E.7. Protect and Conserve Marine, Coastal, Estuarine, and Riparian Habitats: Monitoring Guidance

This guidance is intended 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). 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, and other project monitoring that may be needed for specific projects should be determined by the TIGs.

The Cross-TIG MAM work group developed this monitoring guidance by following the process described in the Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0 (MAM Manual Version 1.0; DWH NRDA Trustees, 2017). This new guidance is being released as a supplement to MAM Manual Version 1.0.

This guidance is intended to assist the TIGs in developing MAM Plans for restoration projects, as appropriate. Specifically, it provides:

- Examples of Restoration Techniques
- Guidance on example restoration objectives, example drivers, and example uncertainties
- Guidance on core performance monitoring parameters for projects within the Restoration Approach
- Guidance on supplemental performance monitoring parameters for specific restoration objectives.

The monitoring parameters identified within a Protect and Conserve Marine, Coastal, Estuarine and Riparian project MAM Plan should be consistent with the recommended monitoring defined within this guidance document, wherever appropriate. Depending on the nature of the restoration project, TIGs may choose not to include some of the elements described in this guidance document (e.g., drivers, uncertainties). If adjustments from the monitoring guidance are needed, 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, 2016b). The guidance provided should not be considered exhaustive. Therefore, TIGs may develop project-level objectives, drivers, uncertainties, and monitoring parameters that have not been previously identified. The TIGs will develop MAM objectives and monitoring parameters that pertain to their restoration activities; and will determine the frequency and duration of monitoring, and the

associated budget they deem appropriate. Finally, this guidance may change as new monitoring parameters, methods, and technologies are identified and/or developed.

The monitoring parameters recommended in this guidance document are further detailed in Attachment E Section E.3, which includes a complete list of core- and objective-specific monitoring parameters identified by the Cross-TIG MAM work group and guidance on measurement unit(s) and monitoring methods. Guidance on monitoring locations, frequencies, durations of sampling and potential analyses is also provided where appropriate.

E.7.1. Restoration Techniques

Restoration Techniques are specific restoration actions the Trustees identified for each of the Restoration Approaches. Restoration Techniques may be used individually or in combination. See Appendix 5.D of the PDARP/PEIS (DWH NRDA Trustees, 2016a). The following are example Restoration Techniques included in the PDARP/PEIS for this Restoration Approach. This list should not be considered exhaustive; additional Restoration Techniques may be developed and/or identified.

1. Acquire lands for conservation.
2. Develop and implement management actions in conservation areas and/or restoration projects.
3. Establish or expand protections for marine areas.

E.7.2. Example Project-Level Restoration Objectives

Project-level restoration objectives should be specific to the resource injuries and clearly specify the desired outcome(s) of the restoration project (15 CFR § 990.55(b)(2)). See Section 2.4.1 of the MAM Manual Version 1.0 for guidance on establishing restoration objectives. The following are example project-level restoration objectives that may apply to one or more of the above-mentioned Restoration Techniques. This list should not be considered exhaustive; additional objectives may be developed and/or identified.

- Acquire or conserve land to conserve target habitats for fish and wildlife; create connections between natural areas; provide protective buffers for existing protected lands, sensitive habitats, and/or water bodies; and /or to facilitate habitat management.
- Acquire or conserve land to prevent threats of development.
- Establish or expand protections for marine habitat to help maintain essential ecological processes, preserve genetic diversity, and/or ensure sustainable use of species and ecosystems.
- Acquire or conserve land to provide mechanisms for protected species management.
- Develop and/or implement management actions to enhance habitats to benefit target fish, wildlife and/or ecosystem services. Example actions include debris removal, invasive species control, vegetation management, and/or visitor access.
- Implement management actions to enhance nesting and foraging habitat for birds
- Acquire or conserve land to protect critical freshwater inflows to estuaries.

E.7.3. Example Drivers

Drivers are outside forces, natural or anthropogenic, that have the potential to influence the outcomes of a restoration project. Drivers tend to be large-scale, long-term forces that are not easily controlled at the scale of a single restoration project (Harwell et al., 2016). See Section 2.4.2 of the MAM Manual Version 1.0 for guidance on establishing the conceptual setting for a MAM Plan, including identifying drivers. The following are example drivers that may

be applicable to this Restoration Approach. This list should not be considered exhaustive; additional drivers may be identified.

