal government has determined that a *de minimis* 10% indirect rate is an acceptable minimum for organizations without a NICRA, as such NFWF reserves the right to scrutinize **ALL** proposals with indirect rates above 10% for cost-effectiveness.

Transferability – Project has potential and plan to transfer lessons learned to other communities and/or to be integrated into government programs and policies.

Communication – Project includes a detailed plan to communicate information about the project to appropriate audiences. Key stakeholders and partners are meaningfully engaged throughout the project.

Monitoring – Project includes a plan for monitoring progress during and after the proposed project period to track project success and adaptively address new challenges and opportunities as they arise.

Long-term Sustainability – Project will be maintained to ensure benefits are achieved and sustained over time. This should include how future funding will be secured to implement necessary long-term monitoring and maintenance activities.

Past Success – Applicant has a proven track record of success in implementing conservation practices with specific, measurable results.

Partnership – An appropriate partnership exists to implement the project and the project is supported by a strong local partnership that leverages additional funds and will sustain it after the life of the grant. Identify proposed partners, if known (including potential or contemplated subawards to third party subrecipients of the applicant), the roles they will play in implementing the project, and how this project will build new or enhance existing partnerships. (Note: a project partner is any local community, non-profit organization, tribe, and/or local, state, and federal government agency that contributes to the project in a substantial way and is closely involved in the completion of the project.)

OTHER

Budget – Costs are allowable, reasonable and budgeted in accordance with NFWF's Budget Instructions cost categories. Federally-funded projects must be in compliance with OMB Uniform Guidance as applicable.

Matching Contributions – Matching Contributions consist of cash, contributed goods and services, volunteer hours, and/or property raised and spent for the Project during the Period of Performance. Larger match ratios and matching fund contributions from a diversity of partners are encouraged and will be more competitive during application review.

Procurement – If the applicant chooses to specifically identify proposed Contractor(s) for Services, an award by NFWF to the applicant does not constitute NFWF's express written authorization for the applicant to procure such specific services noncompetitively. When procuring goods and services, NFWF recipients must follow documented procurement procedures which reflect applicable laws and regulations.

Publicity and Acknowledgement of Support – Award recipients will be required to grant NFWF and funding partners the right and authority to publicize the project and NFWF's financial support for the grant in press releases, publications and other public communications. Recipients may also be asked by NFWF to provide high-resolution (minimum 300 dpi) photographs depicting the project.

Receiving Award Funds – Award payments are primarily reimbursable. Projects may request funds for reimbursement at any time after completing a signed agreement with NFWF. A request of an advance of funds must be due to an imminent need of expenditure and must detail how the funds will be used and provide justification and a timeline for expected disbursement of these funds.

Compliance Requirements – Selected projects may be subject to requirements under the National Environmental Policy Act, Endangered Species Act (state and federal), and the National Historic Preservation Act. Documentation of compliance with these regulations must be approved prior to initiating activities that disturb or alter habitat or other features of the project site(s). Applicants should budget time and resources to obtain the needed approvals. As may be applicable, successful applicants may be required to comply with additional Federal, state, or local requirements and obtain all necessary permits and clearances.

Quality Assurance – If a project involves significant monitoring, data collection, or data use, grantees will be asked to prepare and submit quality assurance documentation (www.epa.gov/quality) and must comply with NOAA's Data Sharing Policy for all environmental data. Applicants should budget time and resources to complete these tasks.

Permits – Successful applicants for implementation projects will be required to provide sufficient documentation that the project expects to receive or has received all necessary permits and clearances to comply with any Federal, state, or local requirements. Where projects involve work in the waters of the United States, NFWF strongly encourages applicants to conduct a permit pre-application meeting with the U.S. Army Corps of Engineers prior to submitting their proposal. In some cases, if a permit pre-application meeting has not been completed, NFWF may require successful applicants to complete such a meeting prior to grant award.

Federal Funding – The availability of Federal funds estimated in this solicitation is contingent upon the Federal appropriations and apportionment process. Funding decisions will be made based on level of funding and timing of when the Federal funding is received by NFWF.

TIMELINE

Dates of activities are subject to change. Please check the Emergency Coastal Resilience Fund page of the NFWF website for the most current dates and information.

Applicant webinars:

Coastal communities impacted by hurricanes Florence and Michael, and wildfires:
Wednesday, September 4, 2019 at 1:00-2:00 p.m. EDT
https://attendee.gotowebinar.com/register/1011951320324698882

Coastal communities impacted by Typhoon Yutu:
Tuesday, September 10, 2019 6:30-7:30 p.m. EDT / Wednesday, Sepember 11, 2019 at 8:30-9:30 a.m. ChST
https://attendee.gotowebinar.com/register/945736531121501185

Additional webinar for those who were unable to attend due to Hurricane Dorian:
Wednesday, September 18, 2019 at 2:00-3:00 p.m. EDT
https://attendee.gotowebinar.com/register/8242740007717574915

Full Proposal Due Date	Tuesday, November 12, 2019 by 11:59pm EDT
Review Period	November 2019 - January 2019
Awards Announced	March 2020

HOW TO APPLY

All application materials must be submitted online through National Fish and Wildlife Foundation's Easygrants system.

1. Go to easygrants.nfwf.org to register in our Easygrants online system. New users to the system will be prompted to register before starting the application (if you already are a registered user, use your existing login). Enter your applicant information. Please disable the pop-up blocker on your internet browser prior to beginning the application process.

2. Once on your homepage, click the "Apply for Funding" button and select this RFP's "Funding Opportunity" from the list of options.

3. Follow the instructions in Easygrants to complete your application. Once an application has been started, it may be saved and returned to at a later time for completion and submission.

APPLICATION ASSISTANCE

A PDF version of this RFP can be downloaded here.

A *Tip Sheet* is available for quick reference while you are working through your application. This document can be downloaded here.

Additional information to support the application process can be accessed on the NFWF website's Applicant Information page.

