Monitoring Plans and Adaptive Management for Coastal Mitigation Projects

An Ecological Framework for Reviewing Compensatory Mitigation Plans: Plan Review Part 4
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Background

Previous webinars:

- Ecological considerations
- Landscape connections
- Use of reference sites
- Hydrology
- Soils
- Plants
- Performance measures

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Secaucus High School, NJMC
Mitigation Plan Components

(33 CFR 332.4(c))

1. Objectives
2. Site selection
3. Site protection instrument
4. Baseline information
5. Determination of credits
6. Mitigation work plan
7. Maintenance plan
8. Performance standards
9. Monitoring requirements
10. Long-term management plan
11. Adaptive management plan
12. Financial assurances
Why Do We Monitor?

Monitoring the compensatory mitigation project is necessary to determine if:

- Project is meeting its performance standards
- Measures are necessary to ensure objectives are accomplished

(33 CFR § 332.2)
Monitoring Program Periods

Baseline

- Prior to construction
- Inform site design and/or to develop performance standards
- Includes existing hydrology, soils and vegetation
- Reference site data/biobenchmarks
Monitoring Program Periods

Interim Monitoring

• From construction until success criteria met
• Used to evaluate performance and/or credit release
• Can be extended
• Informs adaptive management actions

Long-term

• After site deemed successful
• Informs long-term management and maintenance actions
Red Flag Questions

1. Does the plan include the required elements?
2. Does the monitoring plan include enforceable performance standards based upon the project goals and objectives?
3. Does the plan clearly describe the methodologies to be used to monitor performance standards?
4. Does the plan include potential adaptive management measures and triggers to implement them?
5. Does the monitoring plan clearly identify the information to be provided in the monitoring reports?
Question 1: Required Elements

Does the monitoring plan include the required elements?

Must include:

- Parameters to be monitored
- Length of monitoring period
- Parties responsible for conducting the monitoring
- Frequency for submitting monitoring reports
- Party responsible for report submission

(33 CFR § 332.6)
Content and level of detail commensurate with scale and scope of mitigation project.
Length of Monitoring Period

Until performance standards are met

- **Not less than 5 years**
- Longer for slower to develop resource types
  - Forested wetlands
  - Bogs
- May be extended if adaptive management actions needed
Parameters to Monitor

**Biotic**

- **Vegetation**: Cover by species, survival of plantings, health, volunteers, invasive species
- **Fish**: abundance, diversity
- **Wildlife**: species, abundance, diversity
- **Benthic organisms**: species, diversity
Parameters to Monitor

Abiotic

- **Hydrology**: Daily inundation/drainage, documentation of tidal inundation over a specified time period
- **Soils**: Hydric soils or evidence of reduction occurring in the soil, sediment accumulation
- **Physiography**: Signs of excessive erosion or deposition
- **Contaminants**: Evidence of increasing levels of sediment contamination post remediation
Question 2: Performance Standards

Does the plan include enforceable performance standards that are based upon project goals and objectives?

Performance standards are:

• Observable or measurable physical, chemical and/or biological attributes used to determine if a compensatory mitigation project meets its objectives (§ 332.2)
• Must be based on “best available science” that can be measured or assessed in a practicable manner (§ 332.5)
Goals & Objectives

Goals:
• Statement of intended outcome
• Based on ecological services to be replaced

Ex. Establish a low marsh complex to provide habitat for baitfishes

Objectives:
• Identifies specific elements, functions, or services
• Includes features critical to achieving goals

Ex. Establish a 10-acre estuarine low marsh complex, dominated by *Spartina alterniflora* inundated by the tide twice daily

Kane Bank, EnviroFinance
Performance Measures:

- Observable or measurable attributes
- Identifies level that defines success and period of time over which standard must be met

Ex. At the end of 1st growing season, at least 65% areal coverage of the mitigation plantings and/or target hydrophytes (native and similar to ones identified planting plan)
Key Points on Performance Standards

- Use precise and unambiguous language to define compliance
- Measure outcomes not actions
- State exactly what indicators are to be monitored
- Identify the attribute of the indicator that will be monitored
- Specify the desired or required level of the attribute in terms of minimum, maximum or range of values. Do not stipulate an exact number unless an exact number must be achieved
- Write standards based upon minimum thresholds
- Identify when the attribute to be monitored and when the standards must be met

IWR 2007
Enforceable Performance Standards

Consider:

Can the responsible party be forced to comply?
Is it likely to be held up in court?