- Anthropogenic development
- Sea level rise
- Regeneration of native vegetative communities
- Habitat degradation
- Storm impacts
- Ocean acidification

E.7.4. Example Uncertainties

Uncertainties or information gaps have the potential to affect adaptive management decisions for individual or multiple restoration projects. These decisions may include how to improve the likelihood of achieving favorable project outcomes or selecting corrective actions in the event a project is not performing as intended. See Section 2.4.3 of the MAM Manual Version 1.0 for guidance on identifying potential sources of uncertainty for a MAM Plan. The following are example uncertainties that may be applicable to this Restoration Approach. This list should not be considered exhaustive; additional uncertainties may be identified.

- Availability of land for protection or conservation
- Ability to identify willing sellers that own targeted habitats
- Ability to coordinate management of target habitats with existing management plans or agencies with management authority
- Lack of understanding of the threats affecting species targeted for restoration
- Future rate of local relative sea level rise
- Present or future visitor use patterns
- Time lag between management actions and response (e.g., protection actions and system response, interval of invasive plant regeneration through seedbank)
- Opportunities for or barriers to habitat migration
- Ability to enforce management actions

E.7.5. Guidance on Developing Parameters for Project-Level Performance

This section includes two types of monitoring parameters for consideration under the Protect and Conserve Marine, Coastal, Estuarine, and Riparian Habitats Restoration Approach:

1. Core performance monitoring parameters applicable to projects within a Restoration Approach (core performance monitoring parameters are those used consistently across projects in order to facilitate the aggregation of project monitoring results and the evaluation of restoration progress for each Restoration Type; Appendix 5.E.4 of PDARP/PEIS; DWH NRDA Trustees, 2016a)
2. Objective-specific performance monitoring parameters that are only applicable to projects with a particular restoration objective.

Additional adaptive management and/or validation monitoring parameters for consideration have also been identified. These additional parameters may be helpful for resolving uncertainties, explaining outside drivers, optimizing project implementation, supporting decisions about corrective actions and other adaptive management of the project, and informing the planning of future DWH NRDA restoration projects. Tables E.7.1 and E.7.2 should not be considered exhaustive, and other parameters may be considered, as appropriate. See the complete list of core- and objective-specific monitoring parameters for details on the core performance monitoring parameters including definitions, units, and other guidance.

Table E.7.1. Core performance monitoring parameters and additional parameters for consideration under the Protect and Conserve Marine, Coastal, Estuarine, and Riparian Habitats Restoration Approach

Core performance monitoring parameters	Parameters for consideration (as appropriate)
• Area of Project Footprint • Terms of conservation/management plan are being met[a]	• Elevation • Habitat utilization by target species • Species abundance/diversity

[a]. If project includes a conservation/management agreement.

Table E.7.2. Performance monitoring parameters and additional parameters for consideration for projects with specific restoration objectives. These would be collected in addition to the parameters listed in Table E.7.1.

Project-specific objective	Objective-specific performance monitoring parameters	Parameters for consideration (as appropriate)
Create connections between natural areas	• Area of Project Influence	• None identified
Management of invasive species and enhancement of native plantings	• Vegetation survival • Vegetation percent cover • Vegetation species composition	• Vegetation density
Management, control, and removal of debris	• Debris	• None identified.
Enhance habitat for targeted species (e.g. sea turtles, birds)	• Targeted Injured Species Abundance/Density	• Abundance of preferred food/prey species for targeted species • Abundance/density of competing species, invasives, or predators for targeted species • Reproductive capacity of targeted species
Improve coastal water quality[a]	• Dissolved oxygen (DO) • pH • Temperature • Salinity (surface water) • Specific conductance • Discharge • Turbidity	• Nutrients • Pathogens (bacteria) • Sediments

[a] See the "Reduce Nutrient Loads to Coastal Watershed & Reduce Pollution and Hydrologic Degradation to Coastal Watersheds: Monitoring Guidance" for additional details (DWH NRDA Trustees 2017).

References

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

DWH NRDA Trustees. 2016b. 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.

DWH NRDA Trustees. 2017. Monitoring and Adaptive Management Procedures and Guidelines Manual Version 1.0. Appendix to the Trustee Council Standard Operating Procedures for Implementation of the Natural Resource Restoration for the DWH Oil Spill. December. Available: http://www.gulfspillrestoration.noaa.gov/.