



U.S.ARMY

# 2021 Webinars:

## Ecosystem Management and Restoration Research Program



US Army Corps  
of Engineers®



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# Brief Overview and Guide to Developing Monitoring and Adaptive Management Plans

## Webinar Logistics:

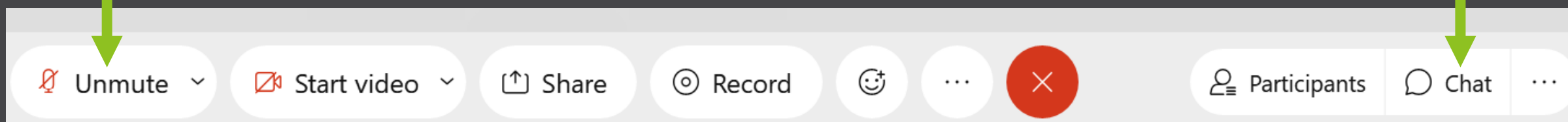
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- The webinar will begin at 1:00 PM CDT.
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# Webinar Instructions

- All lines are muted.
- Submit questions or comments in the Chat Box to “Everyone”.
- The webinar is being recorded and will be shared following the meeting.





# Presenters



Dr. Brook Herman is a Research Ecologist and the acting Program Manager of the Ecosystem Management and Restoration Research Program at the USACE' Environmental Laboratory. She primarily develops integrative and interdisciplinary ecological models and monitoring and adaptive monitoring plans in support of USACE planning projects. She also spent 9 years as a planner in the Chicago District before joining the Environmental Laboratory.



Ms. Darixa Hernandez-Abrams is a Research Ecologist with the U.S. Army Corps of Engineers- Engineer Research and Development Center (USACE-ERDC). She works with integrating ecological modeling to restoration and planning work, improving ecological modeling practices, assessing environmental effects of Corps projects, and water quality monitoring.



Mr. Brian Zettle is a Senior Biologist/Tribal Liaison and Special Programs Manager at the USACE Tribal Nations Technical Center of Expertise (TNTCX). He has been with the USACE for over 18 years, many of those as a planner in the Mobile District where he developed and implemented monitoring and adaptive management plans in support of USACE CW projects.



Dr. Michael Porter is a Fishery Biologist at the Albuquerque District. He works on the Rio Grande with the endangered Rio Grande Silvery Minnow and ecosystem restoration. He is a member of the Environmental Research and Review Group for the Ecosystem Management and Restoration Research Program.



Mr. Andrew Loschiavo is currently acting as the Senior Environmental Specialist at USACE South Atlantic Division, overseeing environmental review and compliance for the Division. Prior to this detail, he served as the Restoration and Resources Section Chief of the Environmental Branch at Jacksonville District in support of the Everglades restoration program. He has over 20 years experience working on natural resource conservation and restoration with USACE and NOAA.



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## *Brief Overview and Guide to Developing Monitoring and Adaptive Management Plans*

Dr. Brook Herman

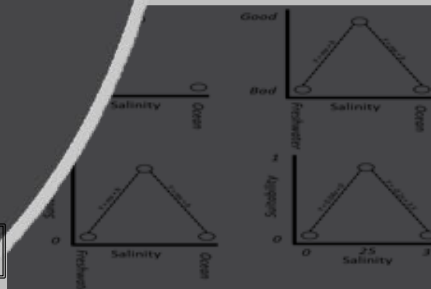
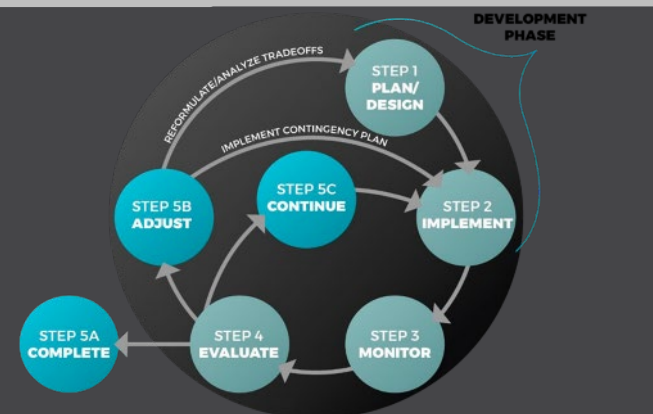
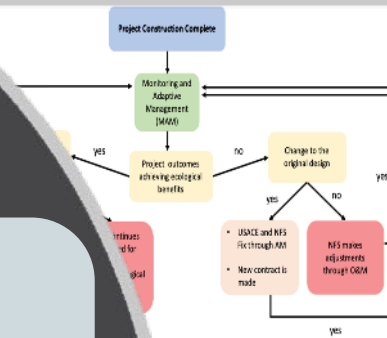
Ms. Darixa Hernandez-Abrams

Mr. Brian Zettle

Mr. Andrew LoSchiavo

Dr. Michael Porter

Distribution A: Approved for public release.



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# Monitoring and Adaptive Management Training Efforts: Overview of Team and Ongoing Efforts

- **Funding: Ecosystem Management and Restoration Research Program (EMRRP)**
- **Technical Note: Brief Overview and Quick Guide to Developing a Monitoring and Adaptive Management Plan**
- **Team:**
  - Brook Herman and Darixa Hernandez-Abrams – Environmental Laboratory
  - Michael Porter – Albuquerque District
  - Brian Zettle – Tribal Nations Tech Center of Expertise (TNTCX)
  - Andrew LoSchiavo – Jacksonville District
  - Nate Richards and Greg Miller – Eco-PCX



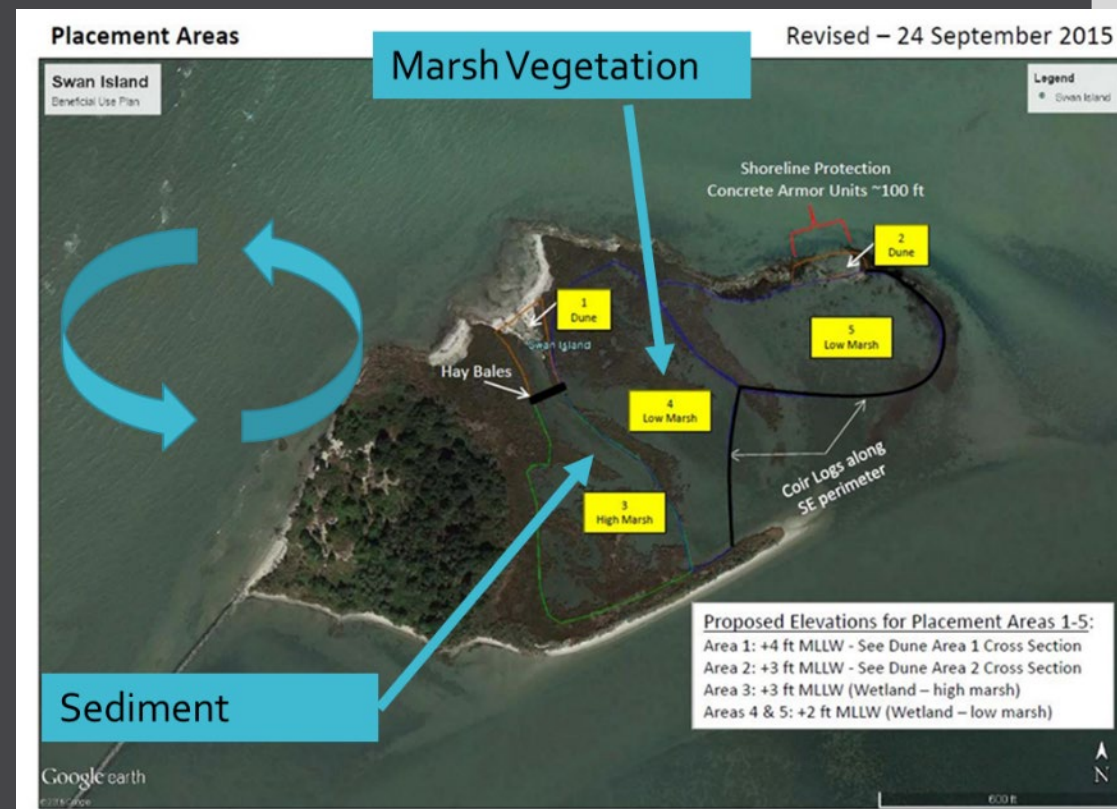


# Monitoring and Adaptive Management Policy

- Section 1161 of the WRDA 2016:  
...when conducting a feasibility study for a project for ecosystem restoration, the recommended project includes a plan for monitoring the success of the ecosystem restoration.

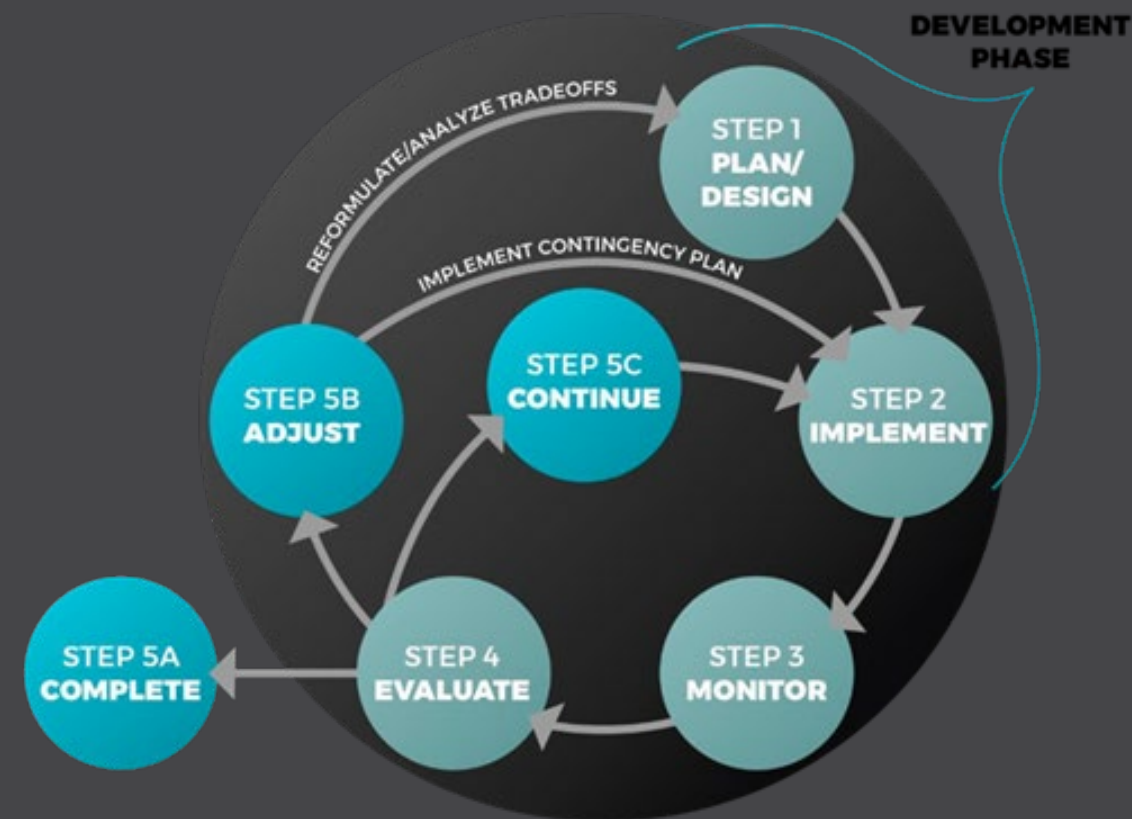
The monitoring plan should include (selected):

- monitoring activities to be conducted
- criteria that determine ecosystem success
- estimated cost and duration of monitoring
- a contingency (adaptive management) plan for taking corrective actions in cases in which monitoring demonstrates that restoration measures are not achieving ecological success in accordance with criteria described in the monitoring plan.
- 2009 Implementation Guidance for Section 2036(a) of the WRDA 2007 and Section 1040 of WRDA 2014 – Mitigation for Fish and Wildlife and Wetland Losses



# Fundamentals of Monitoring and Adaptive Management

- Adaptive management is a tool for flexible decision-making that allows adjustments in management actions to be made as a result of obtaining more knowledge through monitoring. Adaptive management allows for more effective decision-making as project benefits may be enhanced while uncertainty is reduced through obtaining scientific knowledge in a “learning by doing” risk management strategy.
- Fischenich et al. (2019) define adaptive management as “a formal science-based approach to risk management that permits implementation of actions despite uncertainties. Knowledge gained from monitoring and evaluating results is used to adjust and direct future decisions.”



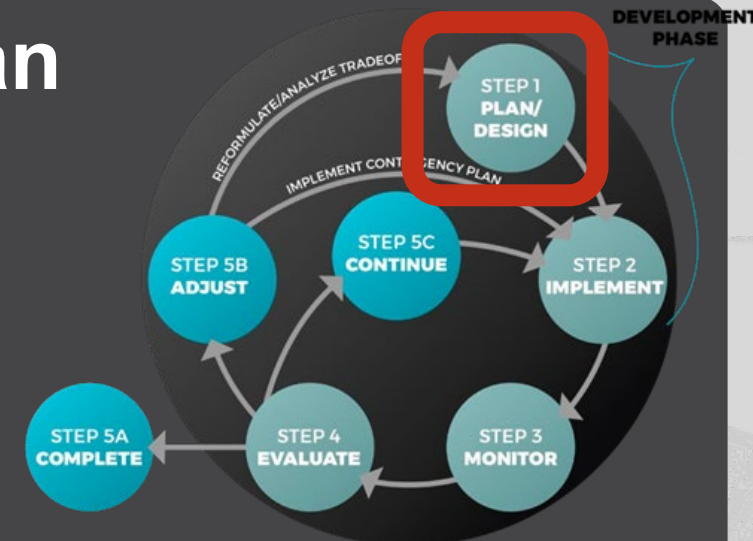


# Monitoring and Adaptive Management Plan Considerations

## • Step 1:

### • Planning Phase:

- Determine Need for Plan
- 1<sup>st</sup> Draft of Plan
- Baseline data collection aligned or in support of Plan
- Conceptual Ecological Model – important components, success criteria, thresholds, triggers



## QUESTIONS

Is the future adjustment of management actions or the decisions based on new information from monitoring possible?

If No, adaptive management is not possible  
If Yes, continue with questions

Is the managed system well understood and are management outcomes readily predictable?

Do the participant agree on the most effective design and operations to achieve goals and objectives?

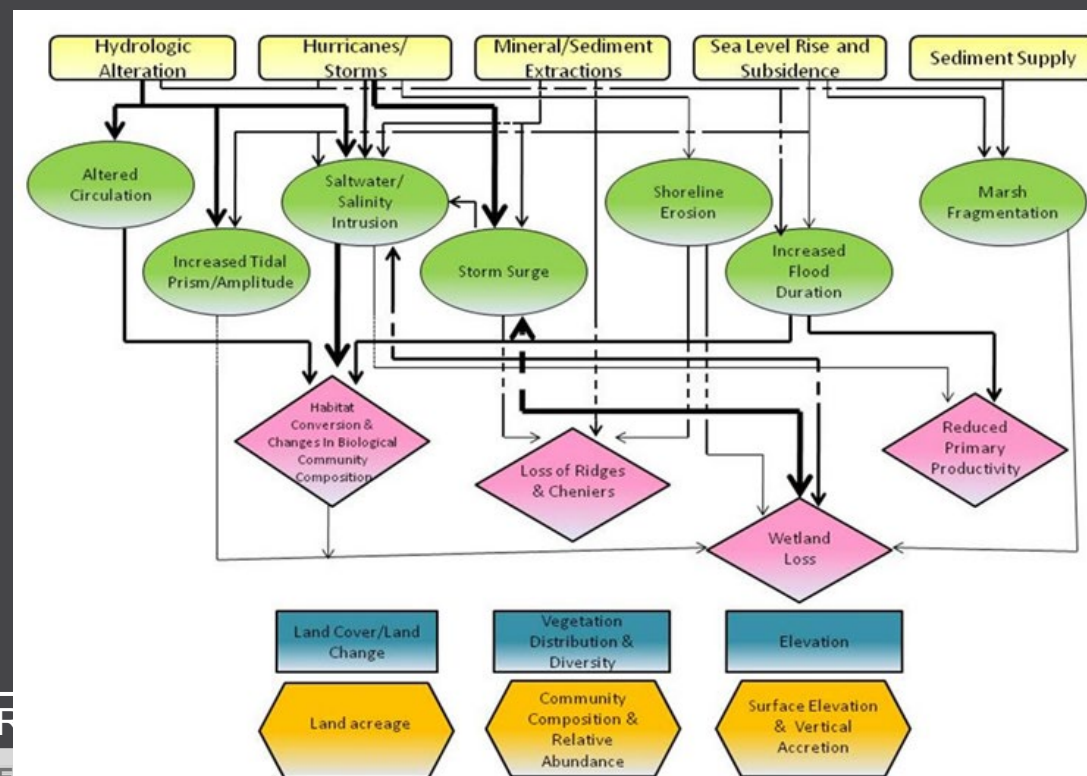
Are the project/program goals and objectives understood and agreed upon?

YES  
to all

**ADAPTIVE  
MANAGEMENT  
IS NOT NEEDED**

NO  
to any

**ADAPTIVE  
MANAGEMENT  
MAY IMPROVE  
SUCCESS  
POTENTIAL**

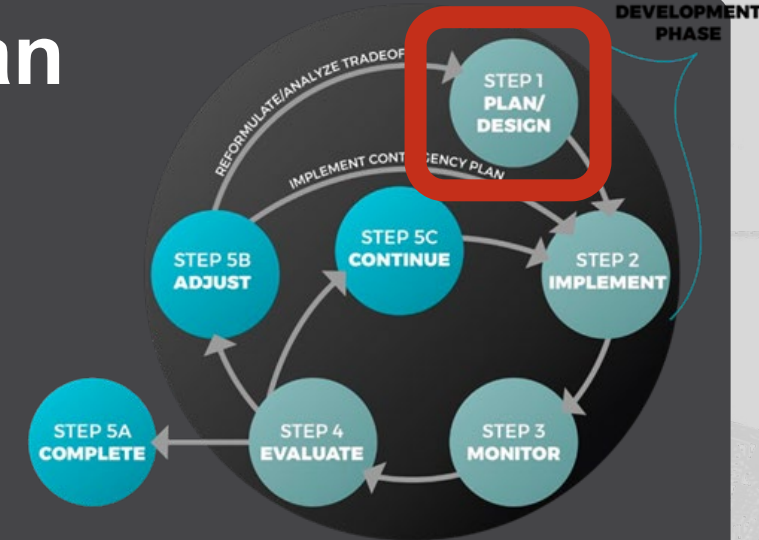


# Monitoring and Adaptive Management Plan Considerations

## Step 1:

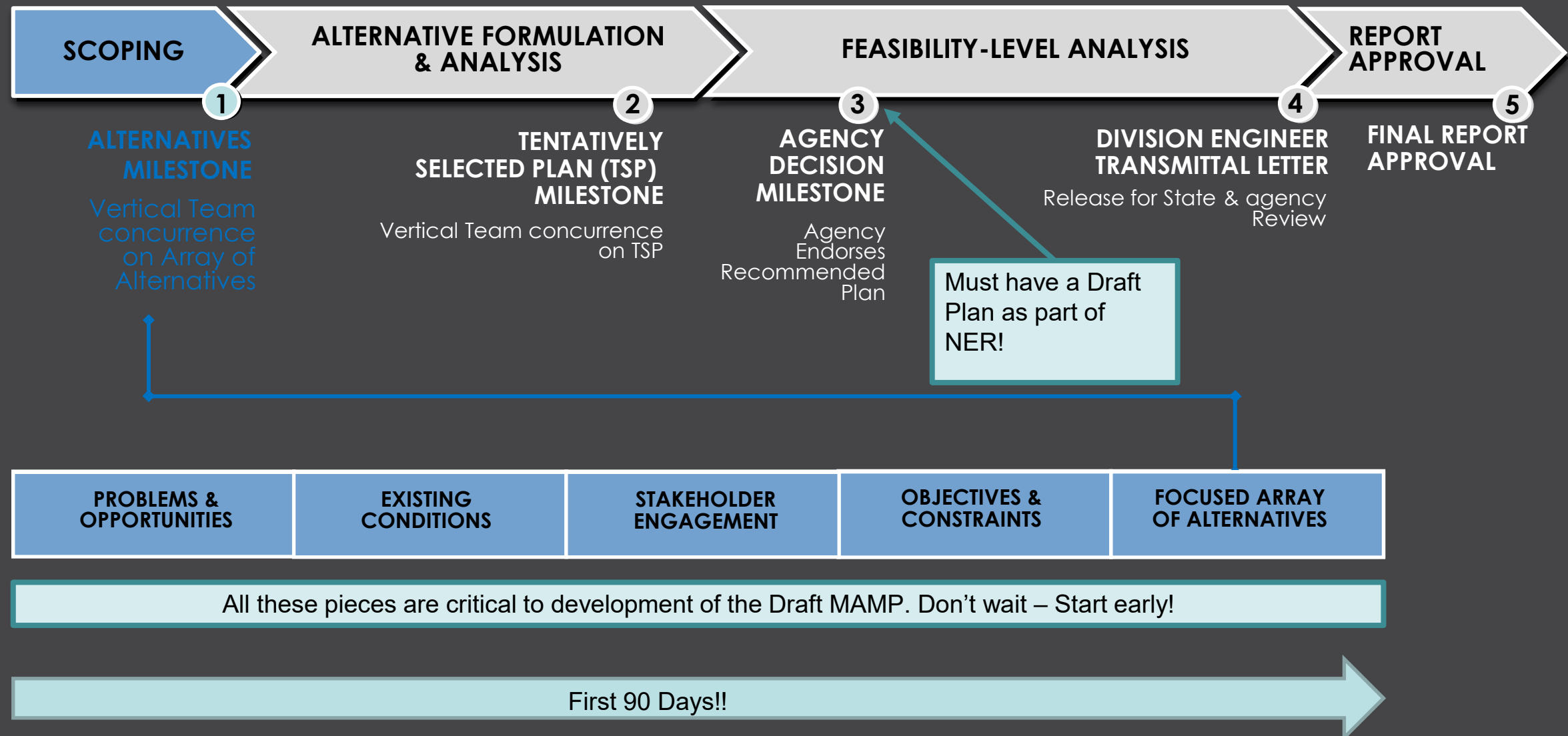
### Planning Phase:

- ▶ 1<sup>st</sup> Draft of MAMP
- ▶ Risk and Uncertainty (Risk Register)
- ▶ Hypothesized Performance



Item	Date	Assessors	Action	Risk and its cause	Consequence	Consequence rating	Evidence for consequence rating	Likelihood rating	Evidence for likelihood rating	Confidence rating	Risk Rating	Risk Management Options	Recommendation
Id number	Date of entry (record each date entry was modified)	Name(s) of person(s) assessing the task	Identify the action you propose to take (i.e., things you will do or not do) in order to accomplish the strategy and develop the information identified in the decision management plan.	Briefly identify the risk associated with the action you are taking, i.e., considering the entry in column D, what can go wrong and how can it happen?	Describe the consequence of the column E risk. If things do "go wrong" in the way described what is the specific consequence for: i) the study, ii) implementing the project or iii) project outcomes? (List the most significant consequence first if more than one.)	If the most significant consequence in column F occurs what is its potential magnitude?	Enter specific evidence used to support the consequence rating in column G.	What is the likelihood that the most significant consequence in column F will occur?	Enter specific evidence used to support the likelihood rating in column I.	Of the consequence and likelihood ratings choose the one you have the least confidence in and rate your level of confidence in that rating.	Qualitative risk rating from lookup table.	Enter alternatives to the action you proposed in column D. Be specific. If you can identify the cost or schedule impacts of implementing these instead actions of the chosen action, please do so to help inform PMP options.	Identify the preferred course of action for managing the risk you have identified. Tolerate the risk associated with the action in column D is the default option. You may recommend something other than the column D entry.
BIO-1	07-Nov-16	Brook	Pursue the certification of the evaluation models, and continue planning process with assumption that evaluation models will be certified in time.	The risk is that though models really come into play after the alternatives milestone that starting to manage this risk at a later date would lead to the planning models not certified in time for CWRB.	Study delayed going through CWRB, extending schedule and costs.	Medium	Study will not be allowed to go to CWRB without model certification, HQ will delay. Delayed certification will extend schedule of study and cost of study.	Medium	It can take as many as 4 years to certify a model. However, as discussed at the charette with Mark Matusiak, one model (OH-FQA) has a long history and should be an easy/quick certification. The other model, which may be measuring ecosystem structure, may not have as much history of use and may be somewhat harder to certify.	Medium	Medium	1. Start coordinating with ECO-PCX, Nate Richards, asap. At the least schedule a phone call to discuss the models and get her understanding of how much time and cost it would be to get these certified. 2. While the charette determined it likely to get a timely approval of the OH-FQA model, for the ecosystem structure model in addition to seeking its approval should also try to find a comparable model that's already approved.	Undertake risk management option.

# Typical Feasibility Study Report Schedule (36 Months)



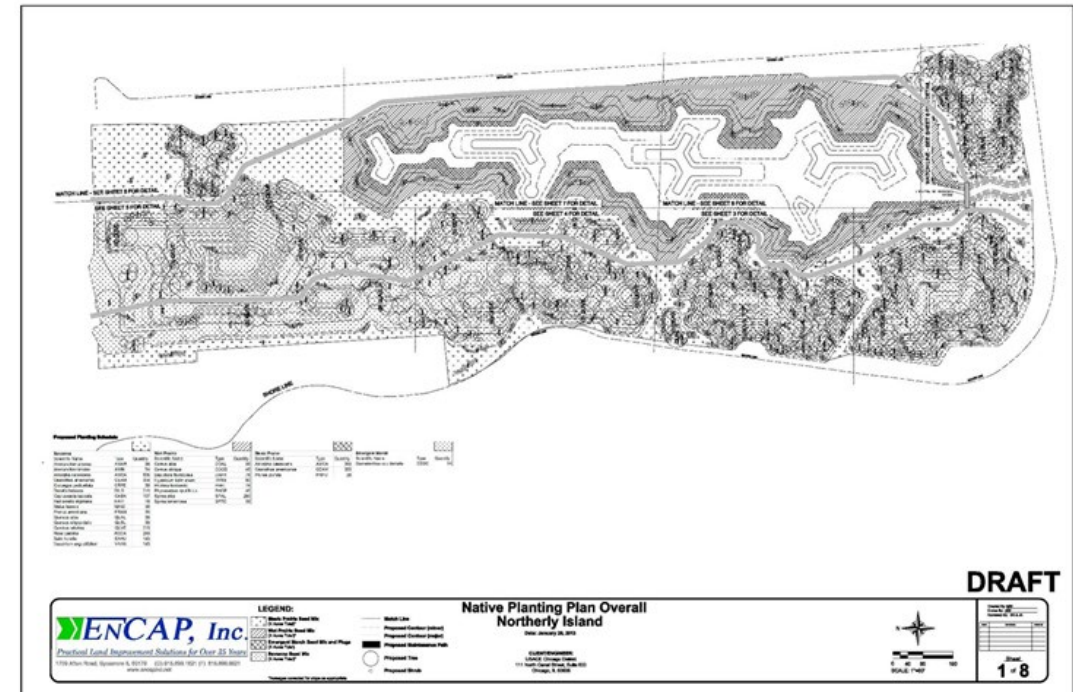
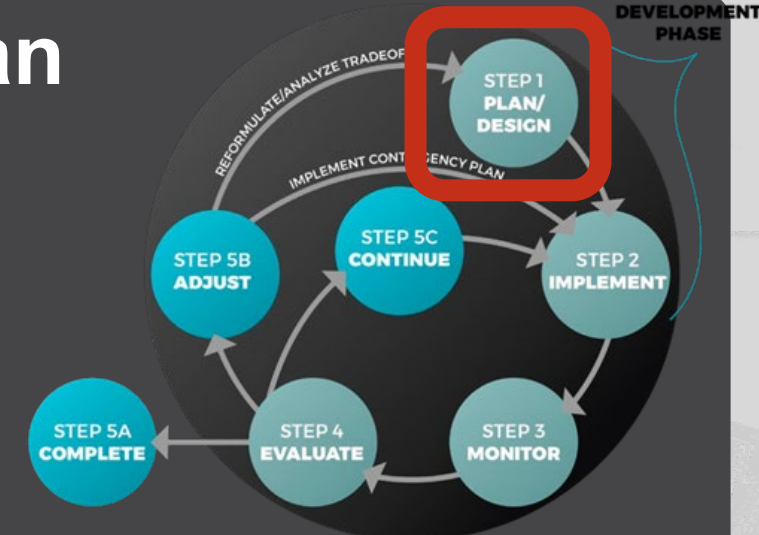


# Typical Feasibility Study Report Schedule (Scoping Stage)

PROBLEMS & OPPORTUNITIES	EXISTING CONDITIONS	STAKEHOLDER ENGAGEMENT	OBJECTIVES & CONSTRAINTS	FOCUSED ARRAY OF ALTERNATIVES
Is Formal Section 7 Consultation likely? Start discussing Plan with USFWS immediately as it will be an RPM.	Consider contingency plans formulated during Risk Register development as adaptive management opportunities.	Employ collaborative adaptive management during scoping charrettes and agency coordination.	Identify uncertainties that can be addressed through adaptive management when developing Conceptual Ecological Model (CEM).	Start developing monitoring metrics when identifying or developing benefits models.

- **Step 1:**

- ▶ **2nd Draft of Plan, based on approved plan and design specifications**
- ▶ **Data collection plan (for baseline) may be implemented during PED to address uncertainties in planning process (risk and uncertainty register), i.e., T&E species, etc.**



- **Step 2:**

- ▶ **Integrate Aspects of Plan into contract:**

- 
- ```

graph TD
    S1((STEP 1  
PLAN/  
DESIGN)) -- "IMPLEMENT CONTINGENCY PLAN" --> S2((STEP 2  
IMPLEMENT))
    S2 --> S3((STEP 3  
MONITOR))
    S3 --> S4((STEP 4  
EVALUATE))
    S4 -- "REFORMULATE/ANALYZE TRADEOFFS" --> S1
    S4 --> S5A((STEP 5A  
COMPLETE))
    S5A --> S1
  
```
- DEVELOPMENT PHASE

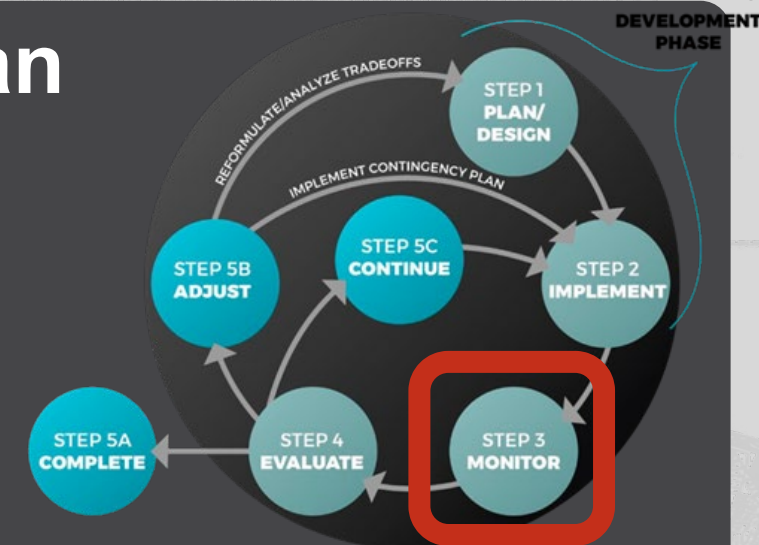




# Monitoring and Adaptive Management Plan Considerations

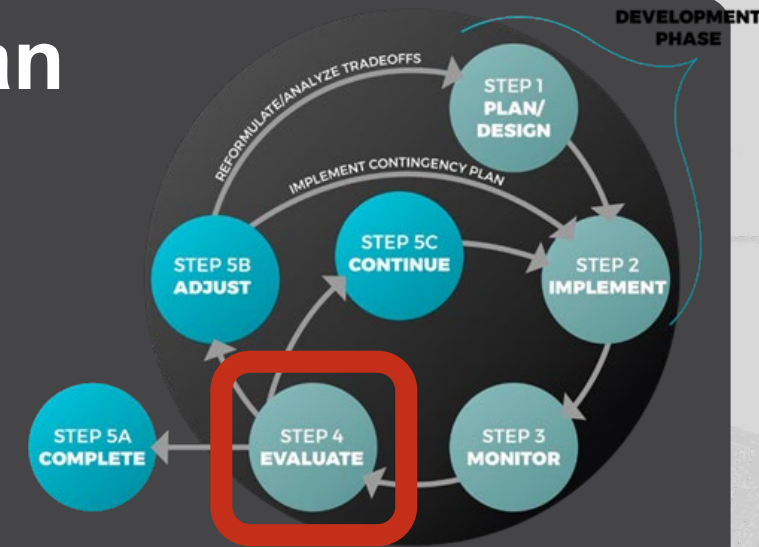
- **Step 3:**

- Monitoring Phase (up to 10 years cost shared):
  - ▶ Final Plan (integrate as-builts if needed)
  - ▶ Implement Monitoring Plan - consistent Data Collection throughout Project Phases (may be new contract)
  - ▶ Overlaps with O&M Phase - Non-federal Sponsor takes over management
  - ▶ Integrate Plan into ORRR&M Manuel
  - ▶ Regular Evaluations (Yearly Milestones)



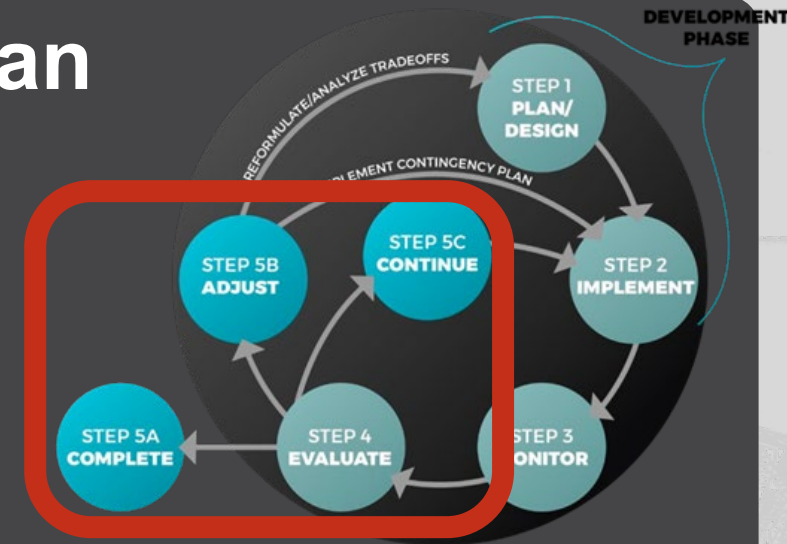
# Monitoring and Adaptive Management Plan Considerations

- **Steps 4-5:**
  - **Evaluate and Adjust if Necessary:**
    - ▶ Compare monitoring results with hypotheses, success criteria
      - Adaptive management may be triggered by an event (e.g., storm, flood, etc.) or by an undesired trend in monitoring.
      - Data collected must be aligned with success criteria and should account for early warnings (e.g., presence/absence of invasive species) and indicators of longer term success (e.g., understory coverage of slow growing tree species).
    - ▶ Compare results with model predictions and conduct data analysis
    - ▶ Communicate Results to Non-federal Partner(s)
    - ▶ Adaptive management options should already be described and ready to be implemented as part of the ORRR&M manual.



# Monitoring and Adaptive Management Plan Considerations

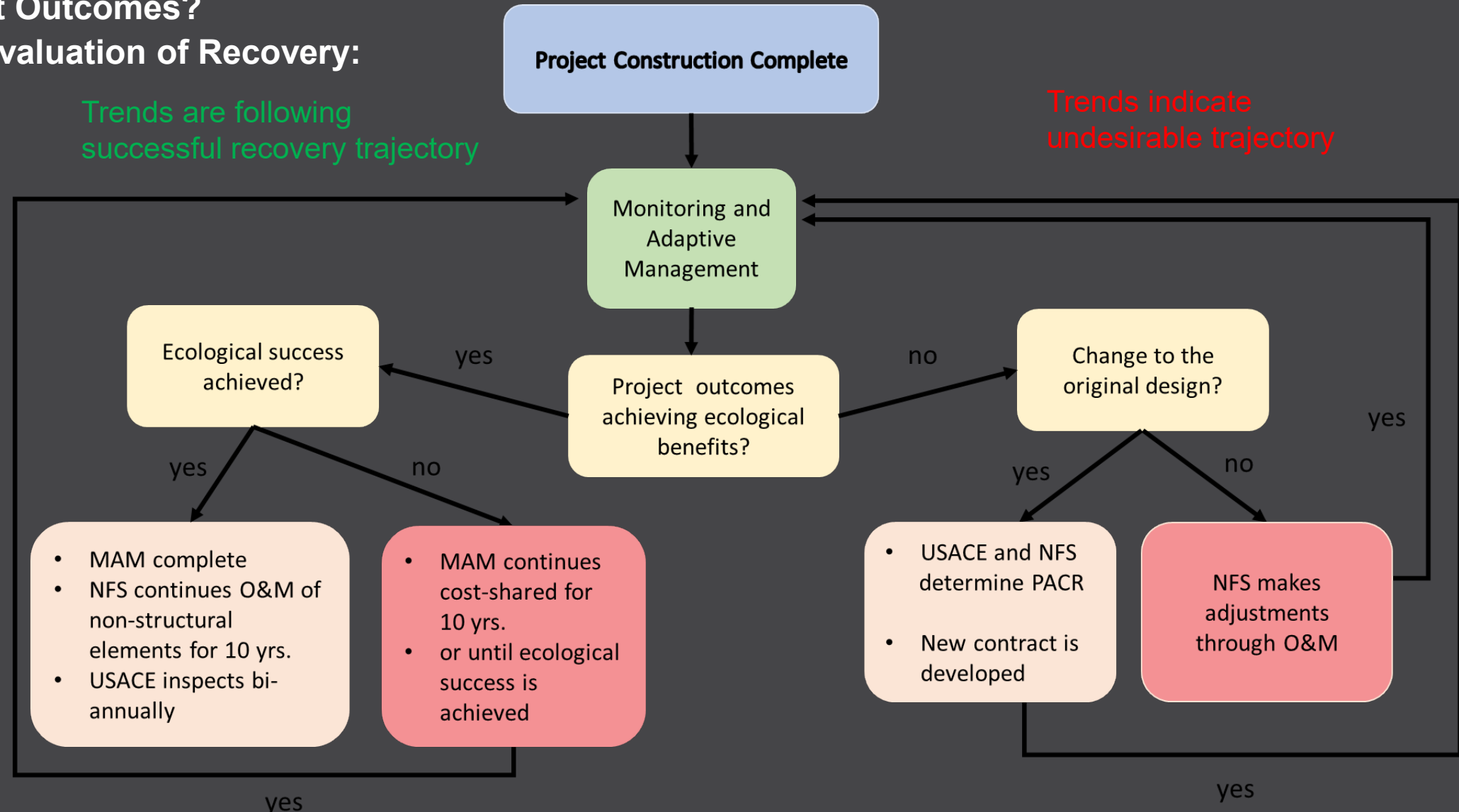
- Steps 4-5:
  - Results of Evaluations (1X per year or every number of years):
    - ▶ Complete (5A) – Ecological Success Criteria has been met, MAM may cease
    - ▶ Adjust (5B) – undesired trends or signals, execute adaptive management options to address trends, may need to adjust MAMP to account for site changes
    - ▶ Continue (5C) – trends are following successful recovery, continue to monitoring until criteria are met (sometimes criteria is a trend over time, i.e., less than 10% cover of invasive for 3 consecutive years)





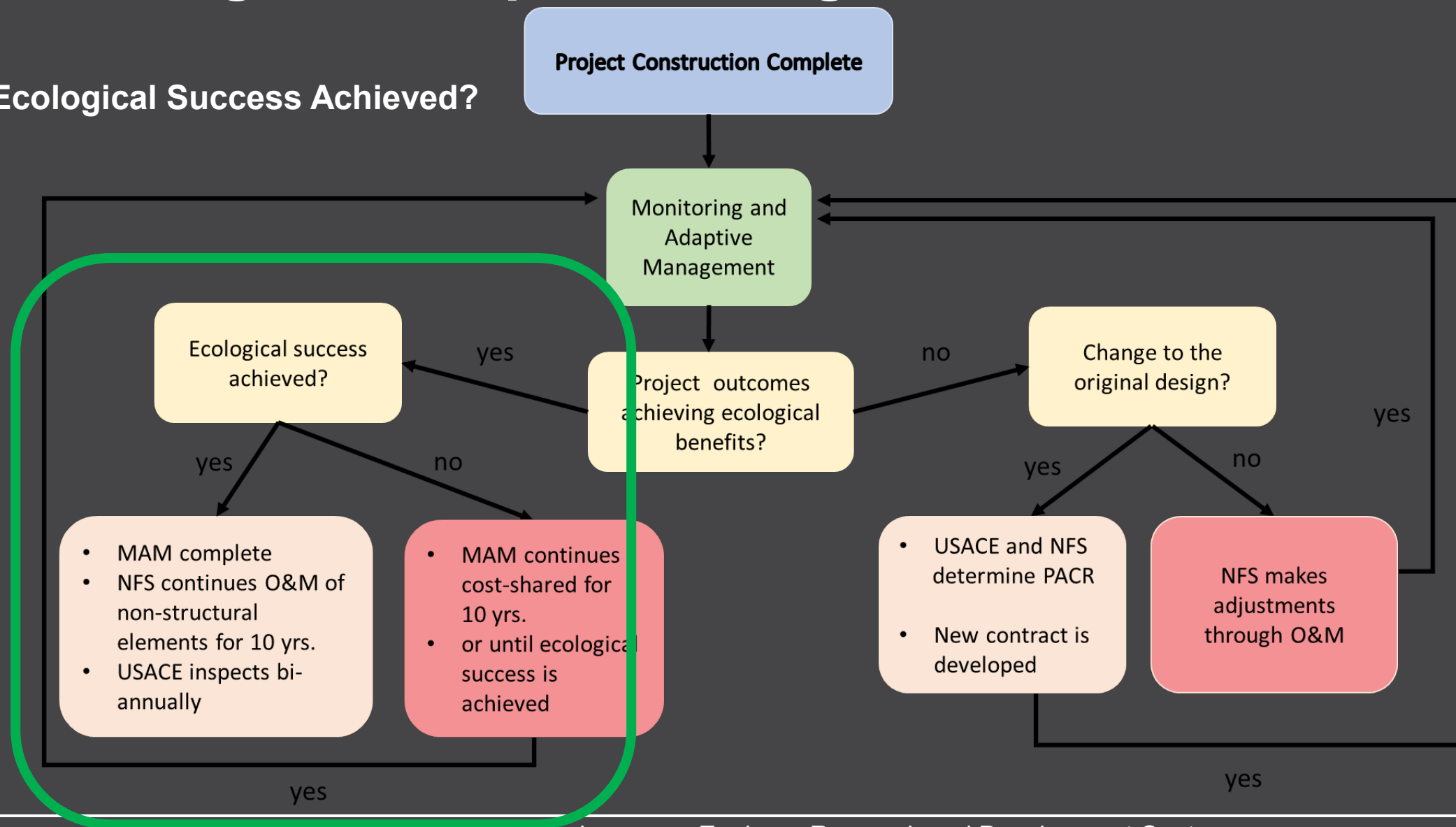
# Monitoring and Adaptive Management Post-Construction

- Project Outcomes?
  - Evaluation of Recovery:



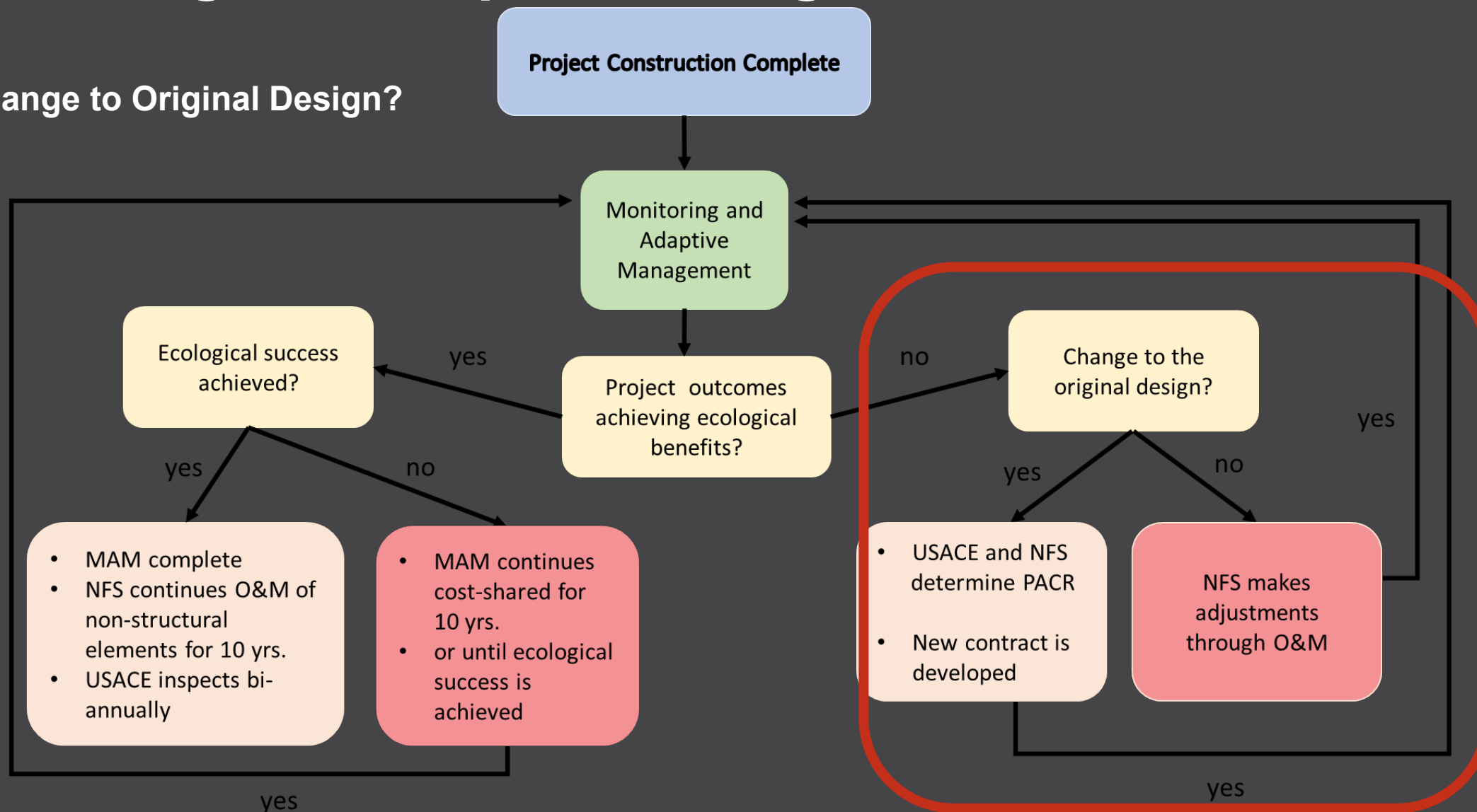
# Monitoring and Adaptive Management Post-Construction

- Ecological Success Achieved?



# Monitoring and Adaptive Management Post-Construction

- Change to Original Design?





# Outline of Sections

## 1. Introduction

## 2. Guidance

List of relevant policies and guidance documents.

## 3. General Monitoring Objectives

## 4. Project Description

*Project Location*

*Project Objectives*

*Description of Problems or Trends*

*Restoration Design Overview (NED Mitigation or NER Plan)*

*Project Objectives*

*Key Risk and Uncertainties*

*Hypothesized Performance*

## 5. Monitoring Components or Elements

*Biological Components*

*Non-biological Components*

*Triggers and Success Criteria*

## 6. Monitoring Design

## 7. Overview of Success Criteria and Project Objectives

## 8. Data Management and Storage

## 9. Monitoring Responsibilities

## 10. Monitoring Tasks, Schedule and Costs

## 11. Reporting

## 12. Adaptive Management (Contingency Options)

## 13. Operations, Maintenance, Repair, Rehabilitation and Replace Plan (OMRR&R)

## 14. References

# Monitoring and Adaptive Management Training Efforts: Overview of Team and Ongoing Efforts

- **Video Training Library** – short descriptions of past MAMP projects
- **Team:**
  - Brook Herman and Darixa Hernandez-Abrams – Environmental Laboratory
  - Michael Porter – Albuquerque District
  - Brian Zettle – Tribal Nations Tech Center of Expertise (TNTCX)
  - Andrew LoSchiavo – Jacksonville District
  - Nate Richards and Greg Miller – Eco-PCX



# QUESTIONS?

## Dr. Brook Herman

[Brook.d.herman@usace.army.mil](mailto:Brook.d.herman@usace.army.mil)

# Questions & Answers

Please post any questions to the “CHAT”.



## Missed past webinars?

**June 15<sup>th</sup>**

**Topic:** Model to Assess Species and Habitat Migration Due to Climate Change

**Speakers:** Dr. Jacob Jung & Ms. Christina Saltus

**June 29<sup>th</sup>**

**Topic:** Monitoring Ecological Restoration with Imagery Tools

**Speaker:** Dr. Kristofer Lasko

**August 17<sup>th</sup>**

**Topic:** Review of Research into Ecosystem Goods and Services in USACE Decision-making

**Speakers:** Ms. Elizabeth Murray, Dr. Charles Theiling, & Dr. Lisa Wainger

**POSTED:**

<https://emrrp.el.erdc.dren.mil/webinars.html>.