NOAA Habitat Conservation
Conserving Habitat for Future Generations

Monitoring Plans and Adaptive Management for Coastal Mitigation Projects

Lakes Creek Mitigation Bank, ASGECI

An Ecological Framework for Reviewing Compensatory Mitigation Plans:
Plan Review Part 4
March 21, 2019

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NOAA FISHERIES SERVICE

Background

Previous webinars:

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

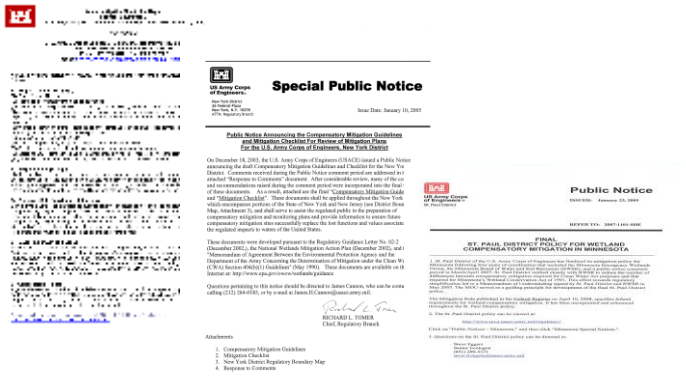
www.aswm.org

?  = Success

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


NEW JERSEY DEPARTMENT OF TRANSPORTATION
ROUTE 72 MANAHAWKIN BAY BRIDGES PROJECT

Submerged Aquatic Vegetation (SAV)
Adaptive Management Plan

April 2016

Prepared For:
New Jersey Department of Transportation
1035 Parkway Avenue
Trenton, New Jersey 08625

Prepared By:
WSP | Parsons Brinckerhoff, Inc.
2000 Lenox Drive, 3rd Floor
Lawrenceville, New Jersey 08648

(33 CFR § 332.2)

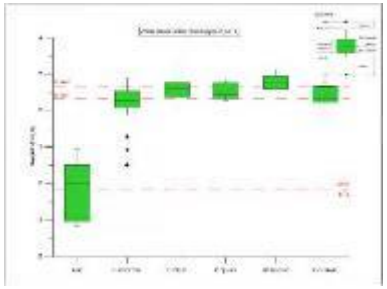
Encap mitigation site, NJSEA

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**

NPS photo



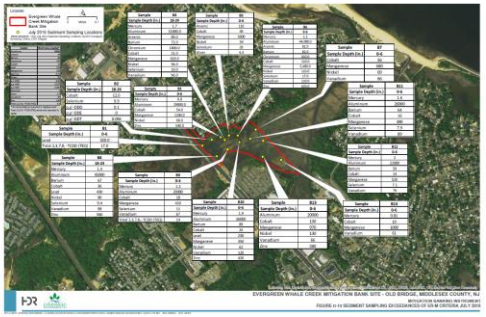
Whale Creek Biobenchmarks
Evergreen Environmental

Table 2: Tidal Datums

Datum	Marshes Saw Mill Creek gage (Gage 4) Observed May-June 2013	Marshes Saw Mill Creek gage (Gage 4) Reconstructed Epoch Based (1983-2001)	Old Place Creek Tide Gage Observed 2005	Rahway River Tide Gage Observed 2005	Bergen Point West Reach Tide Gage (Primary NOAA Gage) Epoch based (1983-2001)
MHHWS	-	2.91***	-	-	-
MHHW	3.27	2.62	2.98	2.52	2.57
MHW	2.97	2.39	2.36	2.19	2.25
MTL	0.42	-0.21	-	-	-0.24
MLW	-2.31	-2.82	-2.28	-3.18	-2.73
MLLW	-2.44	-3.05	-2.42	-3.4	-2.94

*** Computed BY adding the Bergen Point station's principal lunar and solar semidiurnal constituents (Marmer, p.130).

Sawmill Creek tidal data
NYCEDC



Whale Creek contaminants sampling
Evergreen Environmental

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)

