ADAPTIVE MANAGEMENT – A REGULATOR'S PERSPECTIVE

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TOPICS COVERED

- What is Adaptive Management?
- Corps' Regulatory Context
- Project Planning Considerations
- Post-Project Implementation
- Adaptive Management vs Remedial Action
- Example 1 - Cosumnes Floodplain Mitigation Bank, Sacramento County, CA
- Example 2 - Atlantic White Cedar Restoration, Great Dismal Swamp, VA

WHAT IS ADAPTIVE MANAGEMENT?

"The overall goal of adaptive management is **not to maintain an optimal state of the resource, but to develop an optimal management capacity**. This is accomplished by maintaining ecological resilience … that allows the system to react to inevitable stresses, and by **generating flexibility in institutions and stakeholders that allows managers to react when conditions change** (Gunderson 1999). The result is that, rather than managing for a single, optimal state, **we manage within a range of acceptable outcomes** while avoiding catastrophes and irreversible negative effects. "

*Johnson, B. L. 1999. The role of adaptive management as an operational approach for resource management agencies. Conservation Ecology **3**(2): 8. [online] URL: http://www.consecol.org/vol3/iss2/art8/*

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CORPS' DEFINITION OF ADAPTIVE MANAGEMENT

Defined in Corps regs at § 332.2

Adaptive management means the development of a management **strategy that anticipates likely challenges** associated with compensatory mitigation projects and provides for the **implementation of actions to address those challenges**, as well as **unforeseen changes to those projects**. It requires consideration of the **risk, uncertainty, and dynamic nature** of compensatory mitigation projects and **guides modification of those projects to optimize performance**. It includes the **selection of appropriate measures** that will ensure that the **aquatic resource functions** are provided and involves **analysis of monitoring results** to identify potential problems of a compensatory mitigation project and the **identification and implementation of measures to rectify** those problems.

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CORPS' REGULATORY CONTEXT

- Adaptive management plans will guide decisions for revising compensatory mitigation plans and implementing measures to address both foreseeable and unforeseen circumstances that adversely affect compensatory mitigation success. (See § 332.4(c)(12) and § 332.7(c))
  - This plan does not need to account for the universe of all potential circumstances or potential management actions needed.
  - Performance standards or monitoring requirements may be revised to account for measures taken to address deficiencies in the compensatory mitigation project. No other revisions to performance standards will be allowed except in the case of natural disasters. § 332.7(c)(4)
  - Performance standards may be revised to reflect changes in management strategies and objectives if the new standards provide for ecological benefits that are comparable or superior to the approved project. (§ 332.7(c)(2))
  - Permittee or sponsor must notify the Corps (§ 332.7(c)(1))

PROJECT PLANNING CONSIDERATIONS

- The focus of adaptive management should be on taking measures to achieve performance and satisfy the objectives of the compensatory mitigation project (73 FR 19647)
- Does the plan reflect conditions (e.g. stressors) present in the watershed and allow for actions to assist recovery?
- Account for climate variability (i.e. changes in precipitation patterns, flooding potential, or drought)?
- Financial assurances required?

PROJECT PLANNING CONSIDERATIONS

- Avoid overly restrictive design and management requirements (i.e. exclusion of all non-native species) as these sites may not be able to respond to changes in site conditions (i.e. flooding, drought, freeze events).
  - We need to allow sites to change as environmental conditions at various scales (e.g. global, regional, watershed, site, etc.) change.
- Anticipate potential for modifications to site design based upon conditions during earth disturbance.
  - May be important to specify the range of acceptable changes

POST-PROJECT IMPLEMENTATION

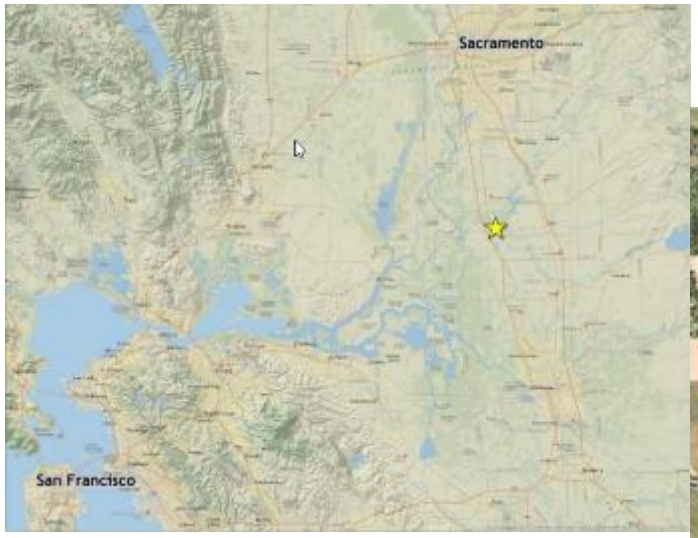
- If monitoring results indicate the project is not/will not meet its approved ecological performance standards then what adaptive management measures are proposed to address such changes?
- If no adaptive mgmt. measures are available, it may be appropriate to consider modifying the ecological performance standards to reflect the conditions of the site.
    - Except in the case of natural disasters, this rule does not allow revisions to performance standards unless they reflect ecological benefits that are comparable or superior to the originally approved objectives.
- Alternative compensatory mitigation may be required to offset a shortfall in aquatic resource functions. (73 FR 19648)

ADAPTIVE MANAGEMENT AND REMEDIAL ACTION

- Remedial actions are taken to a project to best meet the approved goals and objectives.
- Adaptive management would be used to address changes to a plan based upon changing site conditions.
- Examples of remedial action could include: construction of an outlet on-site to reduce inundation for restoration of forested wetland habitat or re-grading a site to attain the appropriate ground elevation.

EXAMPLE 1 – COSUMNES FLOODPLAIN MITIGATION BANK CENTRAL VALLEY, CA

- +/- 472 acre site
- Located on confluence of Cosumes and Mokelumne Rivers in Sacramento, County, CA.
- Construction completed August 2011.



EXAMPLE 1 – COSUMNES FLOODPLAIN MITIGATION BANK CENTRAL VALLEY, CA

- Final monitoring identified less wetlands overall, more of non-wetland floodplain habitat.
- Changed amounts of credits.
- Current conditions indicate floodplain mosaic wetlands may have recovered over time since the final credit release.

Table 1. Credit Status Summary Table

Habitat Type	Anticipated Credits[1]	Actual Credits (Year 6)[2]
Floodplain Mosaic Wetland Restored	299.14	288.53
Floodplain Riparian Restored	121.47	133.75
Shaded Riverine Aquatic Restored	45,781.56 (linear feet)	38,868.00 (linear feet)
Floodplain Riparian Enhanced	38.13	38.13
Shaded Riverine Aquatic Enhanced	10,759.00 (linear feet)	10,759.000 (linear feet)

[1]Per the 2011 as-built maps.
[2]Per the 2016 annual report.

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EXAMPLE 2 - ATLANTIC WHITE CEDAR RESTORATION GREAT DISMAL SWAMP, VA

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1995

1996

1999

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2000

2001

2002

2006

SUMMARY

- The overall goal of adaptive management is not to maintain an optimal state of the resource, but to develop an optimal management capacity. (Johnson, B.L. 1999)
- Important to differentiate between normal stressors needed to maintain ecological integrity and more intensive and damaging disturbances.
- Natural systems are complex and often have nonlinear and unpredictable behavior. (Harris et al. 2006)
- Past is no longer a prescriptive guide for what might happen in the future. (Harris et al., 2006)

"The acid test of our understanding is not whether we can take ecosystems to bits on paper, however scientifically, but whether we can put them together in practice and make them work." A.D. Bradshaw, 1983 Presidential Address to the British Ecological Society

(Perring, et.al, 2015)