For more information or questions about this RFP, please contact one of the following individuals based on your question:

If you have a question about…	***Please contact…***
A project idea in eligible areas impacted by Hurricanes Florence and Michael (AL, FL, GA, NC, SC)	Suzanne Sessine – Suzanne.Sessine@nfwf.org
A project idea in eligible VA areas impacted by Hurricane Florence	Claire Flynn - Claire.Flynn@nfwf.org
A project idea in eligible areas impacted by 2018 wildlfires (CA)	Jim Bond – James.Bond@nfwf.org
A project idea in areas impacted by Typhoon Yutu (CNMI)	Kaity Goldsmith – Kaitlin.Goldsmith@nfwf.org
General questions about the RFP or requirements of the program	Suzanne Sessine – Suzanne.Sessine@nfwf.org
Questions about online application and submission process	Kate Morgan – Katherine.Morgan@nfwf.org

For issues or assistance with our online Easygrants system, please contact:
Easygrants Helpdesk
Email: Easygrants@nfwf.org

Voicemail: 202-595-2497
Hours: 9:00 am to 5:00 pm ET, Monday-Friday.
Include: your name, proposal ID #, e-mail address, phone number, program you are applying to, and a description of the issue.

Core Ecological Metrics for each Priority Resilience Activity

Marsh Restoration (see Appendix A)

- Plant species metrics (e.g. percent cover by plant species)
- Water level (to calculate inundation)
- Elevation
- Shoreline position

Living Shoreline Restoration (see Appendix A)

- Plant species metrics (e.g. percent cover by plant species)
- Water level (to calculate inundation)
- Elevation
- Shoreline position
- Acres of oyster reef restored (if applicable)

Beach and/or Dune Restoration (see Appendix B)

- Shoreline position
- Beach width
- Elevation
- Volume
- Shoreface
- Backshore width
- Dune width
- Dune height
- Dune volume
- Grain size

Floodplain restoration (see Appendix C)

- Plant species metrics (e.g. percent cover by plant species)
- Elevation
- Water level

Emergency Coastal Resilience Fund: Project Monitoring Plan Template

Use the following tables to provide more detailed information on the monitoring requested by NFWF for the type of restoration work for which you have been funded, even if the monitoring will be funded by other sources than your NFWF grant. You MUST use the associated appendix table to help you fill out the tables for your project.

Goal of project: [*In one sentence, please describe the primary goal of the project].*

Monitoring approaches for Marsh Restoration and/or Living Shorelines
[You must use Appendix A to complete this table]

Marsh Restoration and/or Living Shorelines					
Metric (include units)	**Difference to Recommended Methods and Protocols (if any)**	**Spatial extent of metric monitoring**	**Baseline yr**	**Frequency/ Timing**	**Data Limitations/ Considerations**
Percent Cover of biomass by species or cover type (% ranging from 0-100)					
Elevation (cm)					
Shoreline Position					
Water level					
Oyster reef restored (acres)[if applicable]					

Monitoring approaches for Beach/Dune Restoration
[You must use Appendix B to complete this table]

Beach and Dune Restoration					
Metric (include units)	**Difference from Recommended Methods and Protocols (if any)**	**Spatial extent of metric monitoring**	**Baseline yr**	**Frequency/ Timing**	**Data Limitations/ Considerations**
Shoreline position (cm)					

Beach width (cm)					
Elevation (cm)					
Volume (cm^3)					
Shoreface (cm)					
Backshore width (cm)					
Dune width (cm)					
Dune height (cm)					
Dune volume (cm^3)					
Grain size (mm)					

Monitoring approaches for Floodplain restoration

[You must use Appendix C to complete this table]

Floodplain Restoration					
Metric (include units)	**Difference to Recommended Methods and Protocols (if any)**	**Spatial extent of metric monitoring**	**Baseline yr**	**Frequency/ Timing**	**Data Limitations/ Considerations**
Percent Cover of biomass by species or cover type (% ranging from 0-100)					
Elevation (cm)					
Water level					

Appendix A: Metrics and Methods for Monitoring Marsh/Living Shoreline Restoration

Monitoring Overview: Use permanent transects perpendicular from the shore line with quadrat plots to sample changes in plant community, water encroachment and changes in elevation over time.

General guidelines for using transects and quadrats method:

- These guidelines are relevant for the following metrics: Percent cover of biomass, Elevation, and Shoreline position.
- Initial placement of transects must be random and stratified, and then quadrats are placed along those transects. Be sure to capture the edge.
- Transects should capture the seaward edge of marsh vegetation, capture transition zones in elevation or vegetation, and continue through the upper marsh or approximate MHHW, different elevations, upper elevation, and different regions within the site.

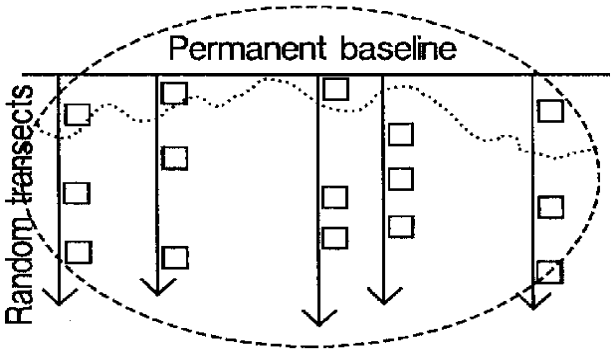

Figure 1: Sketch of random transects and quadrats

- Use 1 m^2 plots.
- Use ~25-50 plots, depending on the size of the project.
- Permanent plots are preferred, as they facilitate capturing change over time, and once established they reduce sampling time. However, but be careful when walking across the same areas over time as this can result in visible damage to the restoration. Be sure to avoid walking within the plot area itself.
- If there are unique vegetation zones (i.e. low marsh, high marsh, etc.) it may be valuable to use a stratified random design (where the strata are the vegetation/elevation zones) with randomization occurring within each strata. For example, if there are two zones of relatively equal size and 6 quadrats total, three would be placed at randomly determined locations (along the transect) within each zone. If zones are substantially different in width, it may be worth distributing the sample plots proportionally.

Guidelines for estimating Percent Cover of Biomass:

- Identify all plant species found in the quadrat. For each species, estimate and record the total percent cover by category (1-9 according to the NCVS vegetation categories outlined below; Peet et al. 1998[1]). Using the same coverage categories, identify and record the cover of live oyster, live mussels, and wrack.

