

Mobile District Stream Mitigation Monitoring Requirements

In general, the monitoring requirements of 33 CFR 332, *Compensatory Mitigation For Losses of Aquatic Resources*, dictate monitoring of a compensatory mitigation site as being necessary to determine if a compensatory mitigation site is meeting its performance standards and, if necessary, adaptive management is required to ensure the site is meeting its objectives. This relationship between project objectives (Appendix B), monitoring, and performance standards is also clearly stated in Regulatory Guidance Letter 08-03, Mitigation Monitoring Requirements which states, “*monitoring reports are documents intended to provide the Corps with information to determine if a compensatory mitigation project site is successfully meeting its performance standards. Remediation and/or adaptive management used to correct deficiencies in compensatory mitigation project outcomes should be based on information provided in the monitoring reports and site inspections*”. *The objectives, performance standards, and monitoring requirements for compensatory mitigation projects required to offset unavoidable impacts to waters of the United States must be provided as special conditions of the DA permit or specified in the approved final mitigation plan (see 33CFR 332.3(k)(2))*. RGL-08-03 also outlines the minimum information required submitted in a monitoring report.

Consistent with information requirements in Appendix B, the following list of parameters should be considered a minimum in developing a monitoring strategy and information to be provided in monitoring reports. If any of the factors listed below are NOT used to monitor any given project, the reason for exclusion should be explained either in the mitigation banking instrument or mitigation plan. The following parameters are required not only to ascertain success of the project through the achievement of performance standards, but also to collect information to be used for adaptive management if required. Also consistent with the stream design requirements in Appendix B, reference stream(s) should also be a component of the monitoring strategy and monitored for these same parameters to provide a consistency assurance check on the progress of the project.

The collection of initial baseline data on physical parameters in streams and riparian buffers is required before mitigation is implemented. Monitoring and collection of the data for demonstrating progress and the achievement of interim target success criteria is required annually, for at least 5 years, or until the final success criteria have been achieved. Additional long-term monitoring may be required after mitigation is completed (mitigation banks).

Instream Monitoring

For projects proposing in-stream mitigation, the monitoring of the stream geomorphology is the primary means of determining if the restoration is “stable”. Post construction monitoring serves multiple purposes in that it allows the practitioner to both evaluate the physical character of the restoration project, and also provides the opportunity to determine the degree of departure from the original design and /or reference stream over time. Generally, monitoring of this nature revolves around a suite of geomorphic parameters, and is focused on assuring that the restored resource is not in a state of disequilibrium (i.e. is not experiencing elevated processes of erosion or aggradation). Relevant measurements (Appendix B Summary Data Worksheet) related to stream pattern, profile, dimension and bed material are considered key indicators of stream

stability and, are most commonly evaluated by taking repeated measurements of established cross-sections and longitudinal profiles. Data from these measurements are useful in determining the lateral and vertical stability of a restored or enhanced reach, as well as a reference reach. Therefore, in cases where in-stream restoration activities are proposed, monitoring will include measurements of geomorphic parameters including channel cross-sections and longitudinal profiles within the restored stream reaches, as well as on any proposed reference channels.

To detect potential changes in stream “stability”, permanent channel cross-sections will be established and located by Global Positioning System in the restored stream reaches. Channel cross sections will be erected perpendicular to the stream channel within both riffles and pools where changes in patterns of erosion and sedimentation can be identified through corresponding changes in channel geometry (e.g., channel widening, incision, etc.). In order to help ensure reproducibility during subsequent monitoring events, cross-sections will be monumented at both ends. Cross-sections will be compared after each monitoring event to detect potential changes in channel geometry that are both consistent and directional. If identified and outside of the designed range, these changes may serve as indicators of channel instability resulting from disequilibria between erosional and depositional processes within the stream channel.

Stream monitoring will also include surveying longitudinal profiles along restored reaches. The profiles will be located in such a manner as to provide adequate coverage along the length of the restored stream reaches. Survey points will include channel thalweg, water surface, inner berm(s), bankfull stage, and top of low bank. The profiles will be measured to monitor average water surface slope, slope, depth, and spacing of various streambed features such as riffles, runs, pools, and glides. The longitudinal profiles will extend parallel to the stream channel for a distance equal to approximately 20 bank full channel widths. Longitudinal profiles will be monumented at the upstream end to allow for reproducibility of the profiles during subsequent monitoring events.

Although not required, water chemistry parameters may be measured with long-term monitoring data of water temperature, DO, turbidity, and water pH to demonstrate no short-term adverse impacts from the project. The presence of various aquatic habitats must be measured as a surrogate to measuring stream biological productivity metrics such as fish and aquatic insect population metrics. While not required, continuous monitoring of stream aquatic species diversity and abundance may be measured for the purpose of demonstrating no short-term adverse impacts from the proposed project and adequate biological recovery of the mitigation site. Monitoring should occur above, within, and below the project stream reach.

Riparian buffer Monitoring: After initial collection of baseline information on vegetation, document any changes in the preserved buffer annually for at least 5 years or the life of the mitigation project. Minimal baseline information to be collected should include vegetation present, species composition, density, and structure including average species height and average species diameter at breast height. The site should be continually monitored for the presence of exotic species and appropriate actions taken when necessary.

- **Riparian buffer restoration and enhancement:** Collection of baseline information on vegetation in the buffer before mitigation is implemented, and annually for at least 5

years or the life of the mitigation project until target success criteria are achieved. Minimal information to be collected annually should include vegetation data required to demonstrate achievement of success criteria metrics reflected in the Mobile District's habitat success criteria found on the RIBITS Site on the Mobile District web page at <http://www.sam.usace.army.mil/RD/reg/>. Riparian restoration projects require monitoring and demonstrating vegetative and hydrologic improvements. For restoration projects, monitoring wells should be placed in both the project site and the target reference site for measuring and demonstrating hydrologic improvements. Upland riparian buffer restoration and enhancement and target ecological performance standards should be based upon target species composition, diversity, and structure metrics similar to that required for forested wetlands, gathered from high quality reference upland riparian buffers in the same watershed.

Monitoring Reports

Parameters listed underneath the functional headings below will be required to be included in monitoring reports. The following parameters are comprehensive and some may not be appropriate depending on the type of stream mitigation being proposed. Reasons for not including any of the following factors may be submit for IRT review.

A. For any in-stream restoration or enhancement project.

- 1) Stream pattern, profile, and dimension metrics using Appendix B Summary Data Worksheet for project site and reference sites.
- 2) Geomorphology
 - a. Channel evolution stage
 - b. Bank migration, erosional patterns, and lateral stability
 - c. Bed form diversity
 - d. Bed material characterization
 - e. Sediment transport competency and capacity*
 - f. Large woody transport and storage
- 3) Hydrology: stream flow measurement should be accomplished using stream gaging techniques.
 - a. Bankfull discharge: baseline (pre-construction); post construction (first year); end of project.
 - b. Precipitation/runoff relationship: baseline versus end of project.*
 - c. Flood frequency and duration. Recommended this data be collected and calculated throughout monitoring period.
- 4) Hydraulic:
 - a. Floodplain connectivity should be assessed using the following parameters: Bank height ratio; entrenchment ratio
 - b. Flow dynamics: stream velocity*

B. For riparian zone restoration/enhancement project.

- 1) Current vegetative management actions
 - a. Target habitat and acreages of mitigation polygon.
 - b. Current land management actions achieved.

- c. Data supporting progress towards achieving the interim or final Mobile District wetland habitat success criteria, or upland habitat success criteria metrics based on an approved reference site.
- 2) Current hydrologic management actions (if proposed).
- 3) Current soil management actions (if proposed).

* As needed on a case-by-case basis