Are they:
• Simple
• Unambiguous
• Clearly stated
• Measureable – qualitative/quantitative
Question 3: Monitoring Methods

Does the plan clearly describe the methodologies to be used to monitor performance standards?

Measures can be:

• Qualitative – descriptive, based upon observation
• Quantitative – based upon sampling and measurements
Quantitative vs. Qualitative

Quantitative
Hydrologic
• Gauges/piezometers
Vegetation
• % cover and composition
• Canopy, sub-canopy, shrub, groundcover layers
• Stem counts
Water Quality
• PH, salinity, DO
Functional/Conditional assessments

Qualitative
Photo monitoring
Wetland hydrology observation
Vegetation community
• % cover estimates
• % dominants estimates
• nuisance species mgmt
Wildlife utilization
Biological integrity assessment
Vegetation Monitoring Example

From Maryland’s IRT Guidance (2016) : Recommended Wetland Vegetation Density Measurement Technique

**When:** Between June 15 and September 30 of monitoring years three and five, subsequent to the completion of the construction of the mitigation project

**Where:** Vegetation sample plots shall be located on a stratified random basis at locations adjacent to each photo location marker. Plots should be located within each elevation gradient and spread throughout the Bank

**Required samples numbers:**
- If the site is < 1 acre, then a minimum of 5 plots/acre
- If the site is > 1 acre but less than 3 acres, then a minimum of 4 plots/acre
- If the site is > 3 acres, then a minimum of 3 plots/acre
Vegetation Monitoring Example

How:
• A targeted vegetation monitoring approach that correlates monitoring stations with vegetative signatures on aerial photography may be useful for larger mitigation sites.
• Record GPS coordinates for plot locations.
• Plot locations should be fixed throughout the monitoring period.
• Each plot shall be of a size no less than 3'x3' (or circular with approximately the same surface area)

What:
• Dominant vegetation species identification
• Percent ground cover assessment
• Number of woody plant stems greater than 10 inches in height
  (total and #/acre)
• The percentage of dominant species FAC or wetter
• Percent survival by planted species
• An invasive/noxious species assessment including percent cover
Question 4: Adaptive Management

Does the plan include potential adaptive management measures and triggers to implement them?

- Strategy to address unforeseen changes in site conditions or components
- An adaptive management plan is required by 2008 mitigation rule (33 CFR § 332.4)
- Plan guides decisions for revising performance measures or undertaking remediation actions
Why is Adaptive Management Important?

- Resources can be complex and dynamic
- Landscape and ecological conditions are changing-climate, sea level rise, development in watershed
- Allows management of risk and uncertainty
- Sustainable mitigation in a changing environment

Sweet et al. 2017. Average annual RSL for New York City (The Battery), Miami (Virginia Key), Fla., Galveston, Tex. and San Francisco, Calif. with their respective (median-value) RSL under the six scenarios. The NOAA RSL observations (tidesandcurrents.noaa.gov/sltrends) are shown relative to the midpoint (year 2000) of the 1991–2009 epoch (1994–2009 at Virginia Key), which is the reference level for the scenarios.
Coastal wetlands are vulnerable to rising seas

Many resources available to help understand risk

https://coast.noaa.gov/applyit/wetlands/identify.html
Adaptive Management

Identify triggers for adaptive management based upon performance standards

- Hydrology, vegetation, etc.

Ex. Performance standard = no more than 10% invasive species on site.

Trigger for action is 5% present during monitoring
Question 5: Monitoring Reports

Does the monitoring plan clearly identify the information to be provided in the monitoring reports?

Information in the report should be sufficient to:

- Assess progress towards meeting performance standards
- Allow for decisions on the need for adaptive management actions
- Determine if bank credits can be released
## Monitoring Report Elements

### Narrative
- Overview (1 page)
- Requirements (1 page)
- Summary Data (4 pages)
- Map/Plan (1 page)
- Conclusion (1 page)

### Supporting Data
- As Builts
- Maps
- Photographs
- Assessment results
- Raw data and Interpretation

> Keep clear and concise

US Army Corps of Engineers
Regulatory Guidance Letter 08-03
Thank You