Level of Detail

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

USFWS CBO

Flickr – N. Tonelli

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

Flckr, fishhawk

Kane Bank, EnviroFinance

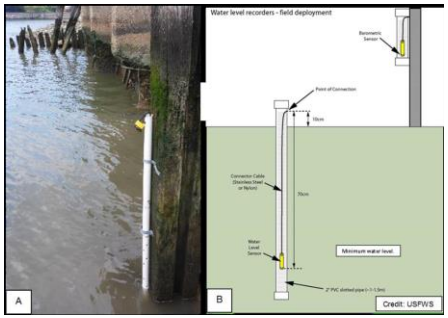
NPS

NPS, G. Frame

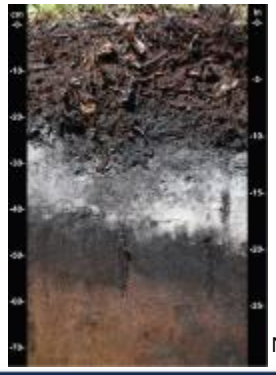
Parameters to Monitor

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



NYC parks



NRCS

USFWS

NYC Parks

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

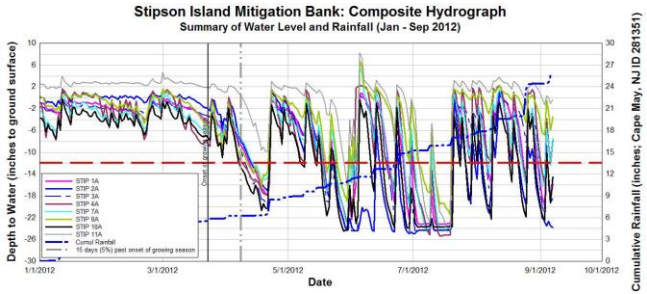
Kane Bank, EnviroFinance

Performance Measures

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)



Stipsons Island Bank, Evergreen Environmental

Kane Bank, EnviroFinance

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?