Cover Range	NCVS category
Solitary/Few/Small	1
0.1-1%	2
1-2%	3

[1] See attached

2-5%	4
5-10%	5
10-25%	6
25-50%	7
50-75%	8
75-95%	9

- Materials needed: meter sticks, PVD quadrat, clipboards and datasheets

Figure 2: Estimating percent cover at permanent sampling location along transect. Take care to walk on opposite side of transect tape to avoid inadvertently standing in plot when setting up transect tape.

General guidelines for Benchmarking:

- These guidelines are relevant for the following metrics: Elevation and Water Level
- Establish a benchmark into a fixed location using materials that can withstand the saltwater environment. A steel rod driven >5' into the ground and encased in concrete is acceptable (see TGBM in figure 2 below). Establish ~1 benchmark for every acre of project.
- Follow the protocol laid out in SOP:3 (Lynch, J. C., P. Hensel, and D. R. Cahoon. 2015[2]). The surface elevation table and marker horizon technique: A protocol for monitoring wetland elevation dynamics.

[2]https://irma.nps.gov/DataStore/Reference/Profile/2225005. This protocol describes the installation of a steel rod with a receiver for attachment of a SET arm. You will not need the receiver - follow the method for installing stainless rod and encasing it with cement – leaving the top of the rod several inches above the ground surface. This rod will provide the stationery reference point (benchmark) from which to reference marsh surface and water level elevations.

Figure 3: Rod installed into ground before installation of cement-filled PVC collar.

Figure 4: Rod with PVC "collar" filled with cement

Guidelines for Elevation monitoring:

- Laser or optical leveling techniques to determine difference in elevation (~cm of change) from a benchmark to each permanent plot.
- These techniques provide consistent results, and the ability to measure change over time, when reliant on a permanent reference benchmark. If none are available, one should be installed.
- Marsh surface elevation can also be obtained with RTK GPS units, which will also provide best results with a permanent benchmark.
- Place the leveling rod/rover pole in the center of the plot. If the ground is very soft, you may need to use a small item placed on the sediment surface to keep the leveling rod from sinking in the mud while you take your reading (the lid of a Tupperware container works well). If you do this, be sure to use it on all plots throughout the site.

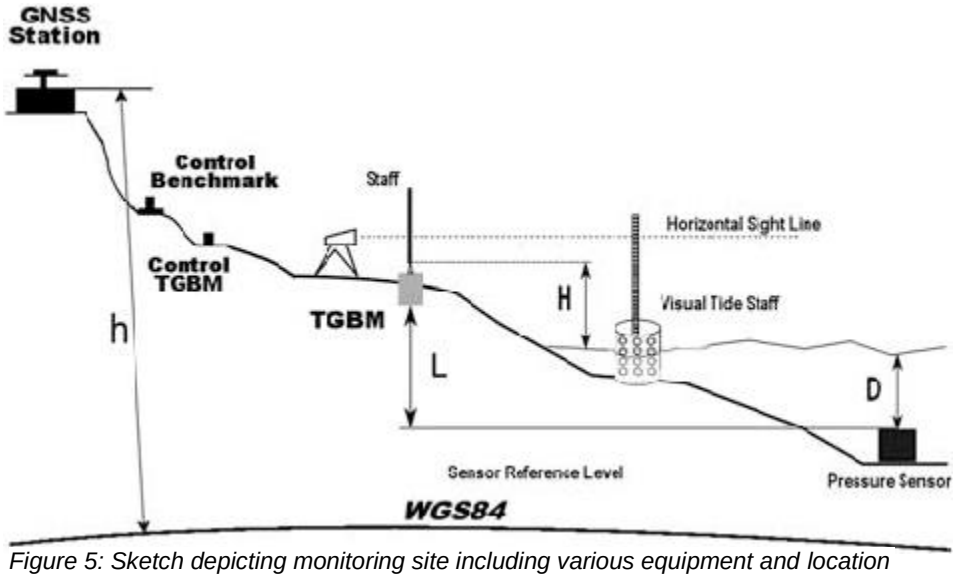

Figure 5: Sketch depicting monitoring site including various equipment and location of measurements within the site.

Guidelines for Water Level monitoring:

- A pressure sensor-style water level logger (Onset or similar, www.onsetcomp.com) should be installed on site. Be sure to select a model that is resistant to saltwater.
- The sensor should be attached to a stable fixed structure (piling or pier) if one is available. If not, attach the sensor to a PVC or rebar pole driven into the substrate far enough to ensure stability (several feet depending on how consolidated the substrate is).
- Sensors can be installed inside of a vented PVC pipe for added protection. The sensor should be attached firmly so that there is no movement in position of the reading lens over time.
- Ideally, to capture the full range of the tide, the sensor should be installed below MLW if at all possible.
- An additional barometric sensor should be installed nearby so that water levels may be corrected for changes in atmospheric pressure (per manufacturer instructions).
- Determine the elevation of the installed sensor relative to the benchmark so that water levels may be interpreted with respect to marsh surface elevation.

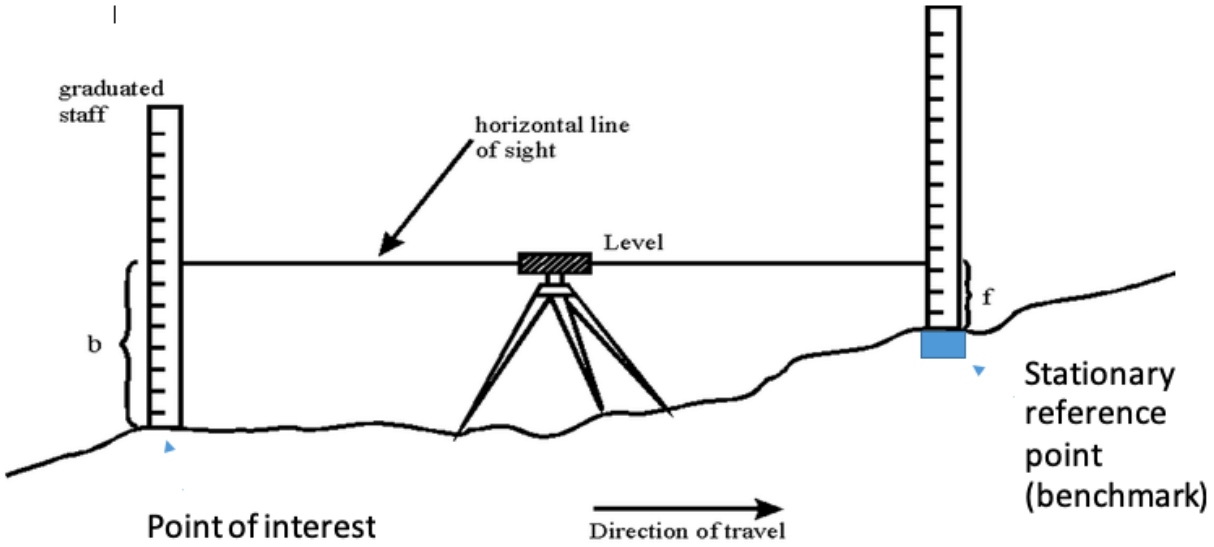

Figure 6: Sketch of leveling technique

Metrics and Protocols:

Metric Name (include units)	Recommended data collection protocols[3]	Spatial extent of metric monitoring	Frequency/ Timing	Use of metric
Percent Cover of biomass by species or cover type (% ranging from 0-100)	Use transects and quadrants method. In each quadrant determine the % of canopy cover (e.g. aerial view looking down) for each plant species.	At each quadrant	Annually around the time of peak marsh biomass (e.g. July-August). Pre- and post- construction.	Increased biomass can result in higher functioning of the marshland for resilience purposes.
Elevation (cm)	Use benchmark method with a laser level, optical level, or an RTK GPS unit.	At each quadrant	Annually in the same seasons every year (e.g. spring and fall every year) and after storm events. Pre- and post-construction.	Provides range of elevation over which marsh species occur (useful for diagnosing plant failure or species shifts). Provides change in elevation (~ 1 cm resolution when tied to a permanent benchmark).
Shoreline position	When establishing your quadrants for the plant community monitoring, include permanent quadrant at the shoreline (e.g. at the edge of vegetation). Mark the edge landward and seaward.	Shoreline quadrant	Annually in the same seasons every year (e.g. spring and fall every year). Pre- and post-construction.	This measurement will give you an idea about the impacts to the shoreline (i.e. wave energy, erosion, design success, etc.)

[3] Grantees are welcome to use a method of monitoring any metric which exceeds the accuracy of the recommended monitoring method.

Water Level (the measure of time and/or water depths that tidal water is over the marsh surface)	Measure water level and marsh surface elevation to the same established benchmark reference point. Water level can be measured with loggers. Most projects will likely only require 1 logger, though large projects may need more.	Loggers should be installed in adjacent subtidal or low intertidal areas.	Measure at 5 to 15 minute intervals for at least 30 days, preferably a year. Pre-construction preferred.	This measurement is needed to calculate the amount of time that the water level is greater than the marsh surface level, e.g. inundation. The distribution of marsh plant species is determined by inundation and salinity. Although it is not a measure of restoration success, measures of inundation time that marsh is covered by tidal water provides valuable data on where the marsh is in the tidal frame. Ideally, this should be determined BEFORE the restoration.
Oyster reef restored (acres)	Only if applicable. Mark edge of restored oyster bed.	Entire reef	Bi-annually in the same seasons every year (e.g. spring and fall every year). Pre- and post-construction.	Document the change in restored oyster reef over time.

Additional Resources:
For more information on the installation of a steel rod with a receiver for attachment of a SET arm visit: https://irma.nps.gov/DataStore/Reference/Profile/2225005

For more information on installing a SET and standard operating procedures see: https://www.nfwf.org/coastalresilience/Documents/nos-set-protocol-installation-sop3.pdf

For more information on the North Carolina Vegetation Survey (NCVS) protocols for recording vegetation percent cover see*:* https://www.nfwf.org/coastalresilience/Documents/ncvs-protocol.pdf

Appendix B: Metrics and Methods for Monitoring Beach and Dune Restoration

Monitoring Overview: Use permanent transects perpendicular from the shore line with quadrat plots to sample changes in plant community, water encroachment and changes in elevation over time. Use a sand gauge or core samples to monitoring sand grain size.

General guidelines for using cross-shore topographic profile method:

- These guidelines are relevant for the following metrics: Shoreline position, Beach width, Elevation, Volume, Shoreface, Backshore width, Dune width, Dune height, and Dune volume
- Beach profile monitoring uses survey transects running shore normal from the landward dune toe to the low water mark (MLW) or closure depth depending on project goals, beach type and location. The beach profile provides information used to assess whether a shoreline is eroding or accreting, changes to key features, along with elevation and sand volume changes at the selected site.
- Establish transects every 400-800 ft. for long-term monitoring for resilience projects. Shorter transect intervals provide greater data density that may be beneficial for analysis objectives depending on project goals. Establish the baseline relatively parallel to the shoreline and then create individual measuring stations for transects perpendicular to the shoreline. Be sure to establish transects at changes in topography. Survey an initial baseline pre-construction which will indicate where to start monitoring post-construction. Transects should be established in control areas beyond the project site. Control profiles should go beyond the project area, ~1,000 feet beyond any major structures or up to 1/2 mile for fairly long beaches without major features.
- Measure at a minimum to mean-high waterline using an RTK GPS or a total station electronic transit. Start survey on landward side of project, and move seaward taking regular interval data points include at all changes in slope, key features (dune toe, swales, berms, berm ponds, ridges, runnels, wrack and high water lines, etc.) and any significant changes in elevation as you cross over the transect site. The Maximum distance between points on the beach can be 20 ft., to verify no significant change in elevation. Surveys should move into the water's edge at low tide to maximize the extent of coverage area. Take sufficient measurements of elevation and distance along the profile that includes all changes in slope to accurately establish the profile cross section. The spacing between profiles and the frequency of surveying depends amongst other things on the type of beach, the reason for collecting the data and financial constraints.
- When surveying the profile, reference measurements to a survey benchmark with a known survey datum. Modern GPS systems using RTK station networks allow for virtual benchmark establishment.

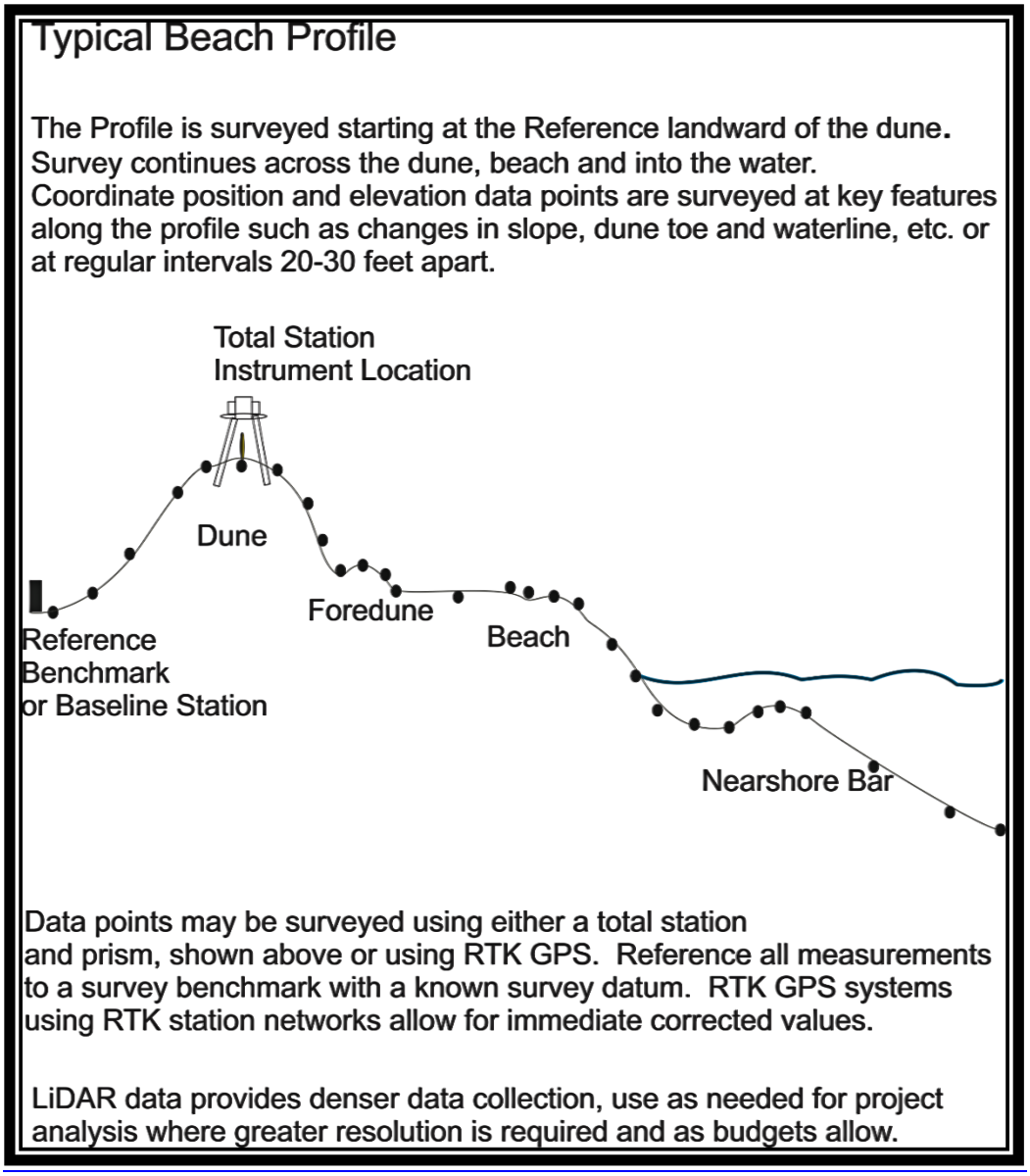

Figure 7: Sketch of Beach Profile Method

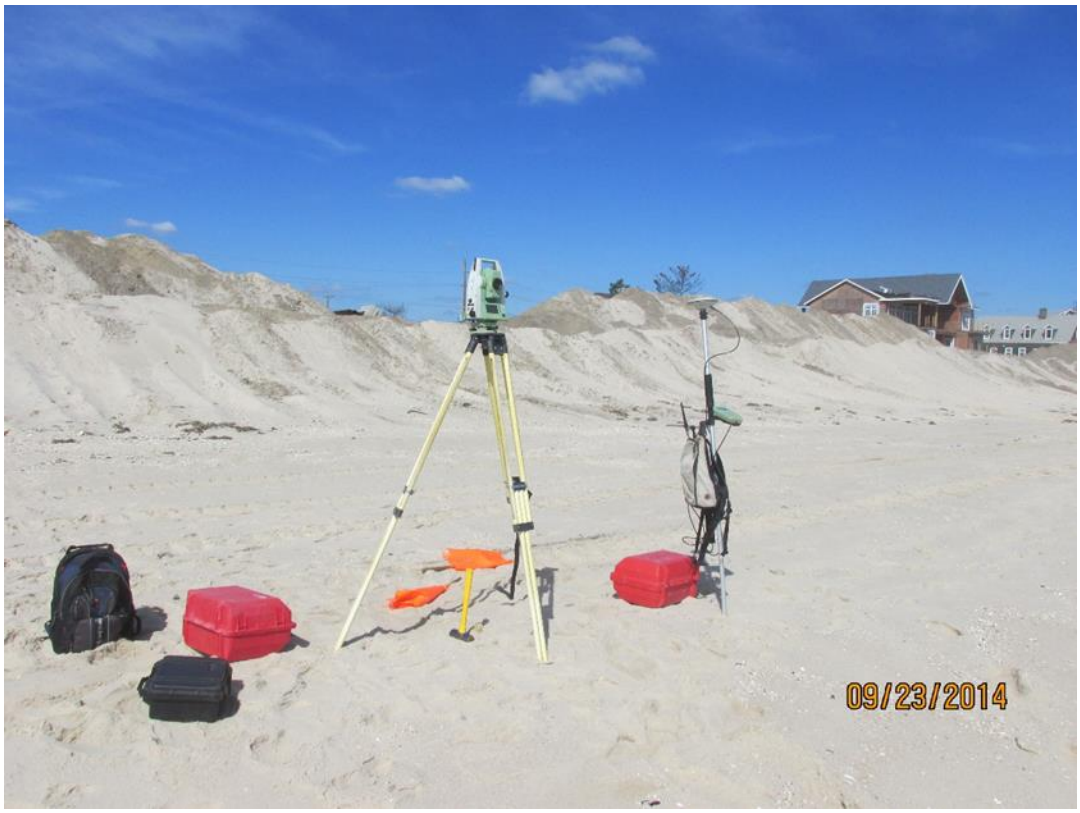

Figure 8: Image of traditional survey equipment used for Beach Profiles (Total Station and RTK GPS Rover)

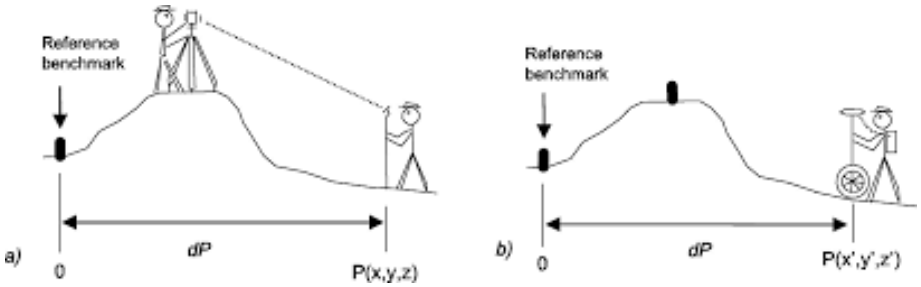

Figure 9: Character sketch of beach profiling using a) Total Station and b) RTK GPS

General guidelines for core samples:

- These guidelines relevant for the following metric: Grain size
- Recommend 20cm thick Core Samples. Taken from dune base to lower beachface slope to determine textural variability across the beach system. Processing method typically used sieving considered adequate, simple method for size determination of sand ranges.

General Guidelines for Sand Gauge:

- These guidelines relevant for the following metric: Grain size
- This is more low-tech than core samples. This method of measuring sand size can be conducted in the field. These are small, credit-card sized, plastic charts with calibrated samples of sieved sand mounted on the face. Allows use of a hand-lens and sand gauge chart, to compare beach samples with calibrated samples for an estimate of the grain size

Metrics and Protocols:

Metric Name (include units)	Recommended data collection protocols[4]	Spatial extent of metric monitoring	Frequency/ Timing	Use of metric
Shoreline position (cm)	Cross-shore topographic profile. RTK GPS following shoreline and beach berm	Statistically significant changes in shoreline position measurements along profile taken no greater than 20 feet onshore 30-40 feet offshore	Bi-annually in the same seasons every year (e.g. spring and fall every year) and after storm events. Pre- and post-construction.	This measurement (in combination with others) will give you an idea about the impacts to the shoreline (i.e. wave energy, erosion, design success, etc.)
Beach width (cm)	Cross-shore topographic profile	See general guidelines above	Bi-annually in the same seasons every year (e.g. spring and fall every year) and after storm events. Pre- and post-construction.	This measurement (in combination with others) will give you an idea about the impacts to the shoreline (i.e. wave energy, erosion, design success, etc.)
Elevation (cm)	Cross-shore topographic profile	Statistically significant changes in elevation measurements along profile taken no greater than 20 feet onshore 30-40 feet offshore	Bi-annually in the same seasons every year (e.g. spring and fall every year) and after storm events. Pre- and post-construction.	This measurement (in combination with others) will give you an idea about the impacts to the shoreline (i.e. wave energy, erosion, design success, etc.)
Volume (cm^3)	Cross-shore topographic profile	See general guidelines above	Bi-annually in the same seasons every year (e.g. spring and fall every year) and after storm events. Pre- and post-construction.	Tells how the beach develops and performs in storms
Shoreface (cm)	Cross-shore topographic profile	See general guidelines above	Bi-annually in the same seasons every year (e.g. spring and fall every year) and after storm events. Pre- and post-construction.	Tells how the beach develops and performs in storms.

[4] Grantees are welcome to use a method of monitoring any metric which exceeds the accuracy of the recommended monitoring method.

Backshore width (cm)	Cross-shore topographic profile	See general guidelines above	Bi-annually in the same seasons every year (e.g. spring and fall every year) and after storm events. Pre- and post-construction.	This measurement (in combination with others) will give you an idea about the impacts to the shoreline (i.e. wave energy, erosion, design success, etc.)
Dune width (cm)	Cross-shore topographic profile	See general guidelines above	Bi-annually in the same seasons every year (e.g. spring and fall every year) and after storm events. Pre- and post-construction.	This measurement (in combination with others) will give you an idea about the impacts to the shoreline (i.e. wave energy, erosion, design success, etc.)
Dune height (cm)	Cross-shore topographic profile	See general guidelines above	Bi-annually in the same seasons every year (e.g. spring and fall every year) and after storm events. Pre- and post-construction.	This measurement (in combination with others) will give you an idea about the impacts to the shoreline (i.e. wave energy, erosion, design success, etc.)
Dune volume (cm^3)	Cross-shore topographic profile	See general guidelines above	Bi-annually in the same seasons every year (e.g. spring and fall every year) and after storm events. Pre- and post-construction.	Tells how the beach develops and performs in storms. Also relevant for FEMA interests.
Grain size (mm)	Core sample or Sand gauge chat	See general guidelines above	Bi-annually in the same seasons every year (e.g. spring and fall every year) and after storm events. Pre- and post-construction.	Can be an indication of change in slope and accretion. Helps to determine what kind of wave energy is needed to move sand around.

Additional resources:

For more information on conducting a Cross-Profile Topographic Profile visit:

- https://www.escp.org.uk/topographic-beach-survey
- https://www.niwa.co.nz/coasts-and-oceans/nz-coast/learn-about-coastal-environments/beach-types/beach-profile-monitoring-sites
- https://fcit.usf.edu/florida/teacher/science/mod2/resources/beach.profiles.pdf

Appendix C: Metrics and Methods for Monitoring Floodplain Restoration

Monitoring Overview: Use permanent transects perpendicular from the shore line with quadrat plots to sample changes in elevation and water level over time.

General guidelines for using transects and quadrats method:

- These guidelines are relevant for the following metric: Percent Cover of Biomass, Elevation
- Initial placement of transects must be random and stratified, and then quadrats are placed along those transects. Be sure to capture the edge.
- Transects should capture the seaward edge of marsh vegetation, capture transition zones in elevation or vegetation, and continue through the upper marsh or approximate MHHW, different elevations, upper elevation, and different regions within the site.

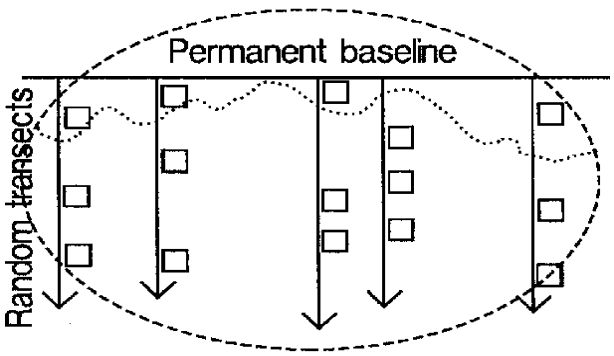

Figure 40: Sketch of random transects and quadrats

- Use 1 m^2 plots.
- Use ~25-50 plots, depending on the size of the project.
- Permanent plots are preferred, as they facilitate capturing change over time, and once established they reduce sampling time. However, but be careful when walking across the same areas over time as this can result in visible damage to the restoration. Be sure to avoid walking within the plot area itself.
- If there are unique vegetation zones (i.e. low marsh, high marsh, etc.) it may be valuable to use a stratified random design (where the strata are the vegetation/elevation zones) with randomization occurring within each strata. For example, if there are two zones of relatively equal size and 6 quadrats total, three would be placed at randomly determined locations (along the transect) within each zone. If zones are substantially different in width, it may be worth distributing the sample plots proportionally.

Guidelines for estimating Percent Cover of Biomass:

- Identify all plant species found in the quadrat. For each species, estimate and record the total percent cover by category (1-9 according to the NCVS vegetation categories outlined below; Peet et al. 1998[5]). Using the same coverage categories, identify and record the cover of live oyster, live mussels, and wrack.

Cover Range	NCVS category
Solitary/Few/Small	1
0.1-1%	2
1-2%	3

[5] See attached

2-5%	4
5-10%	5
10-25%	6
25-50%	7
50-75%	8
75-95%	9

- Materials needed: meter sticks, PVD quadrat, clipboards and datasheets

General guidelines for Benchmarking:

- These guidelines are relevant for the following metrics: Elevation and Water Level
- Establish a benchmark into a fixed location using materials that can withstand the saltwater environment. A steel rod driven >5' into the ground and encased in concrete is acceptable (see TGBM in figure 2 below). Establish ~1 benchmark for every acre of project.
- Follow the protocol laid out in SOP:3 (Lynch, J. C., P. Hensel, and D. R. Cahoon. 2015[6]). The surface elevation table and marker horizon technique: A protocol for monitoring wetland elevation dynamics.

[6]https://irma.nps.gov/DataStore/Reference/Profile/2225005. This protocol describes the installation of a steel rod with a receiver for attachment of a SET arm. You will not need the receiver - follow the method for installing stainless rod and encasing it with cement – leaving the top of the rod several inches above the ground surface. This rod will provide the stationery reference point (benchmark) from which to reference marsh surface and water level elevations.

Figure 11: Rod installed into ground before installation of cement-filled PVC collar.

Figure 12: Rod with PVC "collar" filled with cement

Guidelines for Elevation monitoring:

- Laser or optical leveling techniques to determine difference in elevation (~cm of change) from a benchmark to each permanent plot.
- These techniques provide consistent results, and the ability to measure change over time, when reliant on a permanent reference benchmark. If none are available, one should be installed.
- Marsh surface elevation can also be obtained with RTK GPS units, which will also provide best results with a permanent benchmark.
- Place the leveling rod/rover pole in the center of the plot. If the ground is very soft, you may need to use a small item placed on the sediment surface to keep the leveling rod from sinking in the mud while you take your reading (the lid of a Tupperware container works well). If you do this, be sure to use it on all plots throughout the site.

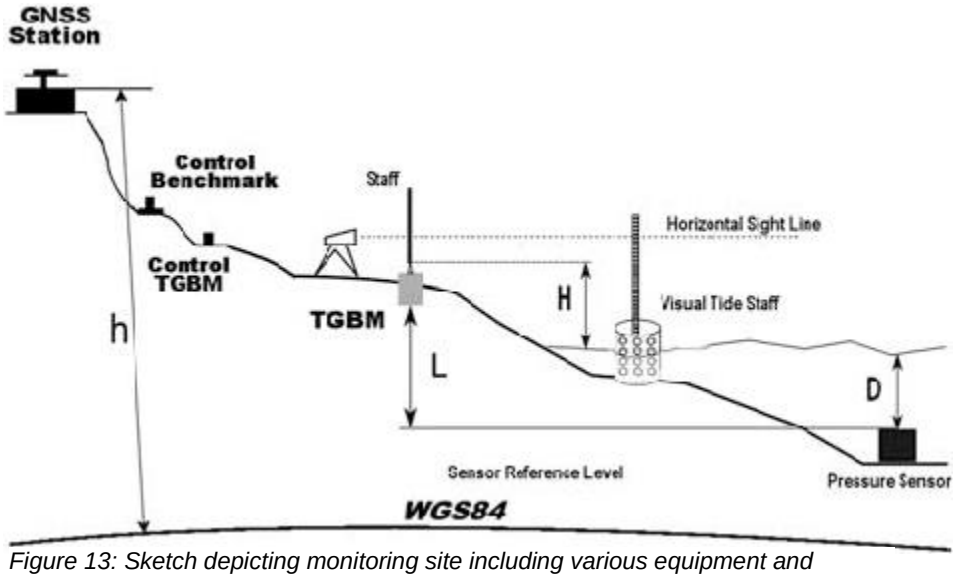

Figure 13: Sketch depicting monitoring site including various equipment and location of measurements within the site.

Guidelines for Water Level monitoring:

- A pressure sensor-style water level logger (Onset or similar, www.onsetcomp.com) should be installed on site. Be sure to select a model that is resistant to saltwater.
- The sensor should be attached to a stable fixed structure (piling or pier) if one is available. If not, attach the sensor to a PVC or rebar pole driven into the substrate far enough to ensure stability (several feet depending on how consolidated the substrate is).
- Sensors can be installed inside of a vented PVC pipe for added protection. The sensor should be attached firmly so that there is no movement in position of the reading lens over time.
- Ideally, to capture the full range of the tide, the sensor should be installed below MLW if at all possible.
- An additional barometric sensor should be installed nearby so that water levels may be corrected for changes in atmospheric pressure (per manufacturer instructions).
- Determine the elevation of the installed sensor relative to the benchmark so that water levels may be interpreted with respect to marsh surface elevation.

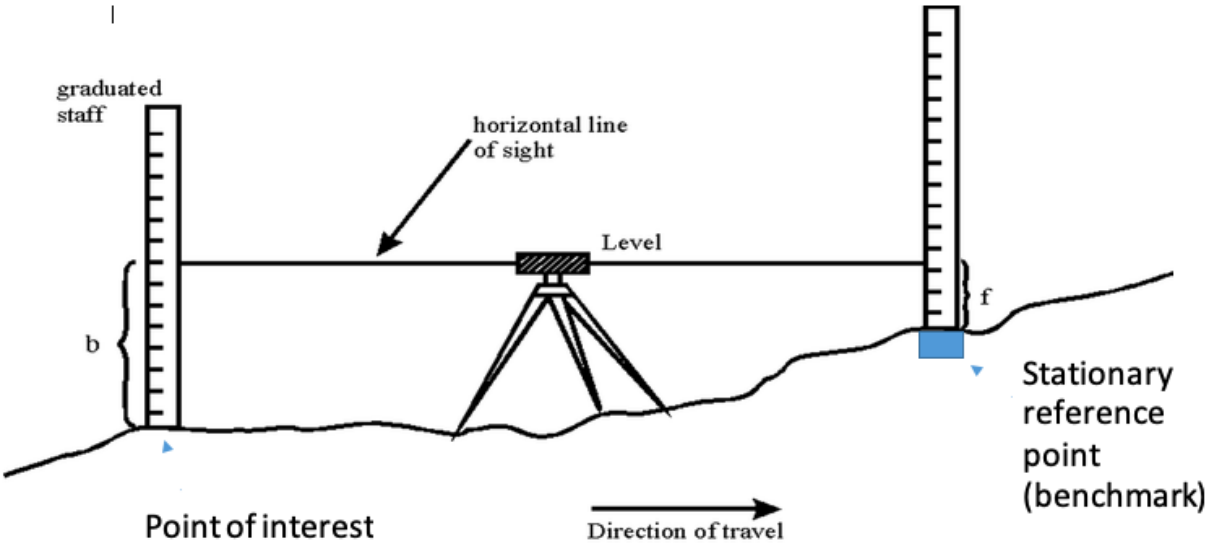

Figure 14: Sketch of leveling technique

Metrics and Protocols:

Metric Name (include units)	Recommended data collection protocols[7]	Spatial extent of metric monitoring	Frequency/ Timing	Use of metric
Percent Cover of biomass by species or cover type (% ranging from 0-100)	Use transects and quadrants method. In each quadrant determine the % of canopy cover (e.g. aerial view looking down) for each plant species. [metric relevant if the project involves marsh creation through placement of dredge spoils] Line Intersect method may be used for forested floodplain.	At each quadrant	Annually around the time of peak marsh biomass (e.g. July-August). Pre- and post-construction.	Increased biomass can result in higher functioning of the marshland for resilience purposes.
Elevation (cm)	Use benchmark method with a laser level, optical level, or an RTK GPS unit.	At each quadrant	Annually in the same seasons every year (e.g. spring and fall every year) and after storm events. Pre- and post-construction.	Provides range of elevation over which marsh species occur (useful for diagnosing plant failure or species shifts). Provides change in elevation (~ 1 cm resolution when tied to a permanent benchmark).
Water Level, Primarily Tidal Influence	Measure water level and marsh surface elevation to the same established benchmark reference point. Water level can be measured with loggers. Most	Loggers should be installed in adjacent subtidal or	Measure at 5 to 15 minute intervals for at least 30 days, preferably a year.	This measurement is needed to calculate the amount of time that the water level is greater than the marsh surface level,

[7] Grantees are welcome to use a method of monitoring any metric which exceeds the accuracy of the recommended monitoring method.

(the measure of time and/or water depths that tidal water is over the marsh surface)	projects will likely only require 1 logger, though large projects may need more.	low intertidal areas.	Pre-construction preferred.	e.g. inundation. The distribution of marsh plant species is determined by inundation and salinity. Although it is not a measure of restoration success, measures of inundation time that marsh is covered by tidal water provides valuable data on where the marsh is in the tidal frame. Ideally, this should be determined BEFORE the restoration.
Water Level, Primarily River Flow Influence	Measure water level and marsh surface elevation to the same established benchmark reference point. Water level can be measured with loggers. Use established river gauge or a staff gauge, surveyed into the same elevation benchmark. Compare on-site results (from data loggers) with river flows (from a river gauge) in order to assess hydrologic connectivity for river influence sites	Nearby established water level gauge	During the rainy season and should capture peak flows during the greatest extent of inundation, and may cover up to 8 months.	This is needed to understand inundation patterns in primarily river flow influenced systems.

Additional Resources:
For more information on the installation of a steel rod with a receiver for attachment of a SET arm visit: https://irma.nps.gov/DataStore/Reference/Profile/2225005

For more information on installing a SET and standard operating procedures see: https://www.nfwf.org/coastalresilience/Documents/nos-set-protocol-installation-sop3.pdf