E: Monitoring Guidance

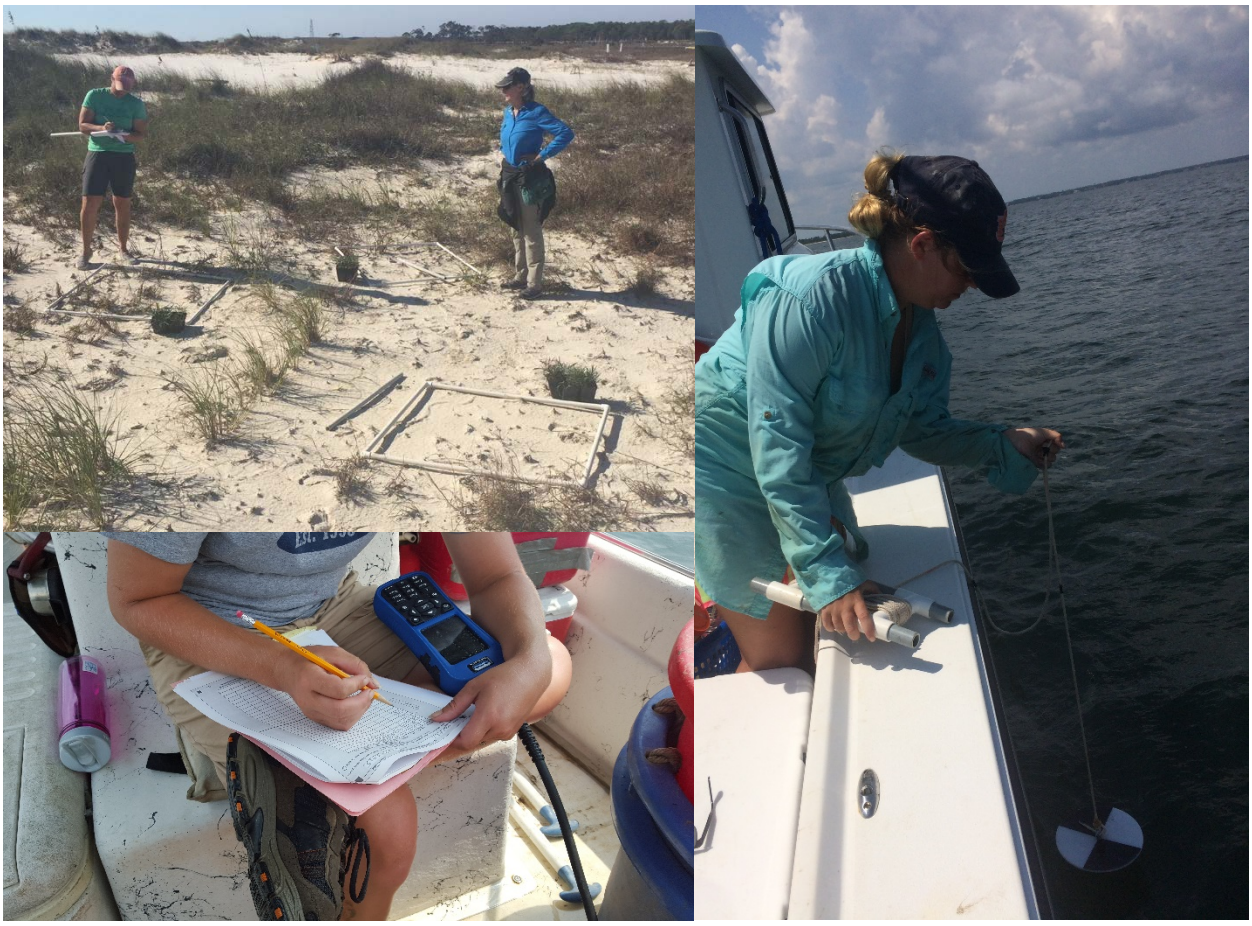

Table of Contents

E. Monitoring Guidance E-1

E.1. Background E-4
E.2. Process for Developing Monitoring Guidance E-5
E.3. Restoration Approach Core and Objective-Specific Performance Monitoring Parameters E-7
E.4. Create, Restore, and Enhance Coastal Wetlands: Monitoring Guidance E-64
E.4.1. Restoration Techniques E-65
E.4.2. Example Project-Level Restoration Objectives E-65
E.4.3. Example Drivers E-65
E.4.4. Example Uncertainties E-66
E.4.5. Guidance on Developing Parameters for Project-Level Performance E-66
E.5. Create, Restore, and Enhance Barrier and Coastal Islands and Headlands: Monitoring Guidance E-69
E.5.1. Restoration Techniques E-70
E.5.2. Example Project-Level Restoration Objectives E-70
E.5.3. Example Drivers E-71
E.5.4. Example Uncertainties E-71
E.5.5. Guidance on Developing Parameters for Project-Level Performance E-71
E.6. Restore and Enhance Dunes and Beaches: Monitoring Guidance E-74
E.6.1. Restoration Techniques E-75
E.6.2. Example Project-Level Restoration Objectives E-75
E.6.3. Example Drivers E-76
E.6.4. Example Uncertainties E-76
E.6.5. Guidance on Developing Parameters for Project-Level Performance E-76
E.7. Protect and Conserve Marine, Coastal, Estuarine, and Riparian Habitats: Monitoring Guidance E-79
E.7.1. Restoration Techniques E-80
E.7.2. Example Project-Level Restoration Objectives E-80
E.7.3. Example Drivers E-80
E.7.4. Example Uncertainties E-81
E.7.5. Guidance on Developing Parameters for Project-Level Performance E-81
E.8. Reduce Nutrient Loads to Coastal Watersheds & Reduce Pollution and Hydrologic Degradation to Coastal Watersheds: Monitoring Guidance E-83
E.8.1. Restoration Techniques E-84
E.8.2. Example Project-Level Restoration Objectives E-84
E.8.3. Example Drivers E-84
E.8.4. Example Uncertainties E-85
E.8.5. Guidance on Developing Parameters for Project-Level Performance E-85
E.9. Restore and Enhance Submerged Aquatic Vegetation: Monitoring Guidance E-87
E.9.1. Restoration Techniques E-88
E.9.2. Example Project-Level Restoration Objectives E-88

E.9.3. Example Drivers E-88
E.9.4. Example Uncertainties E-89