Kane Bank, EnviroFinance 2014/2009

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

NPS, photos

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

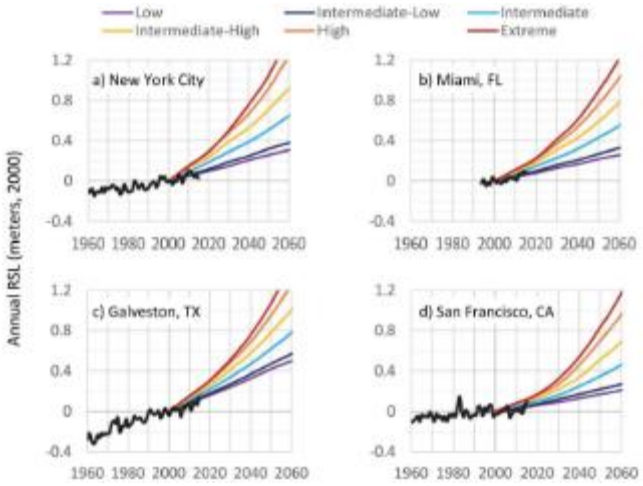
Question 4: Adaptive Management

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

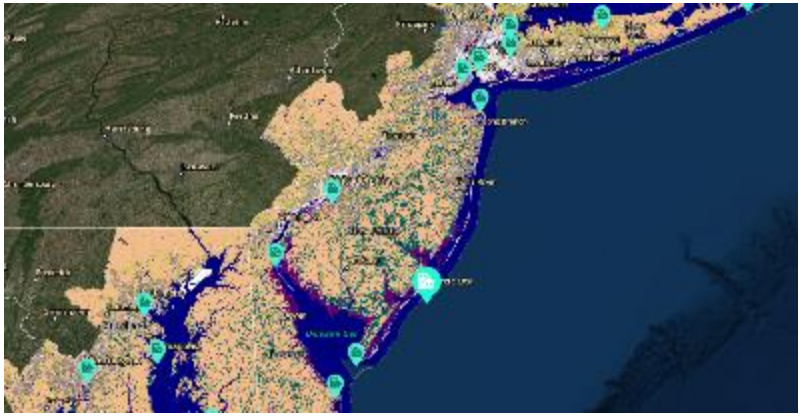


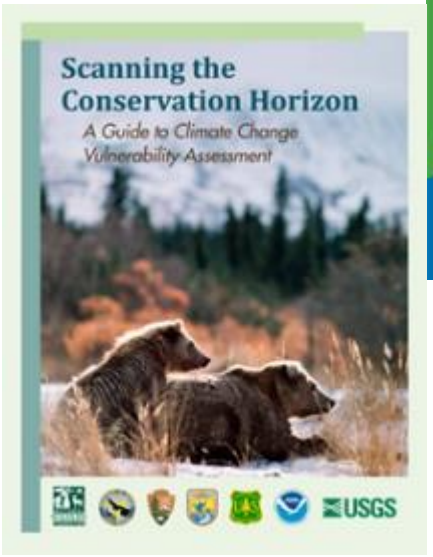
Sweet et. al 2017 . Average annual RSL for New York City (The Battery), Miami (Virginia Key), Fla., Galveston, Tex. and San Francisco, Calif. with their respective (median-value) RSL under the six scenarios. The NOAA RSL observations (tidesandcurrents.noaa.gov/sltrends) are shown relative to the midpoint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

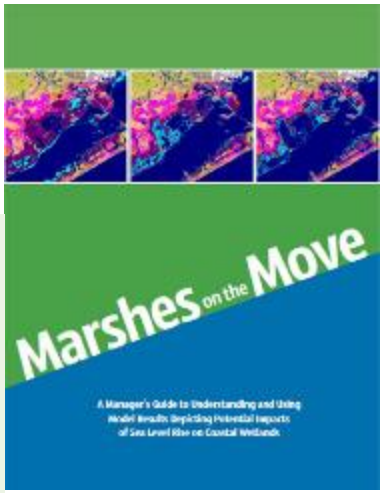
Climate Change and Sea Level Rise

Coastal wetlands are vulnerable to rising seas

Many resources available to help understand risk

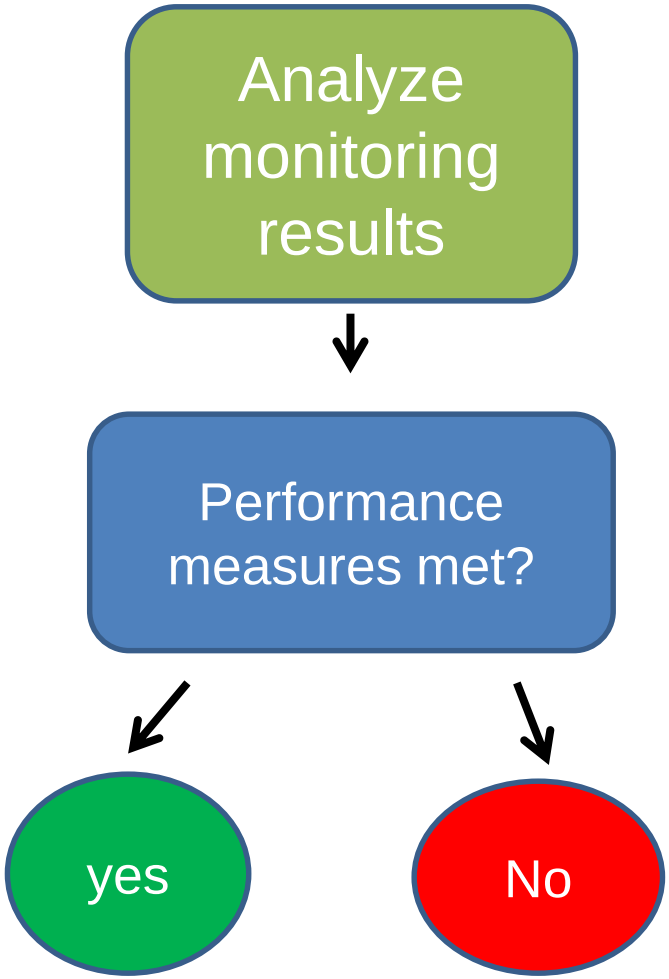






https://coast.noaa.gov/applyit/wetlands/identify.html

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

NEFSC