



# **EXTERNAL COORDINATION AND COMMUNICATION OF ENGINEERING WITH NATURE PROGRAM-FUNDED PROJECTS TO THE WATER INSTITUTE**

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Produced for and funded by the U.S. Army Corps of Engineers Engineering with Nature®  
Program

*August 30, 2024*



## **ABOUT THE WATER INSTITUTE**

The Water Institute is an independent, non-profit, applied research institution advancing science and developing integrated methods to solve complex environmental and societal challenges. We believe in and strive for more resilient and equitable communities, sustainable environments, and thriving economies. For more information, visit [www.thewaterinstitute.org](http://www.thewaterinstitute.org).

## **DISCLAIMER**

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## **SUGGESTED CITATION**

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## PREFACE

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In collaboration with the U.S. Army Corps of Engineers (USACE) Engineering With Nature® (EWN) program, the Water Institute (the Institute) completed a study in 2023 that evaluated policies and practices potentially hindering inclusion of Nature-Based Solutions (NBS) into Civil Works projects where they could potentially advance multiple USACE Mission Areas (Ehrenwerth et al., 2022; Fischbach et al., 2023a, 2023b; Windhoffer et al., 2023). That study included a comprehensive review of USACE project alternative evaluation methods, as well as identification and assessment of approaches for incorporating a wider range of social, environmental, and economic benefits and costs into NBS alternative evaluation.

The Institute has extended that collaboration with EWN to complete several research projects designed to help advance and accelerate incorporation of NBS into Civil Works projects. This report provides a summary of the activities accomplished to support external coordination and communication of the EWN-funded work that the Institute has undertaken.



## ACKNOWLEDGEMENTS

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This report builds on a completed multi-year research effort that was led by the Institute to evaluate policies and practices limiting consideration of Nature-Based Solutions (NBS) in U.S. Army Corps of Engineers (USACE) Feasibility Studies. The authors gratefully acknowledge Dr. Jeffrey King (USACE EWN program National Lead and Program Manager) and Dr. Amanda Tritinger (USACE Assistant EWN Program Manager) for their unfailing support and collaboration on this and all EWN-funded projects being conducted by The Water Institute (the Institute).

Content of this report was reviewed by Alyssa Dausman and the report was reviewed, edited, and formatted by Charley Cameron of the Institute. Additional contributors include Valerie Black, Jordan Fischbach, and Scott Hemmerling.

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## LIST OF ACRONYMS

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Acronym	Term
DoD	U.S. Department of Defense
E&D	Engineering & Design
ERDC	Engineering Research and Development Center
ERDC EL	Engineering Research and Development Center, Environmental Laboratory
EWN	Engineering With Nature®
IWR	Institute for Water Resources
NBS	Nature-Based Solutions
N-EWN	Network for Engineering with Nature
USACE	U.S. Army Corps of Engineers



## INTRODUCTION

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The U.S. Army Corps of Engineers (USACE) Engineering With Nature® (EWN) program works toward better integration and alignment of traditional infrastructure approaches with nature-based solutions (NBS). The Water Institute (the Institute) continues to actively support the EWN program through execution of research as well as coordination and communication with a variety of partners to support advancements of the program. This report summarizes the engagement that took place between October 2023 and September 2024, as supported by funding from the EWN program.

This funding was received as part of a broader set of research tasks that the Institute was contracted to complete in support of EWN. They include:

- Task 1. External Stakeholder Outreach and Engagement to Inform Reanalysis of Completed Studies
- Task 2: Considering Equity and Environmental Justice in USACE Project Evaluation and Prioritization
- Task 3: Accelerating Integration of Nature-based Solutions (NBS) into USACE Civil Works Flood Risk Management Mission
- Task 4: Quantifying Climate Change Mitigation Potential of Nature-based Carbon Sequestration and Storage in U.S. Department of Defense (DoD) Lands

Collectively, these tasks aim to deepen, elevate, and synthesize these emerging evaluation and analysis approaches within USACE and key federal and nonfederal partners and stakeholders.

The coordination and communication summarized in this report is Task 5 of the current contract. This was added in a contract amendment, recognizing that broader engagement of this important work with interested parties is needed. These parties include senior members of the federal government including secretaries and administrators of federal departments, as well as academic researchers.



## SUMMARY OF ENGAGEMENT

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Through execution of the first contract between the USACE EWN program and the Institute, both parties recognized that broader engagement, coordination, and communication of this important work with interested parties was needed for the Institute to continue to support the EWN program. These parties include senior members of the federal government as well as academic researchers. These funds were used to support Jean Cowan, an Institute senior project manager, and Soupy Dalyander, Principal of Research Strategy at the Institute, in efforts to provide this additional engagement. This ensured that timely progress continued to be made on the technical aspects of Tasks 1–4 while the Institute remained fully coordinated with the USACE EWN program as it responded to the external interest in the work. This also allowed Ms. Cowan to serve as a primary point of contact to Dr. Jeff King, National Lead and Program Manager EWN program, thus providing some efficiency for his management of this award.

Broadly, the coordination and communication can be categorized as follows:

- Internal Institute coordination across tasks
- External coordination
  - Client
  - Other USACE staff and academic experts
  - Other federal agency staff
  - Network for Engineering with Nature (N-EWN)
  - Symposia and conferences

### INTERNAL INSTITUTE COORDINATION ACROSS TASKS

Jean Cowan provided programmatic coordination across all tasks to ensure that timely progress was made on the technical aspects of Tasks 1–4 and that coordination needs across tasks were identified, addressed internally as able, or elevated as needed. This effort also allowed the senior project manager to be conversant enough within and across tasks to be the primary point of contact with the USACE EWN program lead, drawing in the technical leads as needed to facilitate resolution of issues in a timely manner and in a way that was as efficient as possible for Dr. King.

### EXTERNAL COORDINATION

The cornerstone of this task was provision of funds to ensure that the research being conducted by the Institute in support of the EWN program was being effectively communicated and shared with the broader technical community. These engagements are broadly categorized as client, other USACE staff and academic experts, other federal agency staff, N-EWN, and the broader community through conferences and symposia. These engagements are summarized below.





## Client Communications

Ms. Cowan met regularly with Dr. Jeff King, and Dr. Amanda Tritinger, Assistant EWN Program Manager, to discuss the status, challenges and opportunities associated with the active tasks. Through these engagements, additional opportunities were identified to engage with others in the EWN community. These regular communications proved to be invaluable not only for ensuring that the Institute's research was as applicable to the EWN program needs as possible, but also for identifying important points of coordination and collaboration to gain critical insights on the work from other experts while it was under development.

## Other USACE Staff and Academic Experts

Early in the process, Dr. King identified USACE EWN practitioner leads who were closely tied to each of the research tasks, and effectively served as extended team members. Through these engagements, as well as through the above-mentioned discussions with Drs. King and Tritinger, opportunities to engage with other USACE staff were identified and pursued as outlined below.

- Task 2:
  - EWN practitioner leads: Kyle McKay and Margaret Kurth (USACE ERDC Environmental Laboratory (EL))
  - Academic Expert: Susana Ferreira (University of Georgia)
- Task 3:<sup>1</sup>
  - EWN practitioner leads: Elizabeth Godsey (USACE Mobile District), David Crane (USACE Omaha District), Edward Brauer (USACE St Louis District)
  - Other USACE Staff: Institute for Water Resources (IWR) staff including Mindy Simmons, Marriah Abellera, Matt Smith, Greg Miller; Katie Brutsche (USACE Beneficial Use Program Manager); Julie Beagle (USACE San Francisco District, Environmental Planning Section Chief)
- Task 4:
  - EWN program lead: Ben Kocar, USACE ERDC EL
  - Other USACE Staff: Ryan Busby (USACE ERDC Construction Engineering Research Laboratory), Jacob Berkowitz (USACE ERDC EL)
  - Academic Experts: Scott Pippin and Daniel Wyatt (University of Georgia)

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<sup>1</sup> Note that additional experts from federal, state, and local governments; academic institutions; and non-profit organizations were also engaged through workshops organized as part of the methodology for eliciting input for the Task 3 research project.



## Other Federal Agency Staff

Notably, the Institute had the opportunity to connect with Dr. Will Rogers (US Department of the Army, Senior Climate Advisor) on its EWN-funded work generally and with specific emphasis on Task 4: *Quantifying Climate Change Mitigation Potential of Nature-based Carbon Sequestration and Storage in U.S. Department of Defense (DoD) Lands*. This discussion led to engagement with Drs. Ryan Busby and Jacob Berkowitz on Task 4.

## Network for Engineering With Nature (N-EWN)

The [Network for Engineering with Nature](#) (N-EWN), established in 2019, is a network of vested organizations creating a resilient future through built and natural infrastructure that work together to improve societal wellbeing by sustainably delivering more value and benefits to people and ecosystems. Through these Task 5 funds, Jean Cowan was able to serve on the N-EWN Advisory Committee and regularly participate in partner meetings to better understand the work that others are doing in support of the EWN program, and to identify opportunities to network and share information about the Institute's work with this broader community. Importantly, these funds also allowed Ms. Cowan to serve on the planning committee for the N-EWN Partner Symposium in St Augustine, Florida, and for Dr. Dalyander to attend and present at the symposium (see following subsection).

## Conferences and Symposia

Below is a summary of conferences and symposia that Institute staff attended in support of communicating EWN-relevant work and to network with other EWN practitioners.

*Policy Forum on Nature Based Solutions, Washington DC February 7, 2024.*

The N-EWN and the National Academy of Sciences' Gulf Research Program hosted a [Policy Forum on Nature-based Solutions](#) on February 7–8, 2024. The event was free and open to the public, bringing together policymakers, regulators, practitioners, academics, and others involved in the funding, policymaking, design, and/or construction of NBS. The event delved into the transformative potential of NBS for infrastructure development, climate change solutions, and community revitalization. The Forum identified and discussed major obstacles in the policy and practitioner space, in order to discuss ways to more effectively implement NBS. There was also a specific focus on financing NBS and the permitting processes involved, as well as ensuring that NBS projects are carried out in an equitable and just way. The event helped to foster actionable dialogues to enhance the implementation and impact of NBS on a global scale.

Valerie Black<sup>2</sup> served on the planning committee and she, Beaux Jones<sup>3</sup>, and Jordan Fischbach<sup>4</sup> moderated sessions. Additionally, Scott Hemmerling gave a presentation on a state-funded project in Louisiana with strong synergy to EWN priorities (Appendix A). Additionally, this Forum provided

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<sup>2</sup> General Counsel and Legal Policy Researcher

<sup>3</sup> President and CEO

<sup>4</sup> Director of Planning and Policy Research/Vice President for Applied Research



Institute staff an invaluable opportunity to network with other EWN practitioners and discuss informally some of their EWN program-funded work.

*N-EWN Partner Symposium St Augustine, FL, May 22-23, 2024*

The [N-EWN Partner Symposium](#) hosted the wide array of partners to discuss NBS projects and partnerships. The goal for this symposium was to provide partners with an opportunity to learn about the innovative work of each organization, create stronger connections between partners, and facilitate collaboration on new projects. This event was by invitation only.

As noted, Ms. Cowan served on the planning committee. Dr. Dalyander attended and presented on a state-funded project in Louisiana with strong synergy to EWN priorities and alignment to the session topic of hydrodynamics and sediment transport (presentation in Appendix B). Dr. Dalyander engaged with other session and conference participations to raise awareness and elicit input on the then-ongoing Task 3 work, as well as to identify synergies between EWN-funded activities and ongoing efforts across Florida, Louisiana, and the other Gulf of Mexico states.

*WEDA Dredging Summit & Expo, Tampa, FL, June 24-27, 2024.*

At the invitation of Dr. King, Dr. Dalyander prepared to participate in this Summit as a speaker in the panel session titled “*Piloting and Evaluating Engineering with Nature and Beneficial Use Dredged Material at Military Installations and Other Sites in the Southeast*” (presentation in Appendix C) as well as the [Nature-based Solutions Engineering and Construction short course](#) (presentation in Appendix D). Unfortunately, Dr. Dalyander was not able to participate due to illness; however, the presentations she prepared are provided in this report.



## CONCLUSION: OPPORTUNITIES FOR FUTURE ENGAGEMENT

Funding to support the Institute’s engagement with the broader EWN community proved to be invaluable not only for the completion of the research tasks, but also for making connections with other researchers and experts in the field.

For Task 3: *Accelerating Integration of Nature-based Solutions (NBS) into USACE Civil Works Flood Risk Management Mission*, the Institute coordinated with EWN to develop a strategic framework that overcomes the challenges and expands opportunities to advance the mission of the EWN program. This framework is designed to advance a goal of promoting widespread integration of NBS with nonstructural and structural measures to reduce flood risk, maintain navigable waterways, and deliver a broad array of ecosystem services to local communities. The framework is comprised of four overarching objectives along with associated enablers which are activities that can be undertaken by USACE personnel alone or in coordination with partner organizations to advance that objective in practice (Figure 1).

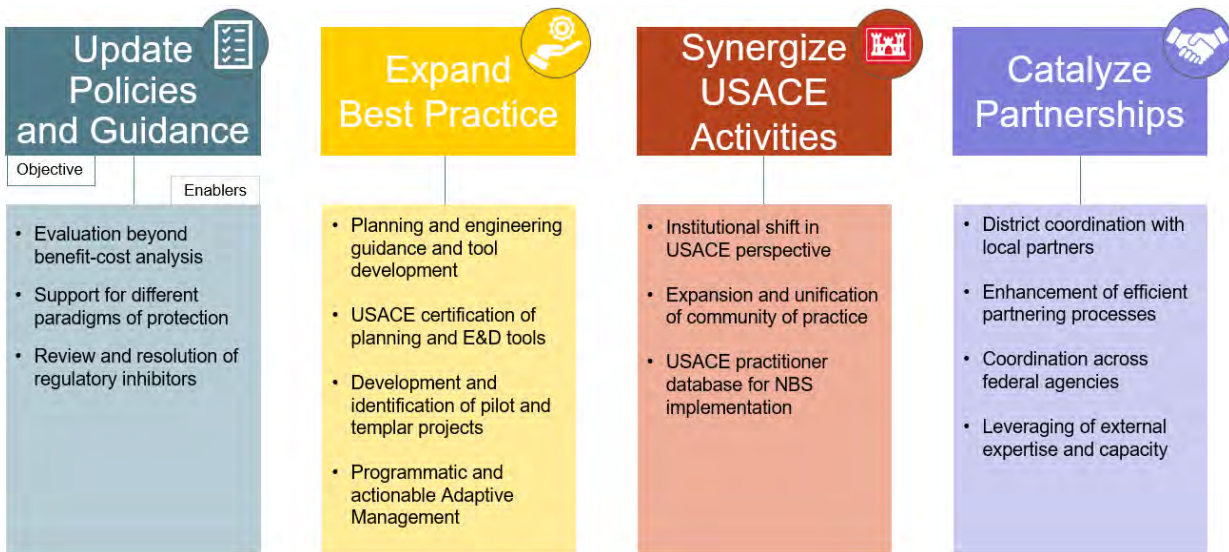


Figure 1. Objectives and enablers that comprise a strategic framework for accelerating implementation of NBS within USACE Civil Works projects. Note: E&D = engineering and design.

This framework is reiterated in this report to highlight some tangible opportunities for USACE to continue to advance opportunities to incorporate EWN features into USACE work through continued collaboration and communication. The objectives “Expand Best Practice” and “Catalyze Partnerships” and their associated enablers could continue to be built upon by continuing to encourage the expansion of both the activities and membership in the N-EWN. Finding ways to encourage more participation in the N-EWN by USACE District staff and others up the chain of command may also contribute to meeting the other two objectives “Update Policies and Guidance” and “Synergize USACE Activities” by increasing awareness of tools and lessons learned that could be used in the development of future feasibility studies.

The Institute is grateful to the EWN program for providing these funds and for facilitating these connections and stands ready to continue its support of the EWN program in any way possible.

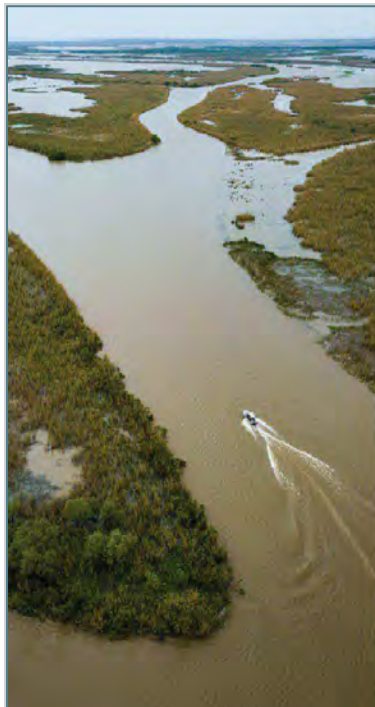


## APPENDICES

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# APPENDIX A. HEMMERLING POLICY FORUM ON NATURE-BASED SOLUTIONS PRESENTATION



## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

Coastal Planning as a Matter of Social Justice

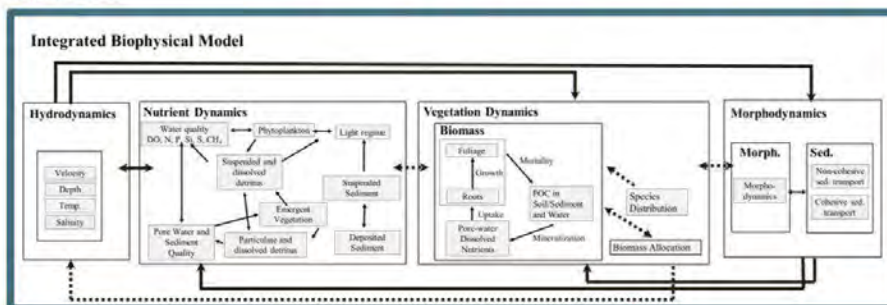
SCOTT A. HEMMERLING

February 8, 2024

## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

In traditional research, **technical science-based knowledge** - including devices such as predictive models, risk indicators, ecosystem services calculations, and benefit cost analyses - is often granted priority over **local experience-based knowledge**

Barra et al., 2020



Meslehe et al. 2015; Baustian et al. 2020

February 8, 2024



## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

- Many residents feel disenfranchised by what they perceive to be a repetitive and ambiguous public engagement process that often leaves them feeling **fatigued, frustrated, and ignored**.
- Despite efforts by agencies to engage with residents, many community groups find the process to be **exclusionary and undemocratic**.



(Gotham, 2016; Hemmerling, Barra, and Bond 2020)

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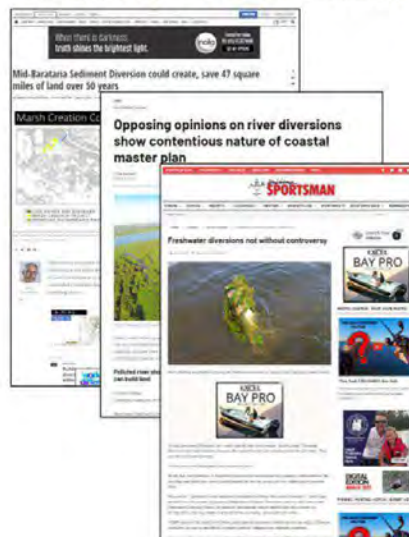


## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

When community members are not actively engaged in coastal research, **knowledge controversies** may result due to:

- A disconnect between local and traditional knowledge and the hydrological and hydraulic science that underpins much of coastal management.
- The inadequacy of policies and the knowledge claims on which they rely resulting from a failure to consult those who live in impacted areas

(Whatmore, 2009)



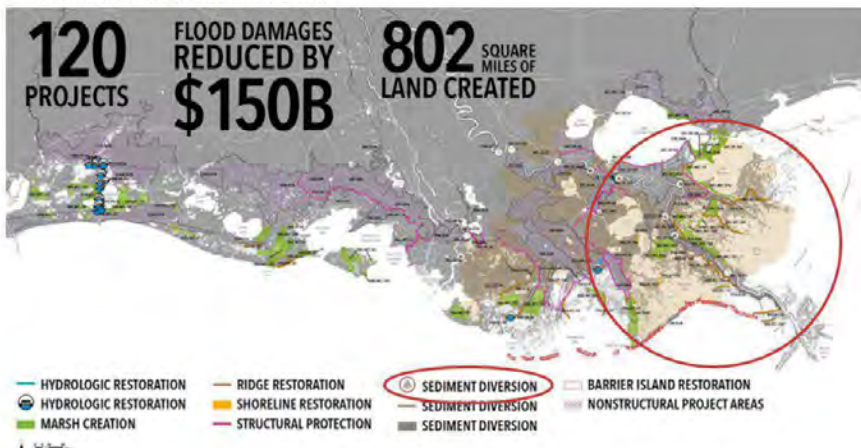
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## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

Louisiana Coastal Master Plan



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## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

- The goal of a sediment diversion is to **move large amounts of sediment from the river into the surrounding wetlands** by maximizing the volume of sediment transported by the least amount of water.
- The Mid-Breton diversion is estimated to **create 15,831 acres of land over 50 years**.



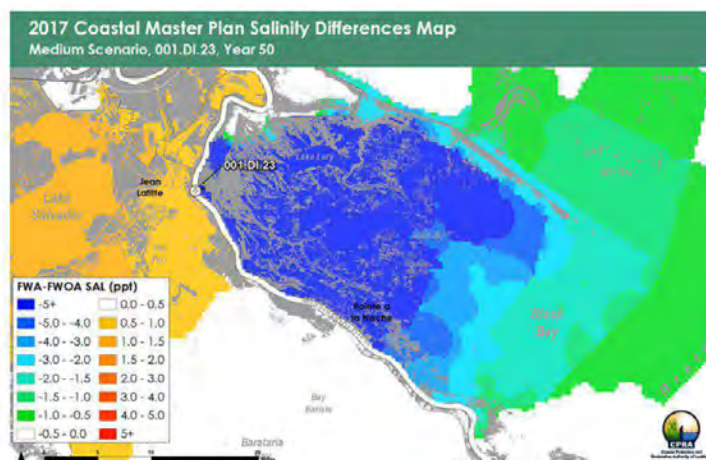
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## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA



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## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA



"I would think the only thing that would make them leave is if they can definitely not make a living shrimping, oystering, crabbing... Them being not able to make a living would be probably the only thing. Because we've seen people's houses be devastated and ... they still rebuilt."

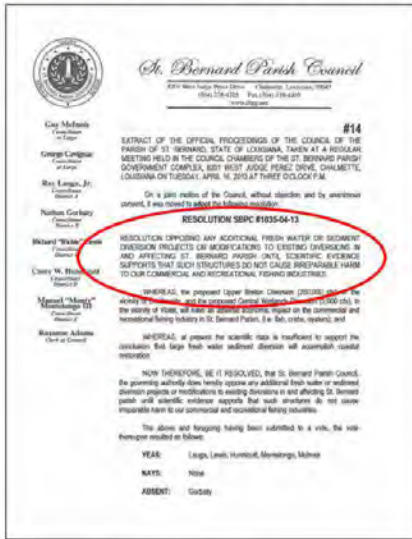
*Terrebonne Parish resident, July 2018*

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# ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

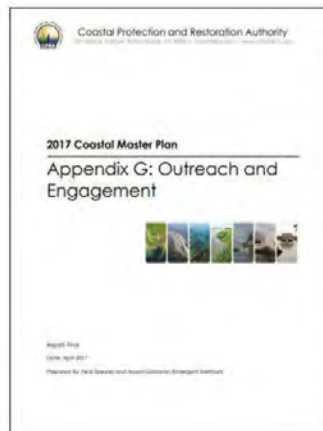


# ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

## Procedural Justice

The concept of procedural justice shifts the focus from the actual distribution of the costs and benefits of coastal restoration projects to the fairness of the process by which these costs and benefits are allocated and decisions are made

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## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

### More Meetings and Public Participation, More Justice?

- More outreach and engagement efforts aspire toward increased procedural justice and accountability to diverse coastal population.
- However, merely increasing levels of procedural justice does not necessarily result in increased social justice.

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## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

For coastal protection and restoration to proceed in a socially just manner, the coastal planning process will need to strike an effective **balance** between **science-driven processes** and **meaningful engagement with residents and stakeholder groups** who are especially vulnerable to risk and most likely to be affected by policy actions.



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## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

### Incorporating Local and Traditional Knowledge

In the fall of 2019, The Water Institute convened an **Environmental Competency Group** to co-design a protection and restoration project that would maximize community resilience using **20 million cubic yards of sediment suitable for wetland creation** expected to be dredged from Bayou Lafourche near Port Fourchon, Louisiana.



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## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

### Incorporating Local and Traditional Knowledge

- **Environmental Competency Group members include:**
  - Greater Lafourche Port Commission & tenants
  - Nearby residents
  - Commercial and charter fishermen
  - Camp owners
  - Louisiana Dept of Wildlife and Fisheries
  - Louisiana Sea Grant
  - Geologists, Ecologists, and Modelers
- **Social science methodology:**
  - **Local Knowledge Mapping:** incorporating community knowledge into model inputs
  - **Participatory Modeling:** designing restoration projects for community priorities
  - **Social Return on Investment:** understanding the social values of projects
- **Meeting 1:** introductions

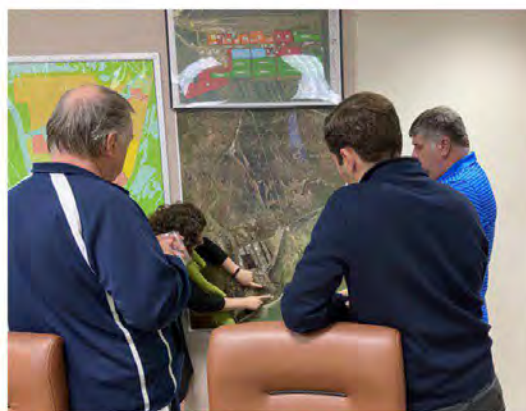


Photo from ECG Meeting 1 (February 2020)

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## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

### Incorporating Local and Traditional Knowledge

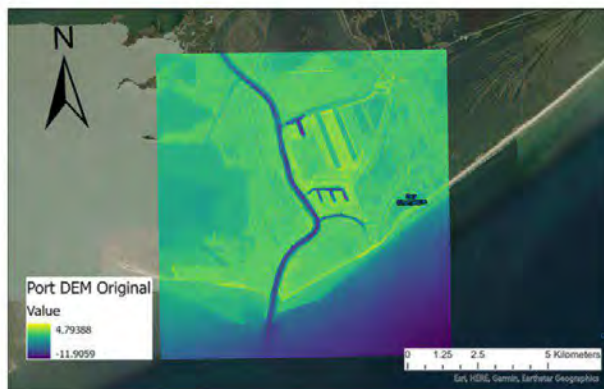
#### REVIEW AND UPDATE MODELS AND INPUT DATA UPDATING THE MODEL INPUTS WITH LOCAL KNOWLEDGE

##### Presented on basics of models

- What is a model?
- What is a model grid?
- What is model uncertainty?

##### Update model inputs data using local knowledge.

- Elevation
- Wetland Vegetation
- Hurricane Gustav (modeled) wave heights and surge heights



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## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

### Incorporating Local and Traditional Knowledge

#### IDENTIFY PLACES OF VALUE AND SOURCES OF THREAT CO-DEVELOPING PROTECTION AND RESTORATION PROJECTS

- Project mapping through a map-based survey platform
- Participants marked places of **value**, sources of **threat**, and **project ideas** on the map
- This input directly influences the projects that are chosen for modeling



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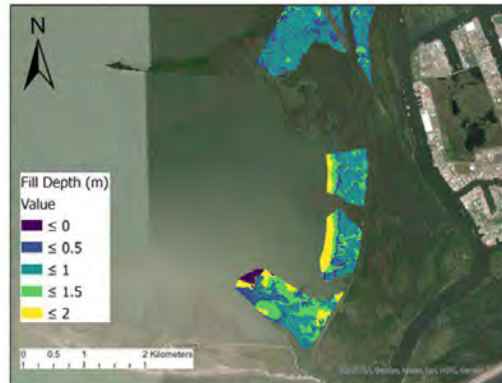


# ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

## Incorporating Local and Traditional Knowledge

### CHOOSING PROJECTS TO MODEL UPDATING PROJECT FOOTPRINTS AND ESTABLISHING ATTRIBUTES

- Drafted based on the places of value, sources of threat, and project ideas from the meetings
- Screened using elevation data to calculate the required fill volume
- Create scenarios from sets of projects that are within the anticipated sediment volume



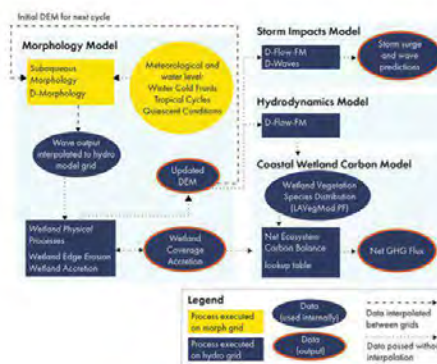
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# ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

## Incorporating Local and Traditional Knowledge

### ASSESSING THE BIOPHYSICAL OUTCOMES OF EACH PROJECT MODEL DEVELOPMENT & CALIBRATION

- Develop modeling framework
- Model testing and calibration
- Run model alternatives for 30 years (to year 2050)
  - Assess carbon pools of protected and created wetlands
  - Assess other co-benefits
    - Community resilience



February 8, 2024



# ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

## Incorporating Local and Traditional Knowledge

### ASSESSING THE SOCIAL VALUE OF EACH PROJECT INTERVIEWING RESIDENTS TO GAIN A DEEPER UNDERSTANDING OF OUTCOMES

- **Recreational value:** for example, hunting, fishing, paddling, birding
- **Cultural value:** pertaining to local culture and history
- **Education and research value:** for the general public, K-12, and university researchers
- **Ecological value:** specifically, in terms of habitat restoration



February 8, 2024



# ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

## Incorporating Local and Traditional Knowledge

### ASSESSING THE SOCIAL VALUE OF EACH PROJECT INTERVIEWING RESIDENTS TO GAIN A DEEPER UNDERSTANDING OF OUTCOMES

- In order to understand the social value of these projects, we need to gain a deeper understanding of potential value of projects, both **positive** and **negative**

East of Port Fourchon (Broad Wetlands)

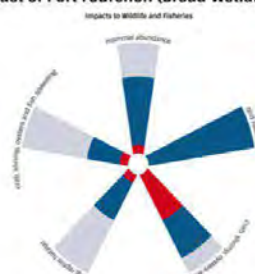


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East of Port Fourchon (Broad Wetlands)



East of Port Fourchon (Broad Wetlands)





# ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

## Incorporating Local and Traditional Knowledge

**ASSESSING THE SOCIAL VALUE OF EACH PROJECT**  
**INTERVIEWING RESIDENTS TO GAIN A DEEPER UNDERSTANDING OF OUTCOMES**



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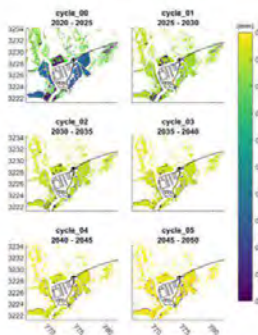


# ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

## Incorporating Local and Traditional Knowledge

**ASSESSING THE SOCIAL VALUE OF EACH PROJECT**  
**INTERVIEWING RESIDENTS TO GAIN A DEEPER UNDERSTANDING OF OUTCOMES**

Landscape Modeling + Social Return on Investment → **Final Project Selection**



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## ACTIVE COMMUNITY ENGAGEMENT IN PROTECTION AND RESTORATION PLANNING IN COASTAL LOUISIANA

### CONCLUSIONS

- **Integrate local knowledge with technical knowledge** to better understand the linkages of environmental change, social vulnerability, and community resilience
- Ensuring that **key stakeholders are identified and consulted early and often in the planning process** will build trust and allow decision-makers to identify the most effective and socially just courses of action
- Community engagement is **integral to defining both the specific objectives and variables needed to assess project impacts.**



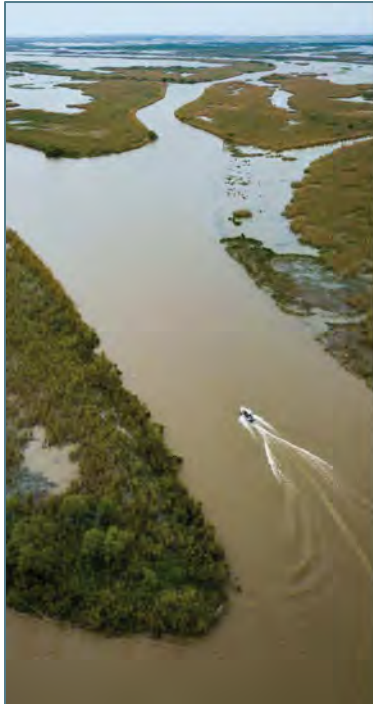
February 8, 2024

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# APPENDIX B. DALYANDER N-EWN SYMPOSIUM PRESENTATION



## BARRIER ISLAND SYSTEM MANAGEMENT (BISM)

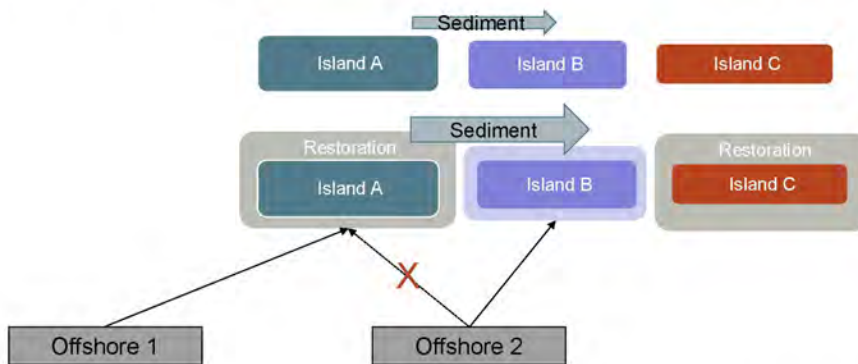
Regional Modeling to Support Nature-Based Solutions

*P. Soupy Dalyander, Travis Swanson, Diana Di Leonardo, Nastaran Tebyanian, Patrick Kane, Michelle Felterman, Matthew Vincent, Syed Khalil, Darin Lee, Maricel Beltran Burgos, Mike Miner*

May 23, 2024

Project supported by the Louisiana Trustee Implementation Group

## COASTAL MANAGEMENT USE CASE: BEST USE OF AVAILABLE SEDIMENT



*How can available sediment be best used to maintain the coastal system?*

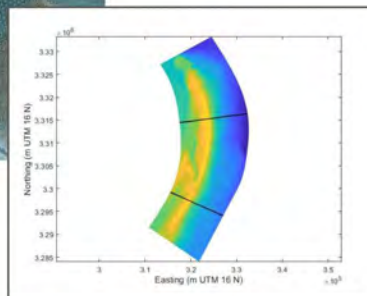




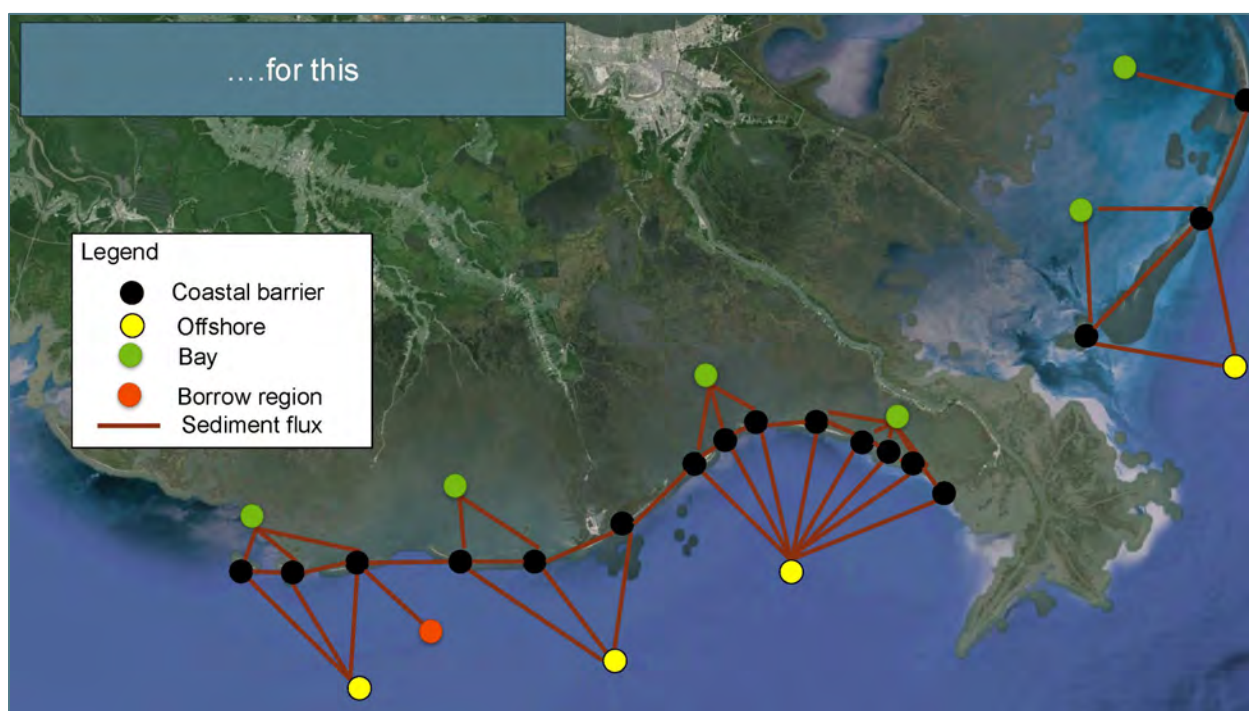
## DECISION-SUPPORT FRAMEWORK DESIGN

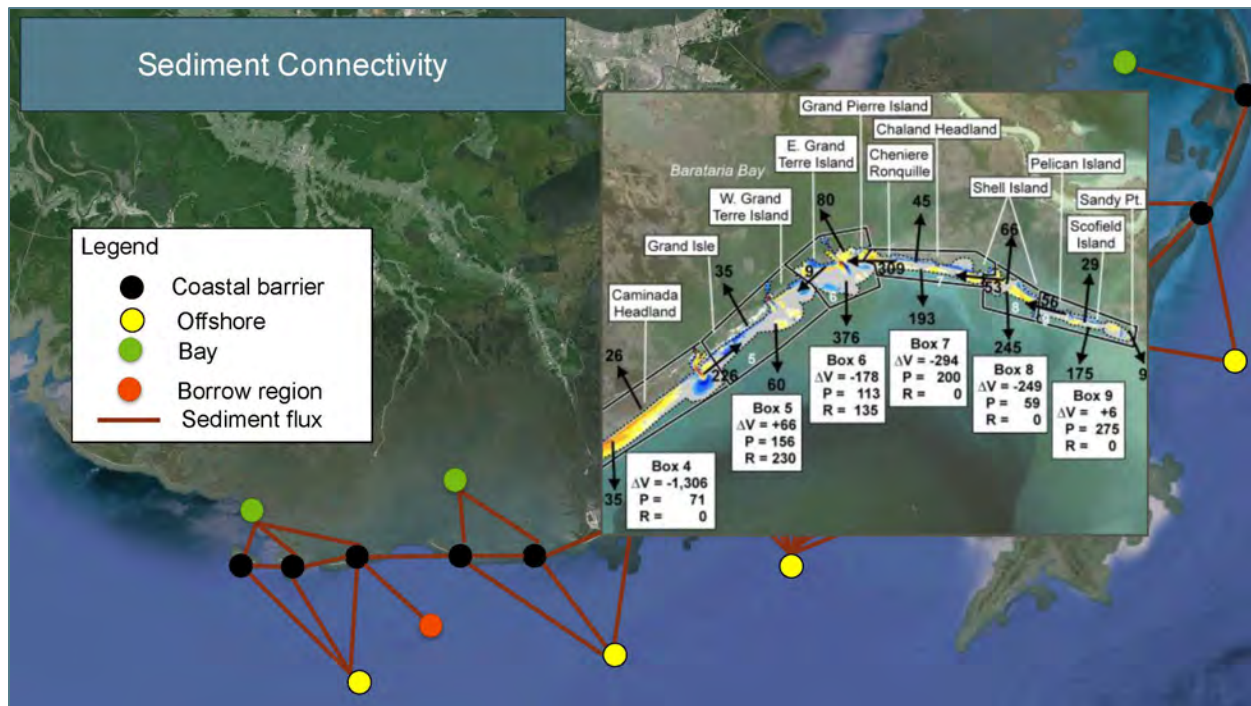


Set aside this...

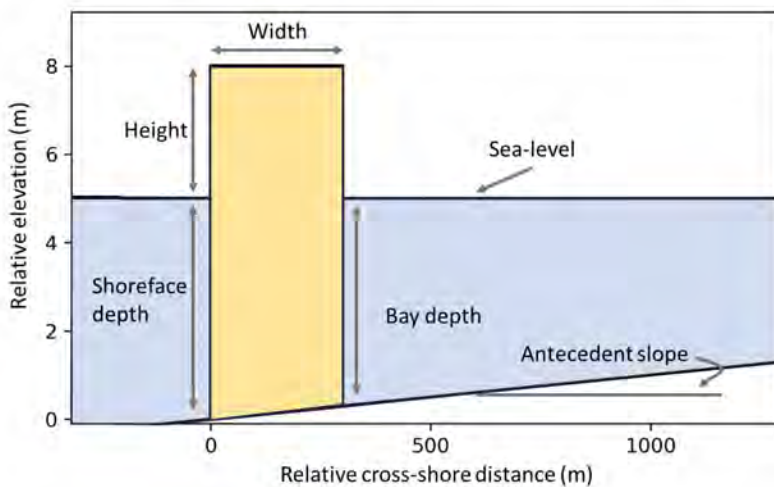


3





## Reduced complexity barrier model



### Processes:

- Overwash
- Sea-level rise
- Shoreface transport
- Restoration

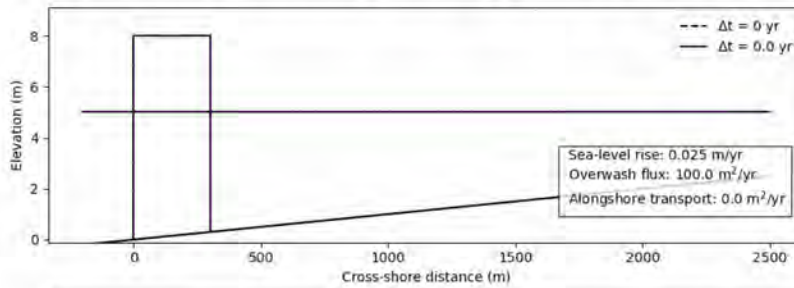
Barrier scales and process rates represent uncertainties during simulation

Simplified from : Lorenzo-Truetsch, J. and Ashton, A.D., 2014, Rollover, drowning, and discontinuous retreat: Distinct modes of barrier response to sea-level rise arising from a simple morphodynamic model. Journal of Geophysical Research: Earth Surface, v. 119, p. 779-801, doi:10.1002/2013JF002941

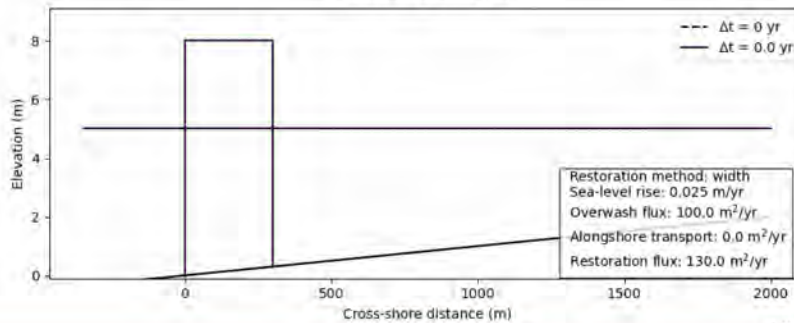




## Demo: barrier motion during sea-level rise:



**Ex: unrestored scenario**  
Fast sea-level rise  
High overwash



**Ex: restored scenario**  
Fast sea-level rise  
High overwash rate  
*Higher restoration*

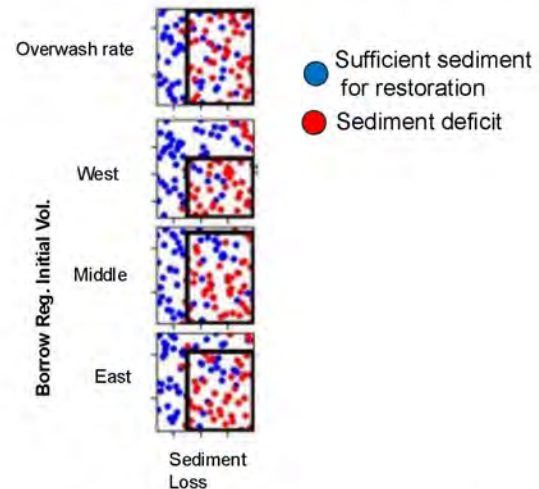
exaggeration 7



## MODELING MANAGEMENT: VULNERABILITY ANALYSIS

- **Management modeled via 1000s of restoration scenarios**
  - What borrow areas to use
  - When and where to restore
- **Uncertainties modeled explicitly**
  - Overwash rate (storminess)
  - Sea level rise
  - Borrow areas available sediment volume

In what scenarios does the management policy lead to sediment deficit?



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## BONUS PERSPECTIVE

- **Institute Project with USACE EWN Program:** Accelerating Integration of Natural and Nature-Based Features (NNBF) into USACE Civil Works Projects
  - Identified **Challenges & Opportunities** to Nature-Based Solutions
  - Developed **Strategic Framework** for Acceleration
- Results relevant to **hydro, wave, sed transport modeling**. NNBF can support “multiple lines of defense”, mitigation of high frequency flooding, sacrificial features, but need:
  - Information quantifying performance, risk
  - Tools compatible with USACE workflows (certified planning tools, approved E&D models, executable in study timelines)
  - Pilot and templar projects





# APPENDIX C. DALYANDER WEDA CONFERENCE PANEL PRESENTATION



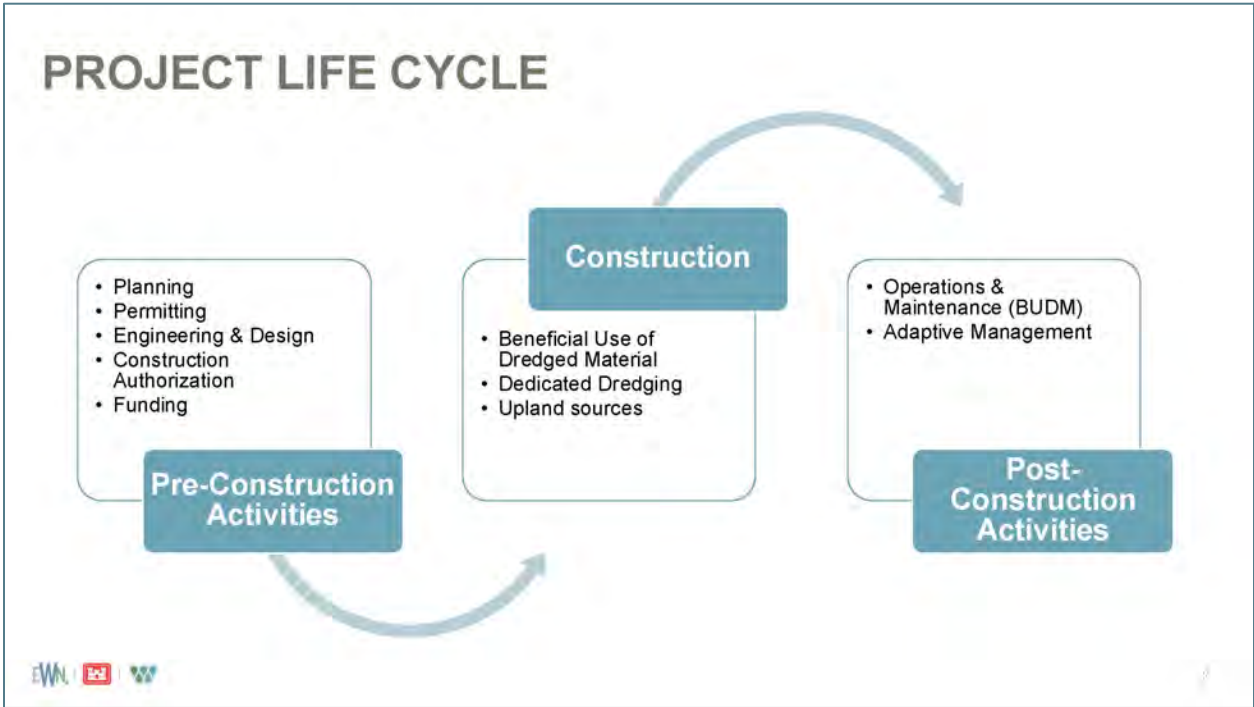
## NATURE BASED SOLUTIONS IN AN EVOLVING POLICY LANDSCAPE

*Project Planning and Implications for Sediment Placement*

**P. Soupy Dalyander**  
The Water Institute

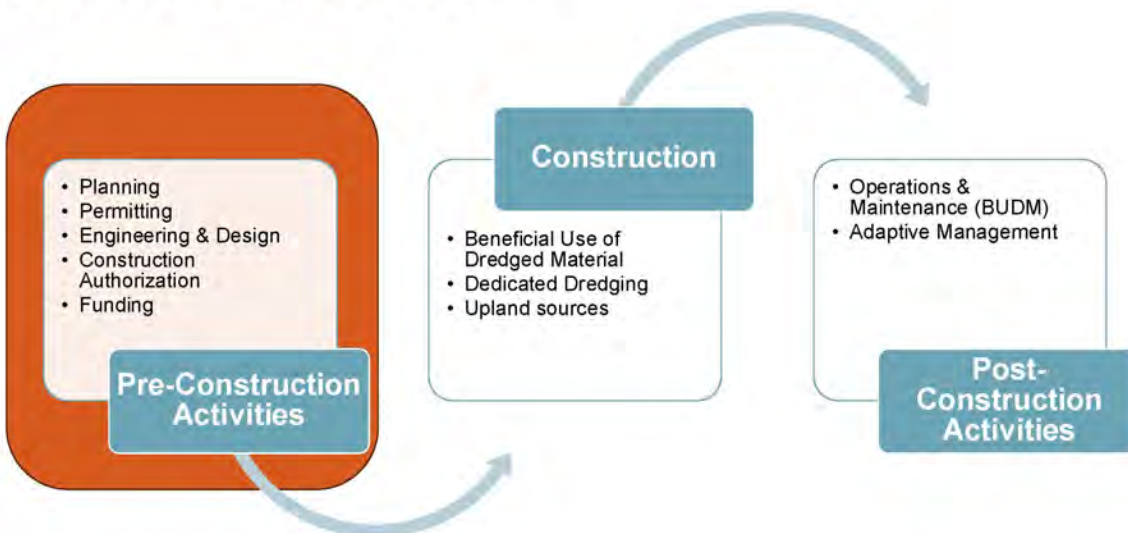
June 2024







## PROJECT LIFE CYCLE



## PROJECT LIFE CYCLE



- Planning
- Permitting
- Engineering & Design
- Construction Authorization
- Funding

**Pre-Construction Activities**

**Why does the evolving policy landscape matter to the dredging community?**

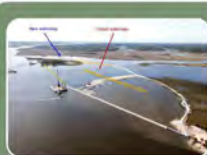
- Pace and process of **alternative selection** and **permitting**
- Number of **nature-based solutions**







## OVERVIEW: USACE PROJECT PLANNING



### Feasibility Studies

- Congressional authorized for specific purpose(s)
- Align to USACE Mission Areas (Navigation, Flood Risk Management, Coastal Storm Risk Reduction, Ecosystem Restoration)
- Alternative evaluation leads to recommended plan



### Continuing Authorities Program

- Standing authorities granted by Congress (e.g., Beneficial Use of Dredged Material)
- Prescribed cost limits and allocation of cost with local sponsor



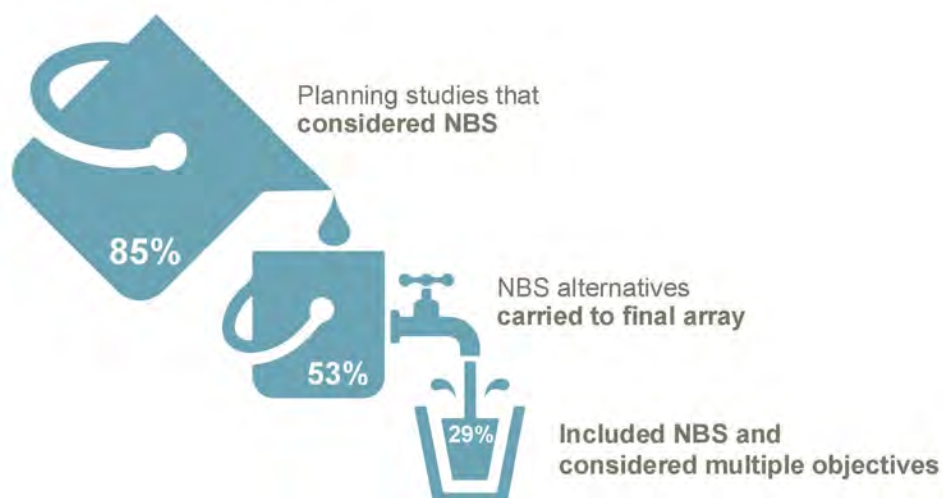
### Comprehensive and Basinwide Studies

- Congressional authorized with broader scope than Feasibility Studies
- May lead to recommendations for additional feasibility studies or actions outside of USACE authorities



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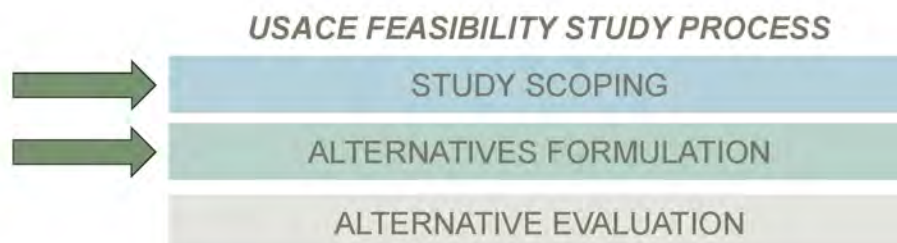
## STATUS QUO: NATURE BASED SOLUTIONS (NBS) IN FEASIBILITY STUDIES



6



## WHY HAVE FEASIBILITY STUDIES NOT LED TO MORE NATURE-BASED SOLUTIONS?



## ALTERNATIVE EVALUATION

### Ecosystem Restoration

- Based on incremental benefit analysis
- Recommend “Best Buy” plan: most benefit for the associated cost

### Coastal Storm Risk Reduction Flood Risk Management Navigation

- Based on Benefit Cost Analysis: ratio of benefits (\$\$) to costs (\$\$)
- Recommend plan with highest benefit cost ratio



# ALTERNATIVE EVALUATION



Infrastructure with Easy to Monetize Value

Small Footprint  
Relatively Low Real Estate Cost



# ALTERNATIVE EVALUATION





# WHY HAVE FEASIBILITY STUDIES NOT LED TO MORE NATURE-BASED SOLUTIONS?

## USACE FEASIBILITY STUDY PROCESS



# HOW IS THE POLICY LANDSCAPE EVOLVING?

## POLICY FLOWCHART BCA EVALUATION



BCA: Benefit Cost Analysis  
 NED: National Economic Development



Status Quo Established





# HOW IS THE POLICY LANDSCAPE EVOLVING?

## POLICY FLOWCHART BCA EVALUATION



February, 2024: Corps of Engineers Agency Specific Procedures to Implement the Principles, Requirements, and Guidelines for Federal Investments in Water Resources  
Released for Public Review



ALTERNATIVES FORMULATION



DRAFT ASP

## EXPLICIT DIRECTION TO FORMULATE NATURE-BASED SOLUTIONS

Develop alternatives that first **improve environmental conditions**, then avoid **adverse effects**

Final array to include a **fully nature-based** and an **environmentally preferred alternative**





## BROADLY REDEFINES ALTERNATIVE EVALUATION PROCESS

**Economic, environmental, and social benefits** should all be considered

Outcomes can be characterized and traded off **whether they can be monetized or not**

Recommend plan that **maximizes net public benefits**



## EXTERNAL ENGAGEMENT AND PERMITTING

Integration of **NEPA and the updated planning process** as much as possible

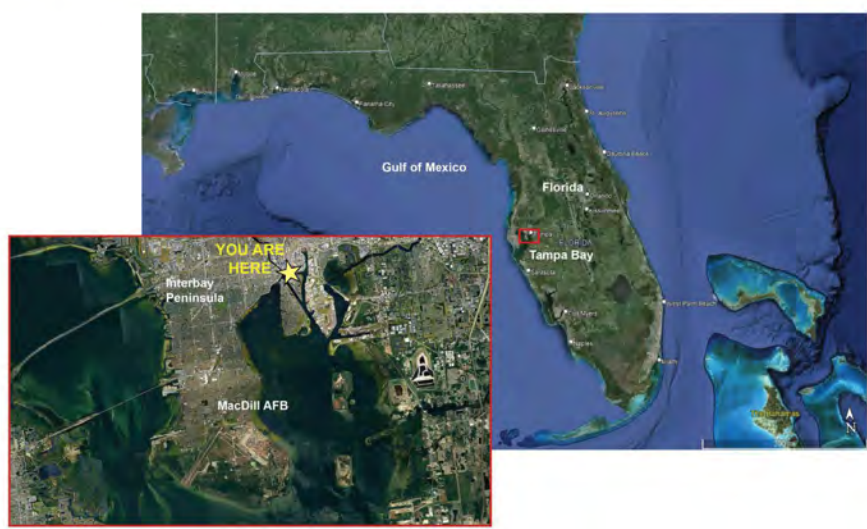
**Early and frequent engagement** of other state and Federal agencies





EXAMPLE IN PRACTICE

## MACDILL AIR FORCE BASE



EXAMPLE IN PRACTICE

## TAMPA BAY FEDERAL NAVIGATION CHANNEL



Image from USACE Jacksonville District





EXAMPLE IN PRACTICE

## NATURE BASED SOLUTIONS AT MACDILL AFB



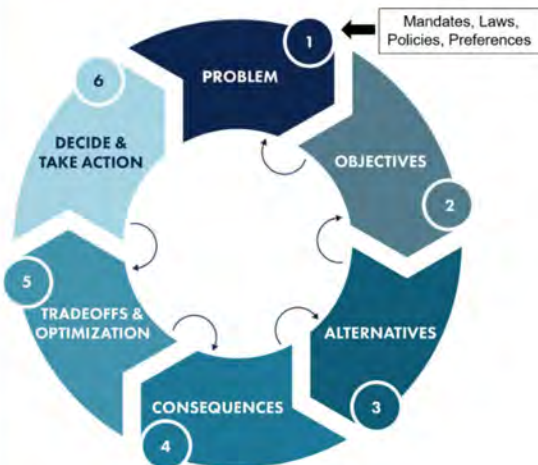
- Infill on the shallow shelf
- Restore longshore bar system
- Construction of barrier islands



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EXAMPLE IN PRACTICE

## INTEGRATED, OUTCOME-FOCUSED PLANNING



- Use of **Structured Decision-Making (SDM)**
- Allows **multi-objective tradeoff analysis**, including monetized and non-monetized outcomes
- Kickoff: workshop with **regulatory agencies** in Summer 2024



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# PROJECT LIFE CYCLE



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# APPENDIX D. DALYANDER WEDA CONFERENCE SHORT COURSE PRESENTATION






Engineering With Nature



US Army Corps of Engineers



THE WATER INSTITUTE

## ACCELERATING INTEGRATION OF NBS INTO USACE CIVIL WORKS PROJECTS

*Advances in Nature-Based Solution Valuation*

P. Soupy Dalyander  
The Water Institute

June 2024

## USACE BENEFITS ANALYSIS HAS EVOLVED OVER TIME

### POLICY FLOWCHART BCA EVALUATION

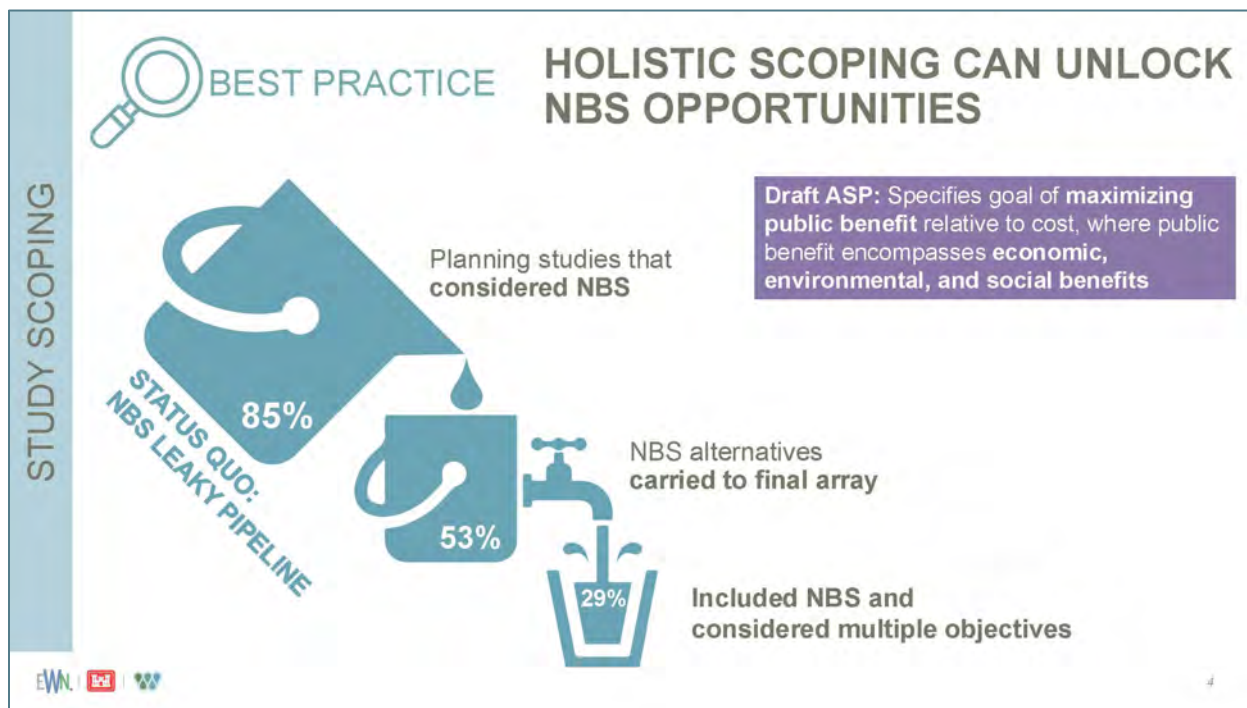
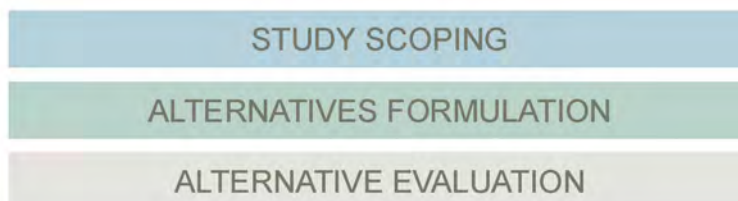


February, 2024: *Corps of Engineers Agency Specific Procedures to Implement the Principles, Requirements, and Guidelines for Federal Investments in Water Resources*  
Released for Public Review





## FINDINGS FROM CROSS-CUTTING ANALYSIS AND BEST PRACTICES CONSISTENT WITH DRAFT ASP





### BEST PRACTICE

## FORMULATE ALTERNATIVES TO MEET MULTIPLE OBJECTIVES



Confluence Park, Denver, CO



### DRAFT ASP

## BROAD CONSIDERATION OF ENVIRONMENTAL OUTCOMES

Develop alternatives that **improve environmental conditions**, then avoid **adverse effects**.

Final array should include (1) no action, (2) fully non-structural, (3) **fully nature-based**, (4) **environmentally preferred**, (5) maximize net public benefits, and (6) locally preferred alternatives





## STATUS QUO

### EVALUATION BASED ON BENEFIT-COST ANALYSIS

---

Monetization of **benefits** including ecosystem services

---

Benefits that could not be effectively monetized were **devalued or excluded**



## BEST PRACTICE

### MONETIZING ECOSYSTEM SERVICE BENEFITS IMPROVES BCA ANALYSIS...

---

Inclusion of **additional benefits** may increase the benefit-cost ratio

---

Improvements in BCA ratio generally not enough to **change alternative rankings**





 **BEST PRACTICE**

**...WITH MULTI-OBJECTIVE ANALYSIS NECESSARY TO CAPTURE ALL BENEFITS**

---

**Benefits exist** that cannot be fully captured by monetary value

---

**Including non-monetary metrics** provides more complete evaluation

---

**More fully addressing multiple objectives** is likely to change rankings and elevate NBS options



 **DRAFT ASP**

**BROADLY REDEFINES ALTERNATIVE EVALUATION PROCESS**

---

Economic, environmental, and social benefits should all be considered **without prescribed hierarchy by PR&G**

---

Outcomes characterized through (1) **monetization**, (2) **quantification**, (3) **qualification (description)**

---

Use of **multi-objective analysis** for considering tradeoffs





## BROADLY REDEFINES ALTERNATIVE EVALUATION PROCESS

Prescribes using **best available tools, methods** for evaluating ecosystem resilience and outcomes

Requires **upstream and downstream impacts** across existing and potential future uses to be considered



## MONETARY AND NON-MONETARY METHODS ARE AVAILABLE TO EXTEND EVALUATION OF ECOSYSTEM SERVICES

### *Multi-Objective Decision Support Approaches*

Evaluate with multiple criteria using valuation, other quantitative, and non-quantitative metrics

### *Non-Market Valuation Methods for Ecosystem Goods and Services*

Worth (how much people would be willing to pay) is not revealed in market prices





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ECOSYSTEM SERVICE VALUATION



## CASE STUDY JACKSONVILLE HARBOR, MILE POINT, FL



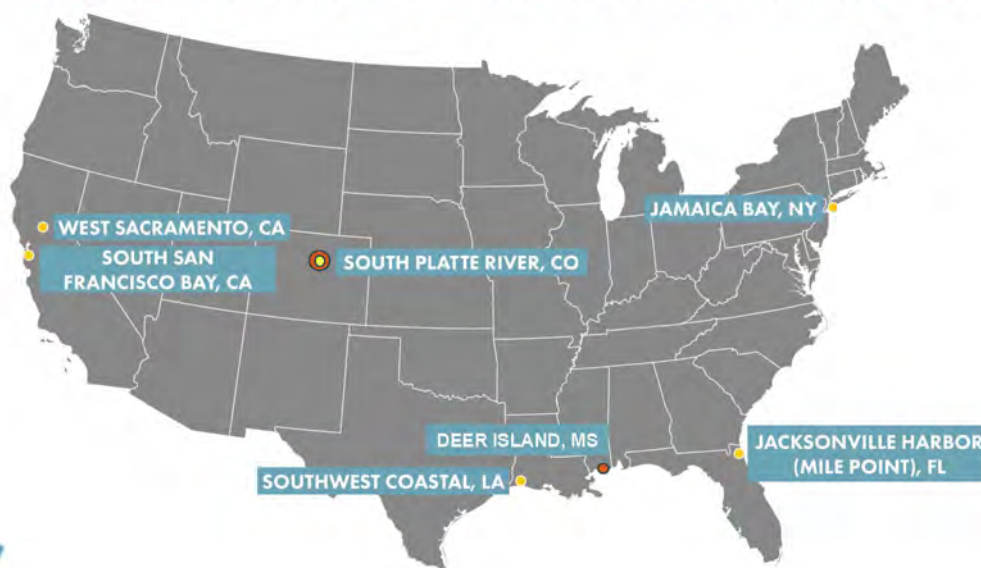
Mile Point Construction (Photo by Mark Bias)







## NBS EVALUATION: CASE STUDIES SELECTED BASED ON MISSION AREA, LOCAL INTEREST, AND AVAILABLE DATA





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