E.9.5. Guidance on Developing Parameters for Project-Level Performance E-89
E.10. Restore Oyster Reef Habitat: Monitoring Guidance E-92
E.10.1. Restoration Techniques E-93
E.10.2. Example Project-Level Restoration Objectives E-93
E.10.3. Example Drivers E-93
E.10.4. Example Uncertainties E-94
E.11. Enhance Public Access to Natural Resources for Recreational Use: Monitoring Guidance E-97
E.11.1. Restoration Techniques E-98
E.11.2. Example Project-Level Restoration Objectives E-98
E.11.3. Example Drivers E-98
E.11.4. Example Uncertainties E-99
E.11.5. Guidance on Developing Parameters for Project-Level Performance E-99
E.12. Enhance Recreational Experiences: Monitoring Guidance E-101
E.12.1. Restoration Techniques E-102
E.12.2. Example Project-Level Restoration Objectives E-102
E.12.3. Example Drivers E-102
E.12.4. Example Uncertainties E-103
E.12.5. Guidance on Developing Parameters for Project-Level Performance E-103
E.13. Promote Environmental Stewardship, Education, and Outreach: Monitoring Guidance E-105
E.13.1. Restoration Techniques E-106
E.13.2. Example Project-Level Restoration Objectives E-106
E.13.3. Example Drivers E-106
E.13.4. Example Uncertainties E-107
E.8.5 Guidance on Developing Parameters for Project-Level Performance E-107

E.1. Background

The Cross-TIG MAM work group has developed monitoring guidance, including core and objective-specific performance monitoring parameters and associated measurement units and data collection methods, for some Restoration Approaches, to promote consistency in data collection among similar types of projects and allow for future analysis across TIGs and Restoration Types (Section 10.6.2 of SOP; DWH NRDA Trustees, 2016). This guidance may also assist the TIGs by providing recommended methodologies for monitoring restoration projects, saving time and money spent developing suitable monitoring protocols for individual restoration projects. If adjustments from this monitoring guidance are needed for a particular project, these adjustments should be described in the project-specific MAM Plan and agreed to by the TIG (Section 10.6.3 of SOP; DWH NRDA Trustees, 2016).

Monitoring guidance has been developed for Restoration Approaches related to coastal wetlands; beaches, dunes, and barrier island habitats; water quality improvements; protection and conservation of marine, coastal, estuarine, and riparian habitats; oysters; submerged aquatic vegetation; and recreational use projects, using the process described in Section E.1. Monitoring guidance for additional Restoration Approaches will be included in future versions of this document. The monitoring guidance is organized in this manual as follows. First, the core and objective-specific performance monitoring parameters are presented in a single, alphabetized list that also includes recommended measurement units; monitoring methods; and guidance on the location, frequency, and duration of the sampling, as appropriate to each parameter. The remainder of the document presents guidance specific to each of the Restoration Approaches. For each approach, core and objective-specific performance parameters, and additional parameters for adaptive management or validation monitoring are provided in tables. Information related to the process (Section E.2) that informed the identification of the parameters, such as example drivers and uncertainties, is also included.

Project teams within each TIG will identify parameters applicable to the objectives for each individual restoration project when developing the project MAM Plan. In addition to the project monitoring guidance identified in this Manual, specific monitoring may be required to comply with permits granted by regulatory agencies. The TIGs are not restricted from adding additional parameters not identified herein, such as those needed for regulatory compliance, to evaluate pre-restoration baseline conditions, or to evaluate project “as-built” conditions. Other project monitoring that may be needed for specific projects should be determined by the TIGs.

Reference

DWH NRDA Trustees. 2016. Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the *Deepwater Horizon* (DWH) Oil Spill. Originally approved May 4, 2016; revised November 15, 2016.

E.2. Process for Developing Monitoring Guidance

The following process was used to develop monitoring guidance for each Restoration Approach:

1. Example project-specific restoration objectives were developed for each Restoration Technique, using the strategy described in Section 2.4.1.1 of the MAM Manual Version 1.0.
2. Drivers and potential uncertainties that may influence the project's ability to achieve the restoration objectives were documented. Existing conceptual models relevant to the Restoration Approach were compiled and reviewed, if available, such as those described in Section 2.4.2.1 of the MAM Manual Version 1.0.
3. Core performance monitoring parameters were identified, which could be used to evaluate progress toward the example restoration objectives. Monitoring frameworks developed by the Trustees for several commonly implemented types of projects during Early Restoration were reviewed to help identify relevant performance monitoring parameters. Existing monitoring plans developed for similar types of projects were also reviewed for relevant performance monitoring parameters.
4. Additional monitoring parameters were identified for each objective that may help resolve uncertainties, explain outside drivers, optimize project implementation, support decisions about corrective actions or other adaptive management of the project, and/or inform the design of future DWH NRDA projects.
5. The identified parameters were categorized into the following groups:
    a. Performance monitoring parameters: Two types of performance monitoring parameters were identified:
        i. Restoration Approach core performance monitoring parameters are used to evaluate project performance for restoration objectives common to projects under the Restoration Approach and should therefore be collected for projects within a Restoration Approach, to the extent practicable. The intent of performance monitoring is to document whether the projects have met their established performance criteria and determine the need for corrective actions (15 CFR § 990.55(b)(1)(vii)).
        ii. Objective-specific performance monitoring parameters are used for additional restoration objectives for a specific project under a Restoration Approach and should therefore be collected for projects that include those additional objectives to the extent practicable.
    b. Additional parameters for adaptive management or validation monitoring that may be used to resolve uncertainties, explain outside drivers, optimize project implementation, support decisions about corrective actions and other adaptive management of the project, and inform the planning of future DWH NRDA restoration projects, as described in Appendix 5.E.3.1 of the PDARP/PEIS (DWH NRDA Trustees, 2016). Selection of specific additional monitoring parameters will depend on the needs of the individual project, and additional monitoring parameters may not be needed for all projects.
6. For each core and objective-specific performance monitoring parameter, the parameter was defined and some technically sound data collection methods, including methodology references, monitoring location, frequency and duration, potential additional analyses, and additional relevant references were summarized, as appropriate.

Reference

DWH NRDA Trustees. 2016. *Deepwater Horizon* Oil Spill: Final Programmatic Damage Assessment and Restoration Plan (PDARP) and Final Programmatic Environmental Impact Statement (PEIS). http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan.