DATA-DRIVEN AND SCIENCE-BASED DECISION-MAKING: SCALING IMPACT

THE WATER INSTITUTE

Soupy Dalyander, PhD

The Water Institute

WHAT SETS US APART

Science-Informed Decision Making

We tackle hard problems

that matter most to people and ecosystems,

working alongside our partners,

grounded in interdisciplinary methods and scientific integrity,

leading to impactful outcomes,

and building transparency and trust in decisions.

Interdisciplinary, science-informed planning

Teams spanning policy, ecology, hydrology, engineering

Emphasis on transparency and collaboration

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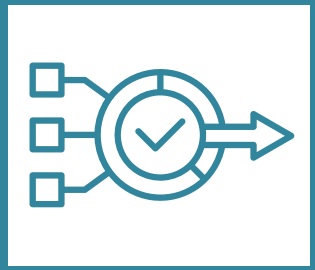
TODAY'S PRESENTATION

- Resilience Planning and Vulnerability Assessments
- Community Resilience: Beyond a Plan
- Hazards and Resource Management Support
- Deeper Dive: MacDill AFB

OUR APPROACH TO RESILIENCE PLANNING

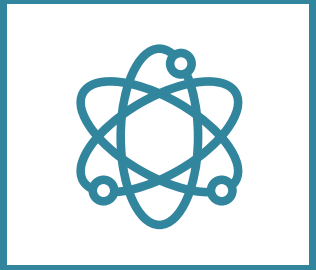
COLLABORATIVE

Incorporates wide range of perspectives



ACTIONABLE

Living documents that guides ongoing decisions and implementation



SCIENCE-GROUNDED

Guided by the best available science and data

AMBITIOUS

In process and outcomes

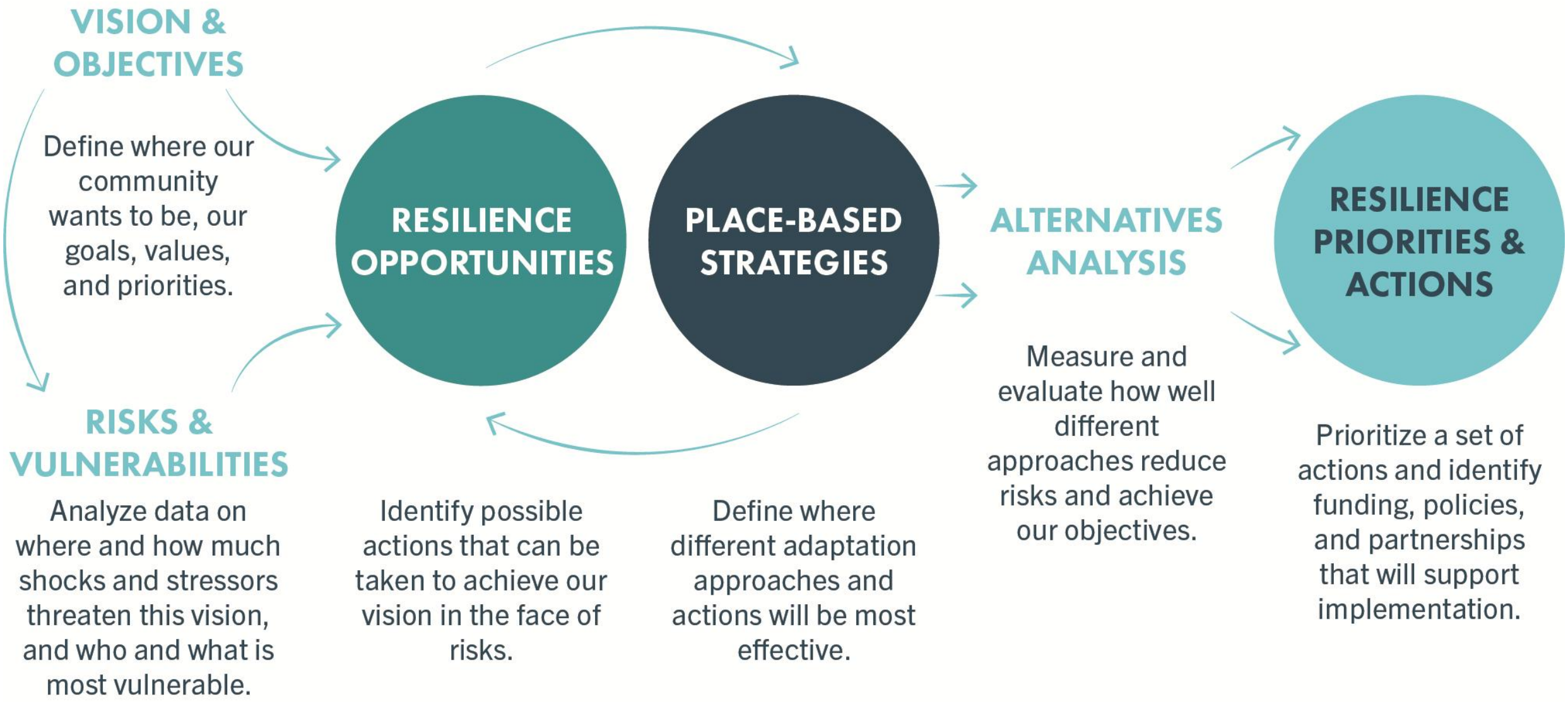
PRIORITIZED

Prioritizes communities and populations most vulnerable to flood impacts

TRANSPARENT

Objectives, priorities, and decisions are clear to all involved

PLANNING GROUNDED IN SCIENCE-BASED DECISION METHODS



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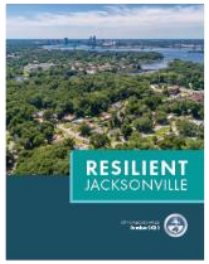
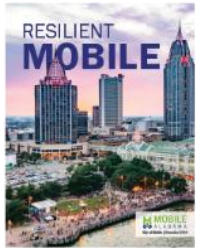
RESILIENCE PLANS: EXAMPLES

LEADERSHIP OF REGIONAL & NATIONAL RESILIENCE PLANS

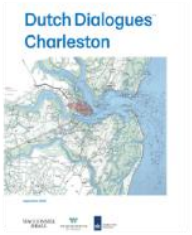


Resilient Jacksonville
APA National Award
The Water Institute, Prime
McHugh, Project Director



Resilience Mobile Assessment and Plan
The Water Institute, Prime
McHugh, Project

Resilient Houston
APA Texas Award
The Water Institute, Prime
McHugh, Project Manager



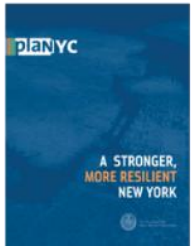
Charleston Dutch Dialogues™
The Water Institute, Prime

Louisiana Coastal Master Plan
The Water Institute, Prime

OnePGH: Pittsburgh's Resilience Strategy
Fischbach, Project Manager/Technical Lead

Resilient New Orleans
APA National Award
McHugh, One of the Primary Authors

Climate Ready Boston
APA National Award
Roberts, Project Manager/ Technical Lead



NYC Special Initiative for Rebuilding and Resiliency
Roberts, Technical Advisor

SF Embarcadero Seawall Resilience Program (CA)
Roberts, Project Manager/ Technical Lead

City Case Study: St. Petersburg

st.petersburg
www.stpete.org

- Vulnerability assessment began last fall
- Multi-hazard approach (e.g., flood, heat, sea level rise); aligning with and going beyond the Resilient Florida requirements
- Providing and communicating risk and vulnerability data in a way that can strategically inform an eventual citywide resilience plan

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SCAPE

TAYLOR ENGINEERING, INC.

Clearview
LAND DESIGN, P.L.

TBEP
TAMPA BAY ESTUARY PROGRAM

County Case Study: Walton County

- Advancing resilience through public-private partnerships
- Addressing economic, infrastructure, environmental, and flood resilience challenges and opportunities
- Providing recommendations for resilience activities in partnership with coordinating committee
- Vulnerability assessment ongoing; will help inform decisions around future resilience activities and investments

PRIDE • PRESERVATION • CONSERVATION
WALTON COUNTY, FLORIDA

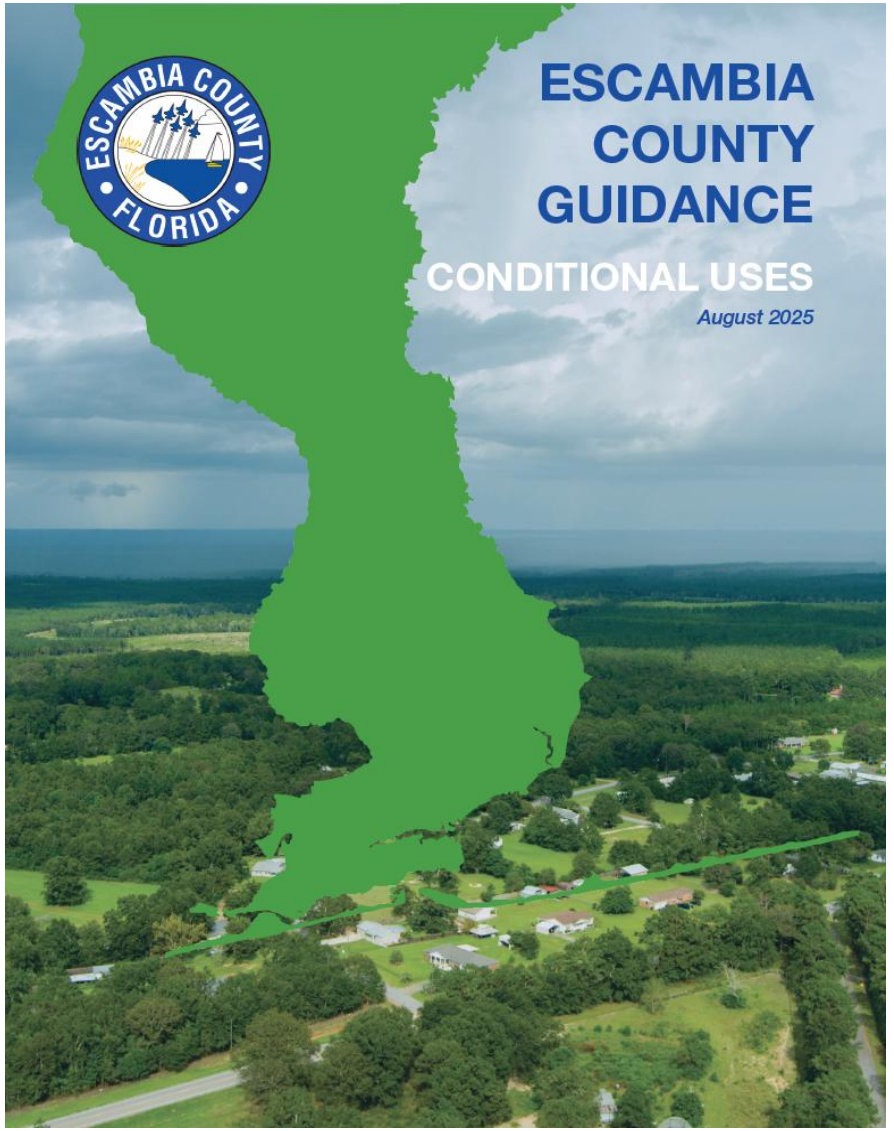
SEASIDE Institute™

TAYLOR ENGINEERING, INC.

THE WATER INSTITUTE

County Case Study: Escambia County

- Addresses incompatible, or "nuisance" uses adjacent to neighborhoods
- Grounded in community input to prioritize resident concerns
- Uses the Land Use Development Code to ensure land uses are compatible with healthy and thriving neighborhoods



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wsp

ESCAMBIA COUNTY FLORIDA

COMMUNITY RESILIENCE CENTER
AT THE WATER INSTITUTE

FOCUS AREAS

- Insurance Affordability and Availability
- Community-Led Migration Legal Frameworks and Approaches
- Equitable Flood Risk Planning and Policies
- Fundamentals for Equitable Climate Resilience

For more details on how we developed the focus areas, see the report from the November 2023 Center Workshop by scanning the QR code or visiting *thewaterinstitute.org/reports/gcecr-kick-off-workshop-report*

PROJECT SPOTLIGHT:

Resilience Support

Networks for Resilience

COMMUNITY RESILIENCE CATALYST

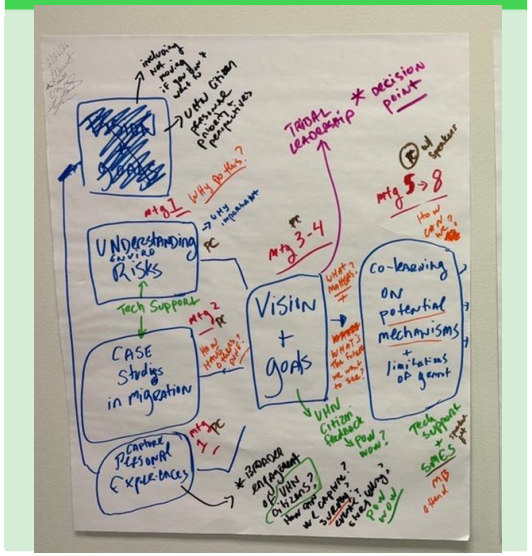
- **Education:** Work with often overlooked south Louisiana communities to enhance awareness of pathways for increasing community resilience.
- **Technical Support**: Provide capacity to communities in overcoming barriers to resilience planning and action

WEBSITE: HTTPS://THEWATERINSTITUTE.ORG/PROJECTS/CRC/CATALYST

BUDDY SYSTEM

One-on-One Support

Co-working



Trainings

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

COMMUNITY RESILIENCE CENTER
AT THE WATER INSTITUTE

UNITED HOUMA NATION

Actionable flood forecasts for emergency operations in complex environments

- Near real-time updates
- Localized flood hazard models
- Web dashboards for EOC & desktop

Coastal and Compound Flood Forecasts

MetGet

WIND AND PRESSURE FIELDS + RAINFALL →

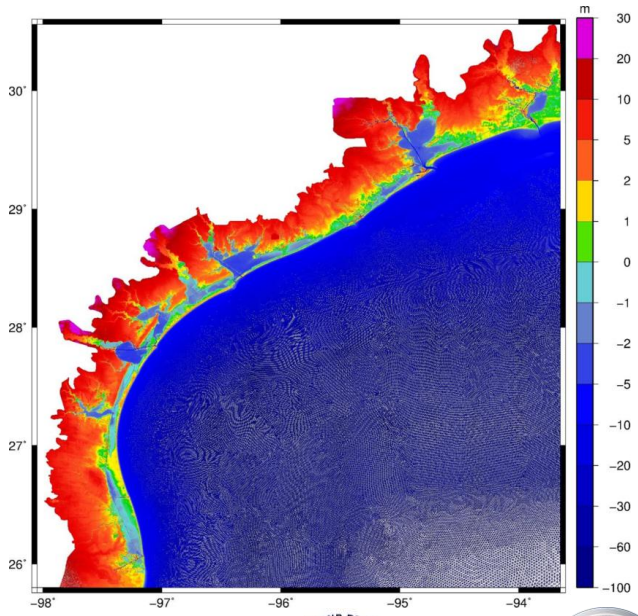
THE WATER INSTITUTE Floodwater

COASTAL WATER LEVELS → LOCALIZED FLOOD HAZARD PREDICTIONS

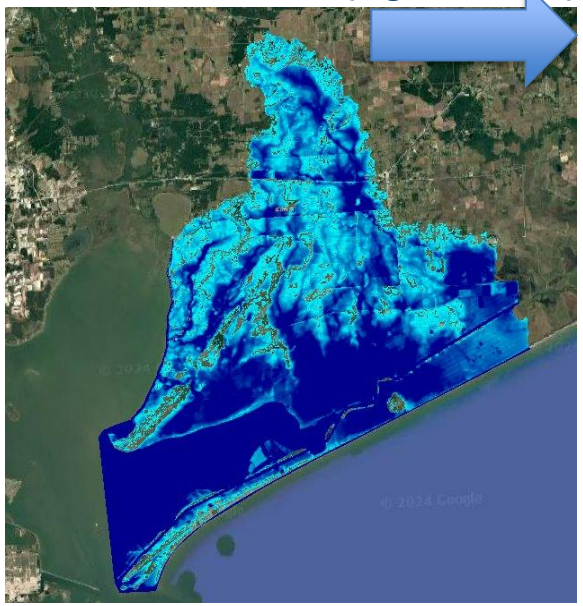
THE WATER INSTITUTE FloodID

FLOOD HAZARD VISUALIZATION + DECISION SUPPORT TOOLS

Coastal Model (e.g., ADCIRC)



Fluvial/Pluvial Model (e.g., HEC-RAS)



Roadway Critical Access Restriction Forecast

NOAA · CPRA · City of Jacksonville, Florida · GOHSEP · Louisiana Watershed Initiative · Coastal Resilience Center — A U.S. Department of Homeland Security Center of Excellence

MANAGING SAND AS A STRATEGIC RESOURCE

Sand is the currency of the landscape. No sand, no sediment, no land

Where is sediment, and is that where we want it?

- "All of the above" approach to finding sand through offshore dedicated dredging and beneficial use
- **Areas with "no sand" sometimes hide a lot!**

Who or what needs sediment?

- **Each town, state, stakeholder, ecosystem needs sediment for to survive and thrive**

What does sediment do for you, and can you use it?

- Resources previously thought "off-limits" can be shown to be viable with minimal impacts on other stakeholders or ecosystems
- **Not all sand/sediment is equal- regional assessments allow for most effective "match" of resources to need**

Maximizing future value of investments

- **Centering sand and sediment at the beginning of coastal planning enables more economically efficient and performant options**

MANAGING SAND AS A STRATEGIC RESOURCE

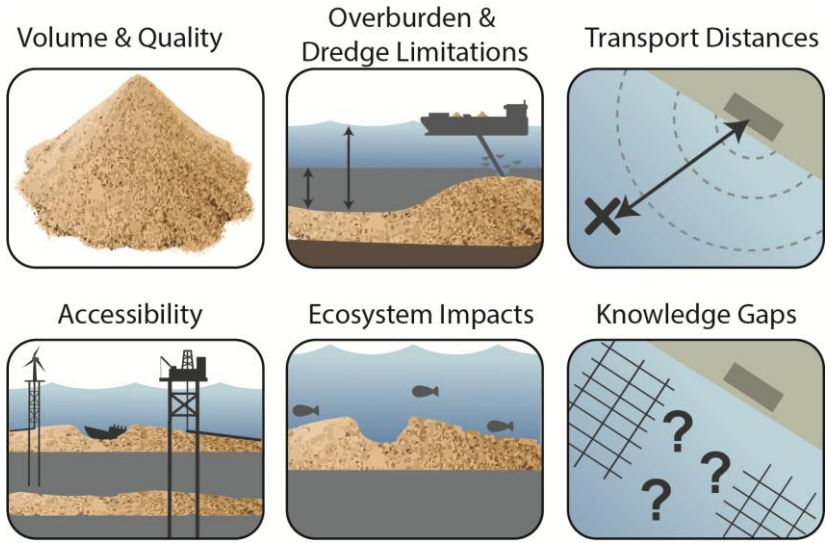
Where do I go to find usable, economically viable sediment for my region?

Is there enough sediment for my goals?

Louisiana Coastal Master Plan
Planned Restoration Projects

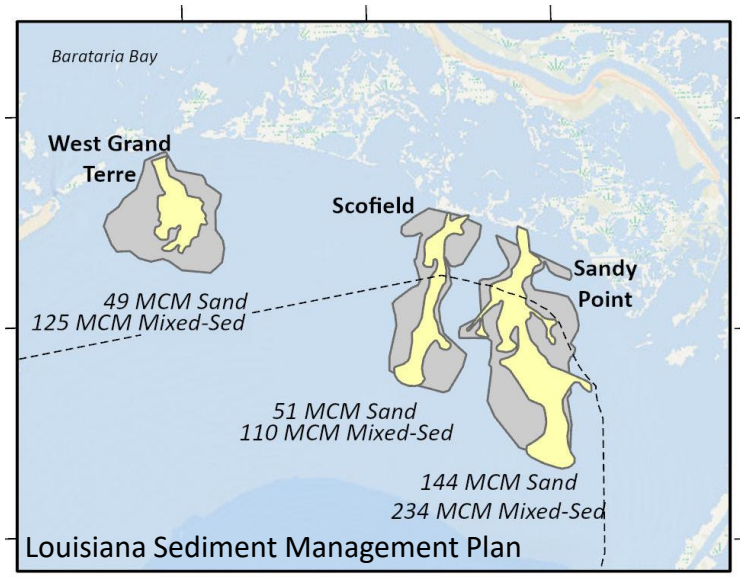
- Coastal protection, storm risk reduction, and ecosystem restoration **all require sediment**
- Planned project needs can easily outpace available sediment resources

How do I find sand and can I use it?



- **Regional scale coordination** supports consideration of potential sediment needs and efficient finding of suitable sediments beyond a single project
- Locate sediment that is **economically viable, environmentally accessible,** and supports regional stakeholder needs

Enabling long-term planning and success



- **Regional sediment inventories** provide actionable roadmaps for coastal planning, engineering design, and construction
- Support project design and coordination by having accurate inventories of how much sediment is located where

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COLLABORATIVE AND MULTI-OBJECTIVE APPROACH TO PRIORITIZING NATURE-BASED SOLUTIONS FOR MACDILL AIR FORCE BASE

U.S. Department of Defense

U.S. AIR FORCE

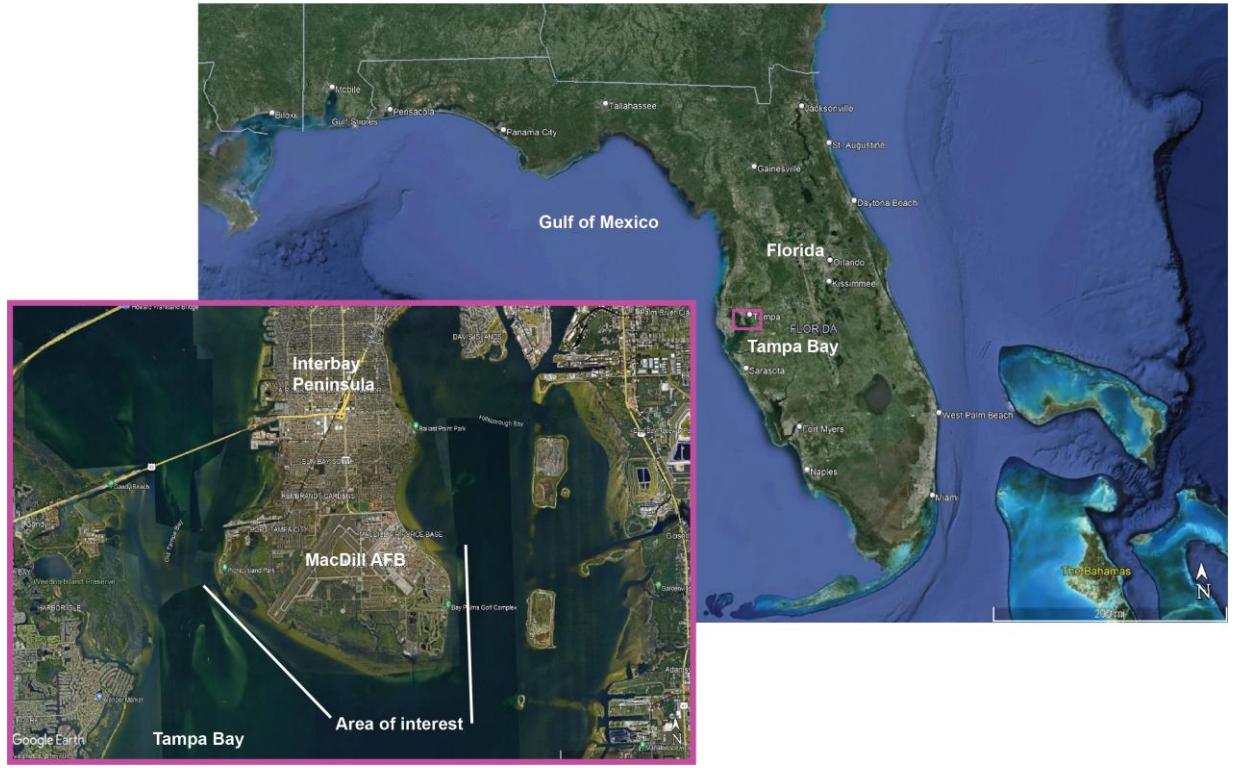
NATIONAL FISH AND WILDLIFE FOUNDATION NFWF

COASTAL ENGINEERING CONSULTANTS INC.

March 2026

MACDILL AIR FORCE BASE: INTRODUCTION

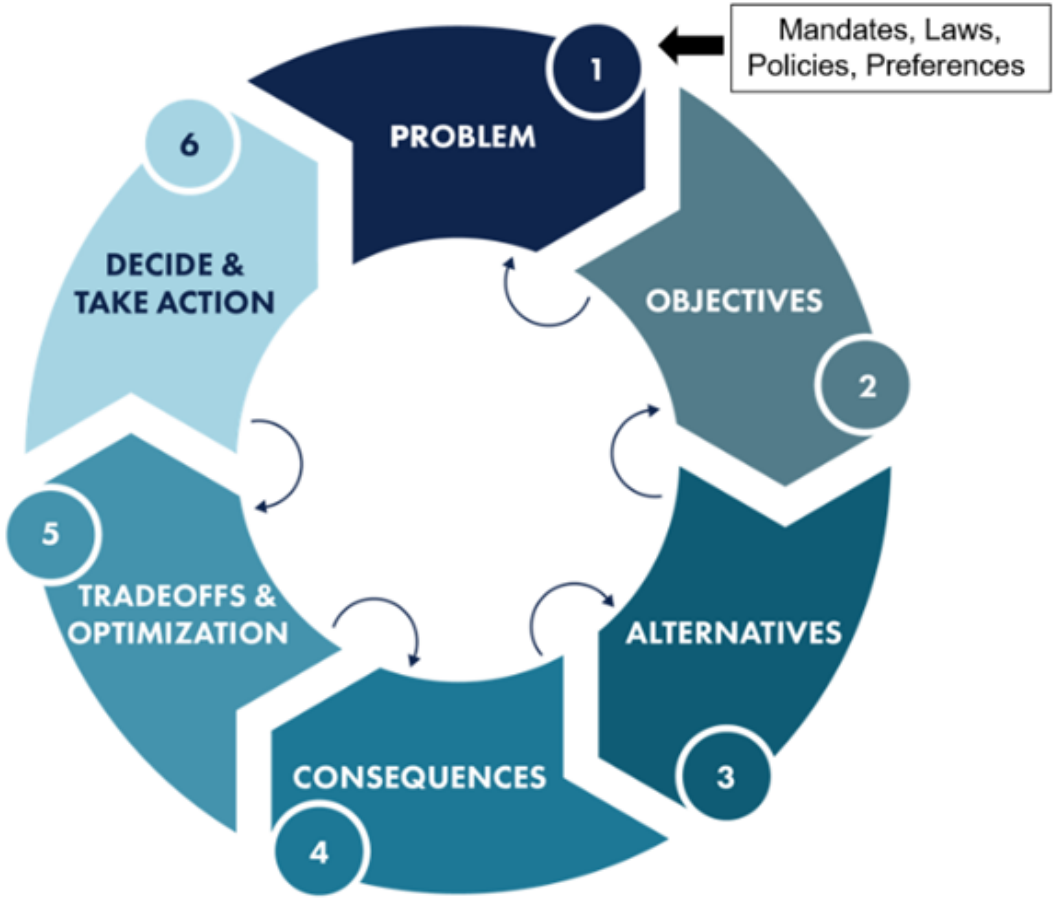
- MacDill Air Force Base interested in constructing **nearshore Nature-Based Solutions**
- Potential source material:
  - **Beneficial use of dredged material** (BUDM) from planned deepening of the Tampa Harbor Nav Channel
  - Regular **harbor maintenance**
  - Offloading of material from **dredge material management areas (DMMAs)**



STRUCTURED DECISION-MAKING (SDM)

PrOACT Framework :

- Define the **Problem**
- Determine the **Objectives**
- Identify **Alternatives**
- Evaluate alternatives and forecasting the **Consequences**
- Evaluate the **Trade-offs**
- **Decide and take action**
- Apply **Adaptive Management** as needed



Multiple passes: (1) Rapid prototyping; (2) Quantitative analysis; (3) Reloop and refine

DEFINE THE PROBLEM

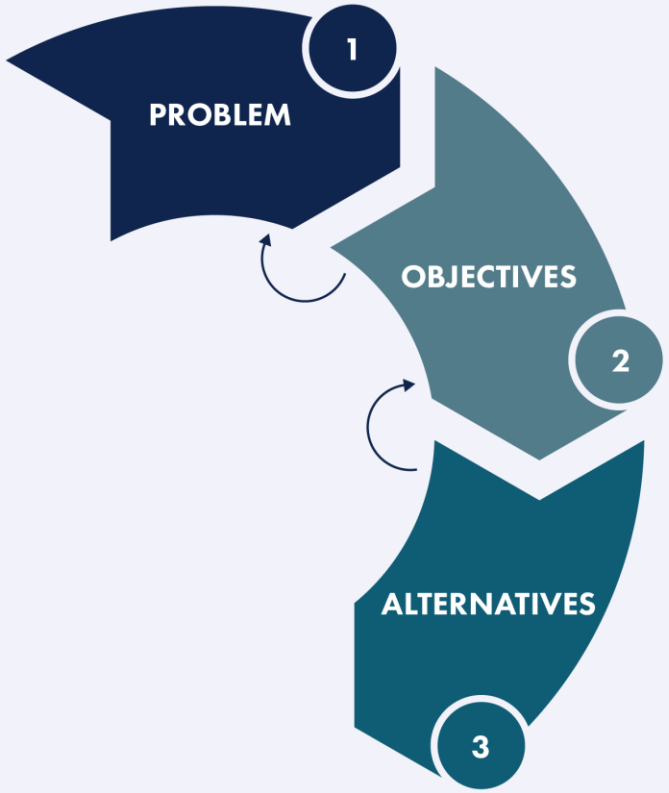
Identify:

- MacDill AFB concerns
- Federal and state agencies with relevant authorities
- Local and private organizations with interest and expertise
- **Constraints: funding, sediment availability, regulatory**

ARTICULATE OBJECTIVES

Category	Objective
Coastal Protection and Air Force Operations	Maximize wave attenuation
	Minimize inland storm surge
	Minimize probability of bird/wildlife aircraft strike hazard (BASH)
	Minimize installation perimeter security concerns
Habitat	Maximize extent of submerged aquatic vegetation (SAV)
	Maximize benefits to other habitats and species of concern
Regional Benefits and Impacts	Minimize downstream erosion

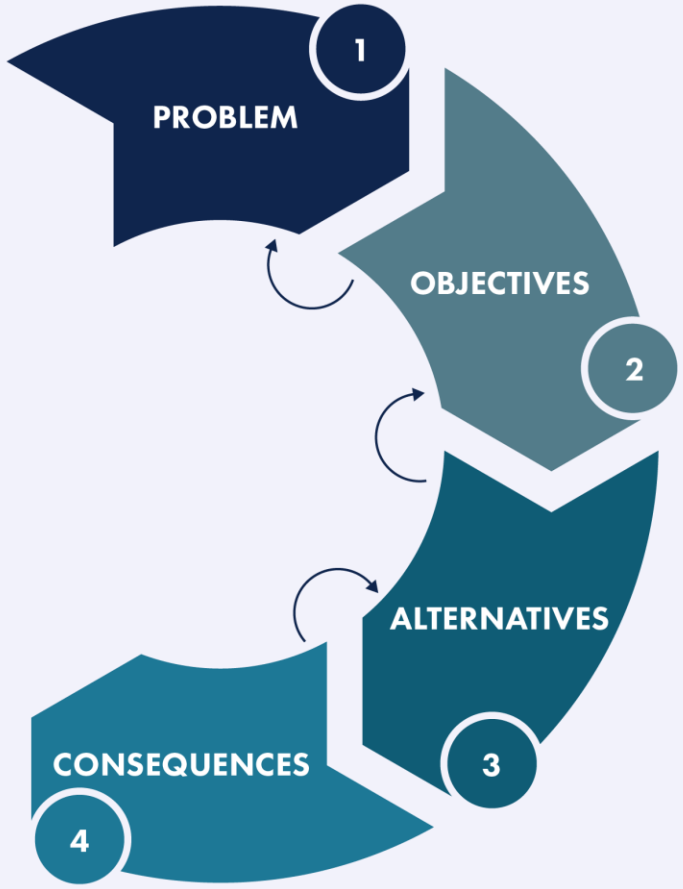
IDENTIFY ALTERNATIVES



- Place sediment to create and extend **shallow shelf habitat**
- Reestablish **historic longshore bars**
- Construct **barrier islands**

Spatial component: potential opportunities along the southwest (SW), southeast (SE), and eastern (E) shorelines

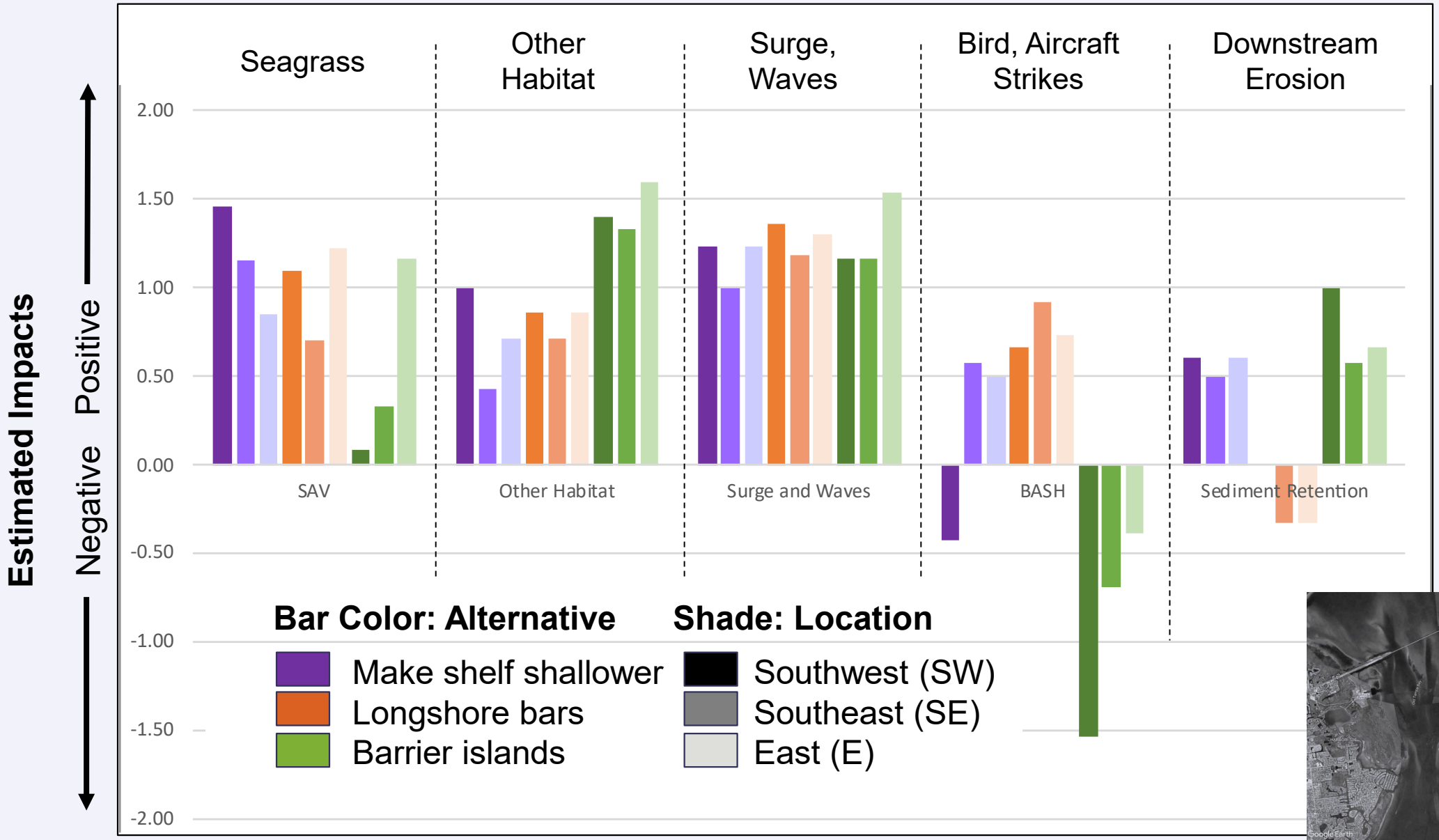
ANALYZE CONSEQUENCES



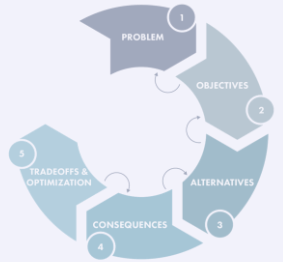
Rapid Prototyping Workshop

- Participants provided input based on **subject matter expertise**
- **Structured approach:** elicited for each objective and alternative across **three spatial zones**

CONSEQUENCES & TRADEOFFS



CONSEQUENCES & TRADEOFFS



Seagrass | Other Habitat | Surge, Waves | Bird, Aircraft | Downstream

Expect mostly positive outcomes, but…

Uncertainties:
How **much** wave energy reduction?
Where will sediment go?
What will impacts be to **seagrass?**

Estimated Impacts
Positive
Negative

2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00

SAV | Other Habitat | Surge and Waves | BASH | Sediment Retention

Concerns:
Potential increase in **bird aircraft strikes**
Increased **downstream erosion**

ALTERNATIVES

★ *We are here*

Concepts

- Sediment placement to **make the shelf offshore shallower**
- Reestablish **longshore (sand) bars**
- Construct **barrier islands**

★ **Initial Set of Alternatives**

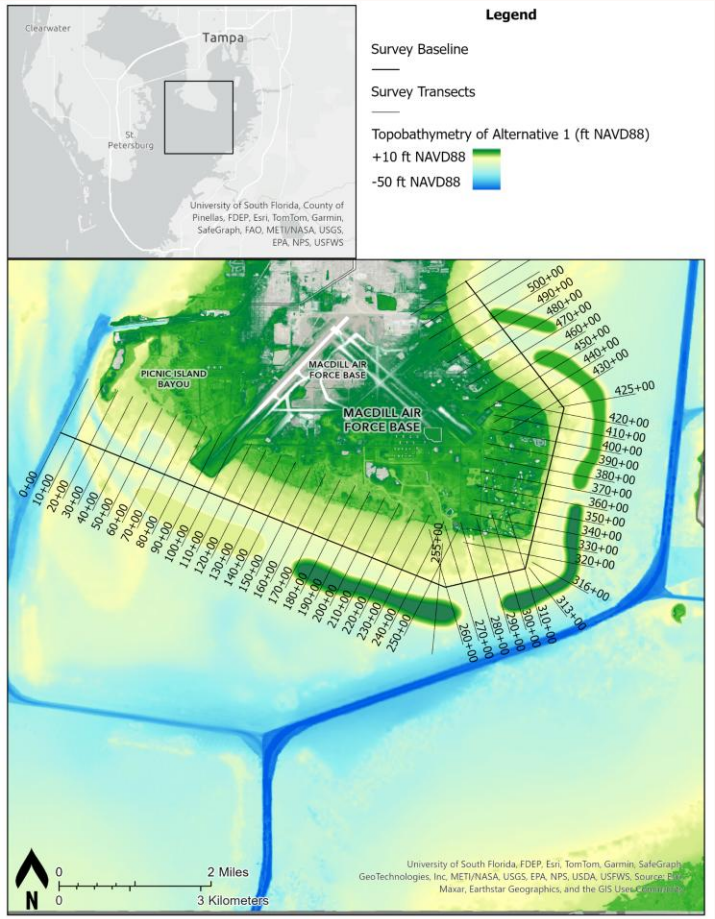
- Isolate the effects of concepts types
- What are the impacts if placed at different locations?

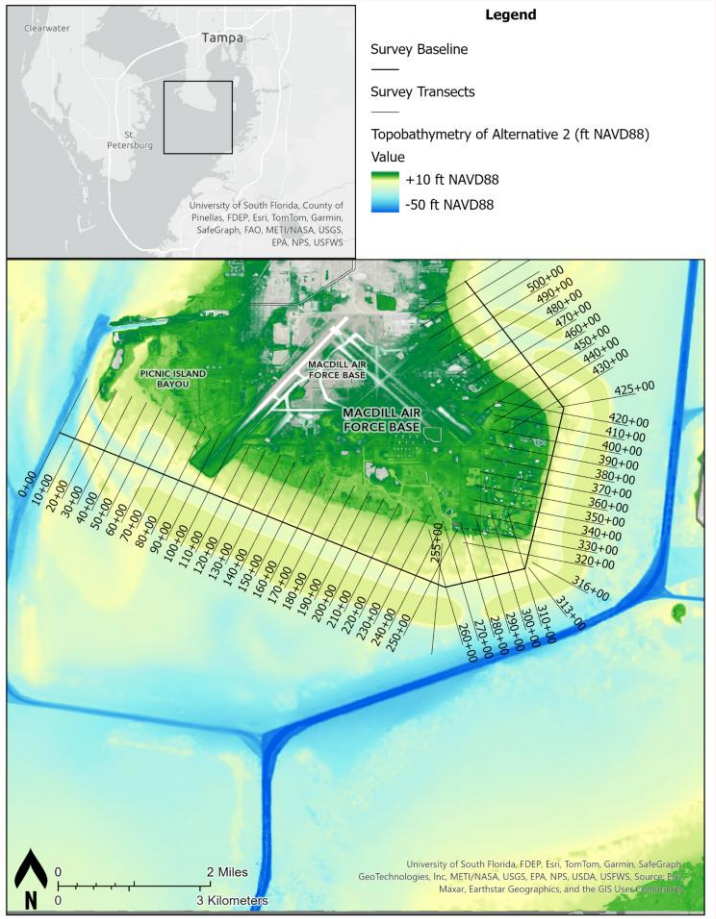
Refined Set of Alternatives

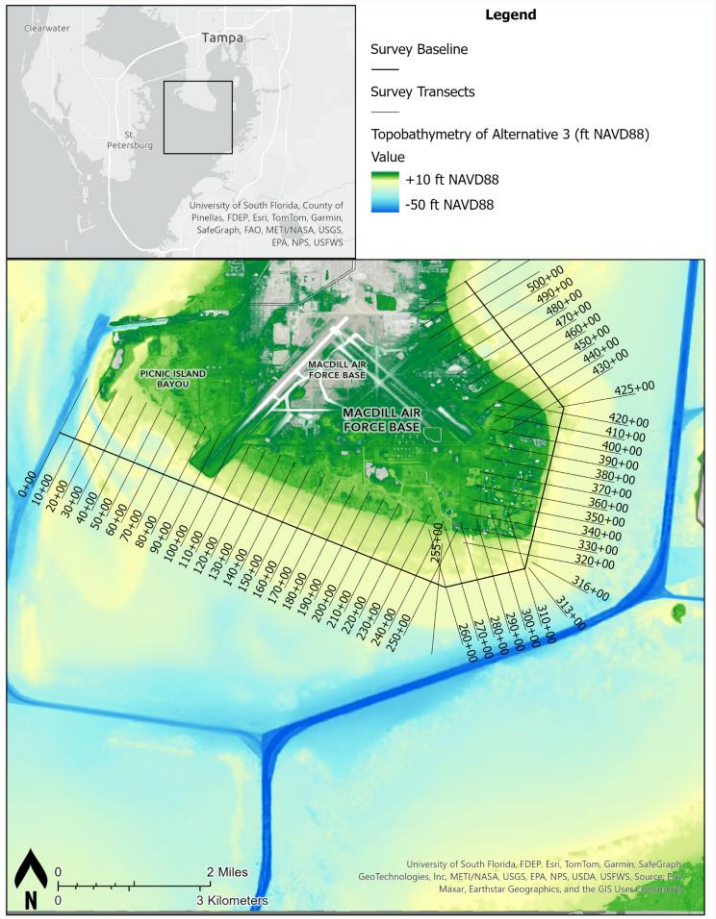
- Scale, combine, and refine based on initial analysis

Alternative for 30% Design → **45% Design**

ALTERNATIVES

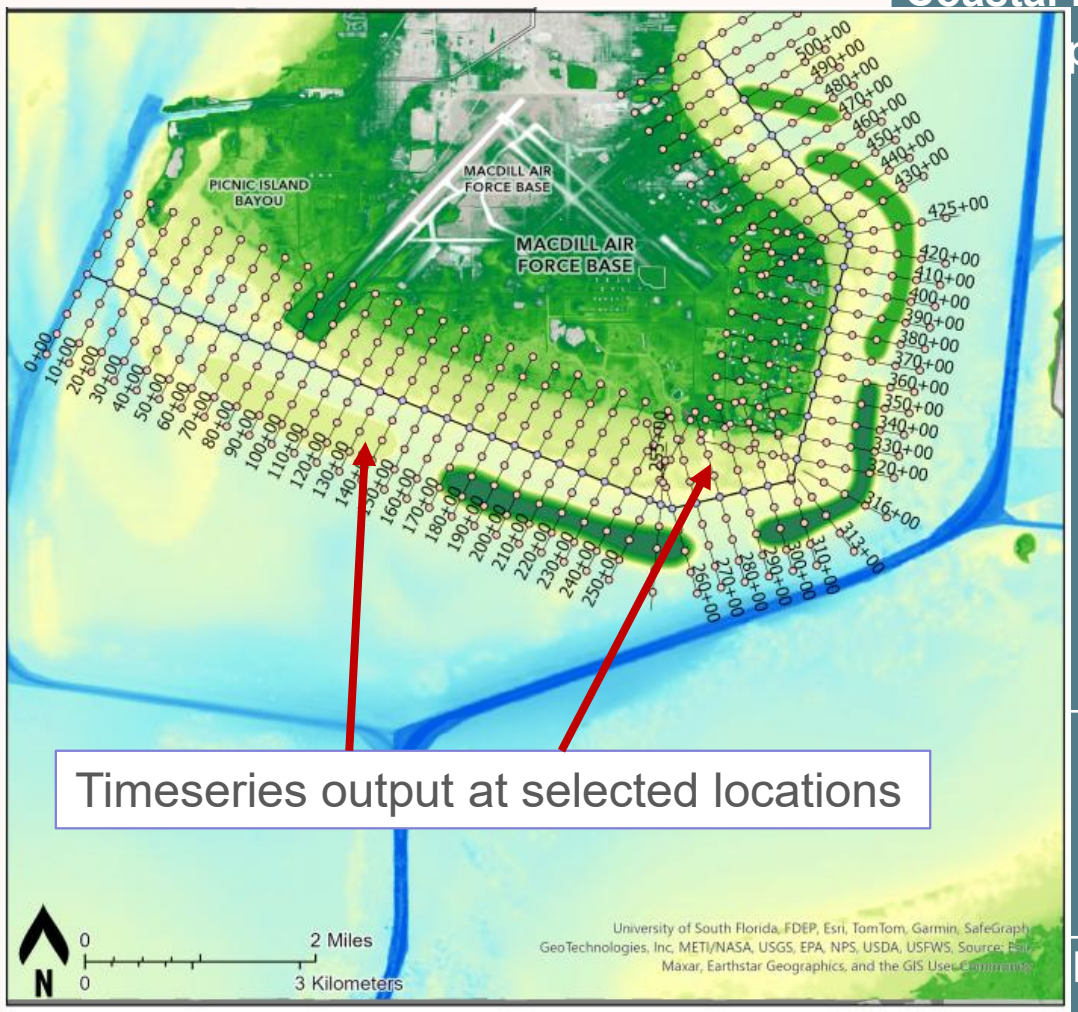






(1) Go big to identify maximize impact and isolate concerns
(2) Isolate different feature types to inform design

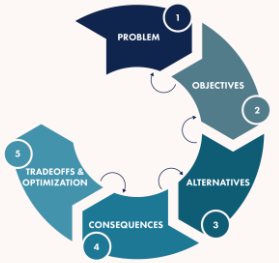
CONSEQUENCE ANALYSIS: EXAMPLES

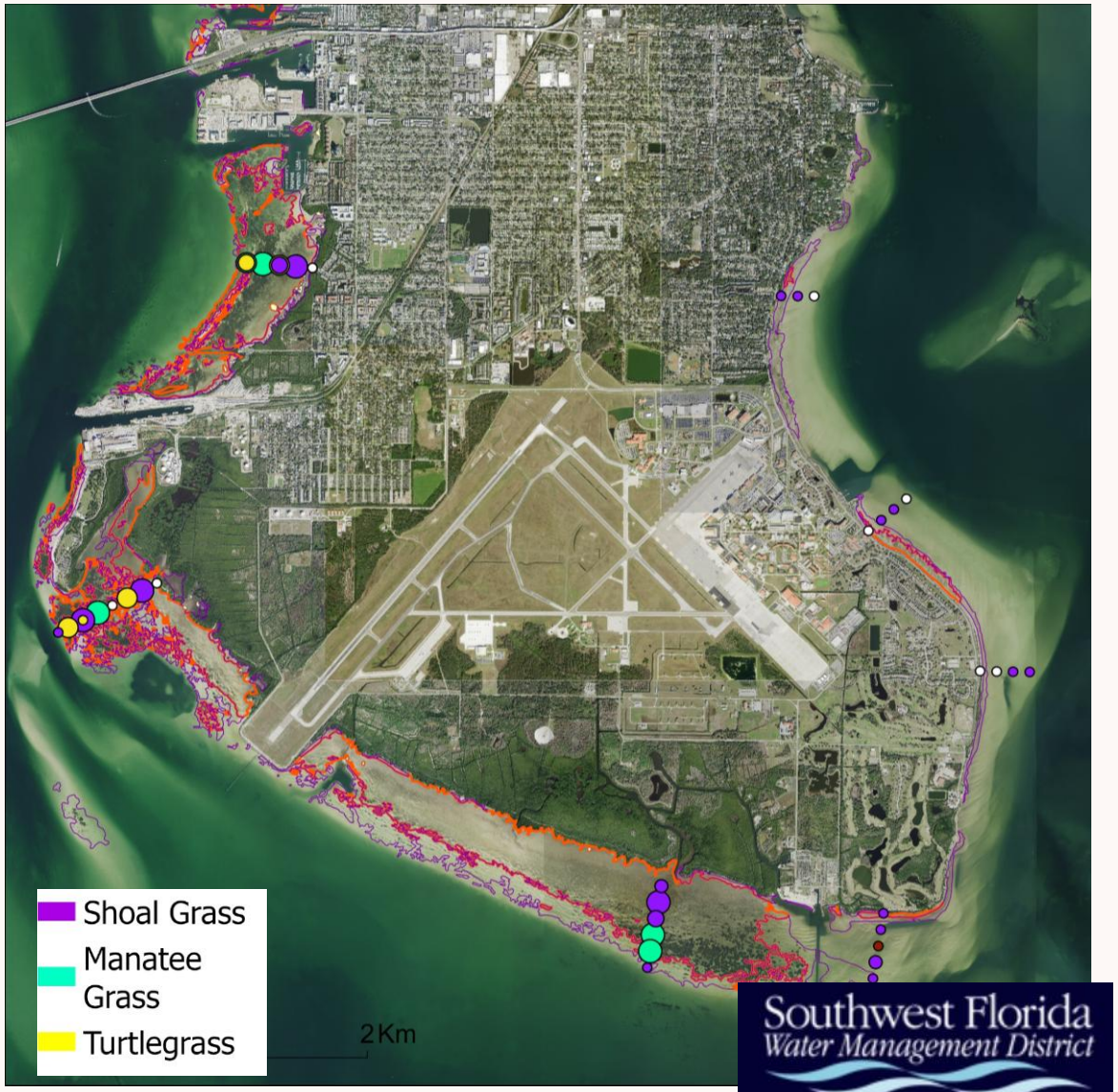


Category	Objective
Coastal Protection and Air perations	Reduce wave energy
	Minimize inland storm surge
	Minimize probability of bird/wildlife aircraft strike hazard (BASH)
	Minimize installation perimeter security concerns
	Maximize extent of seagrass and other vegetation
	Maximize benefits to other habitats and species of concern
l Benefits and Impacts	Minimize downstream erosion

CONSEQUENCE ANALYSIS: EXAMPLES

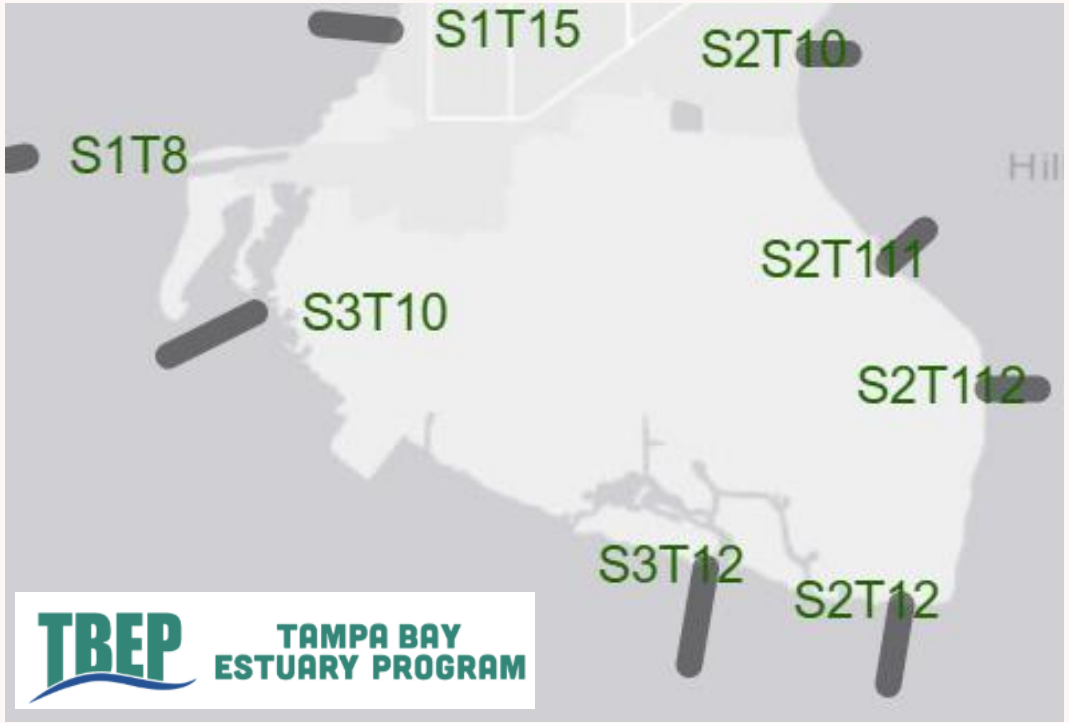
OBJECTIVE: MAXIMUM EXTENT OF POTENTIAL SAV HABITAT





Overview: draft analysis

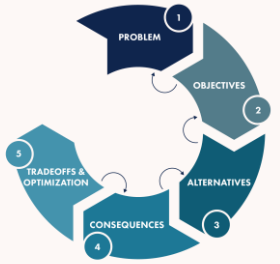
Historic extents of SAV from field data and remote sensing



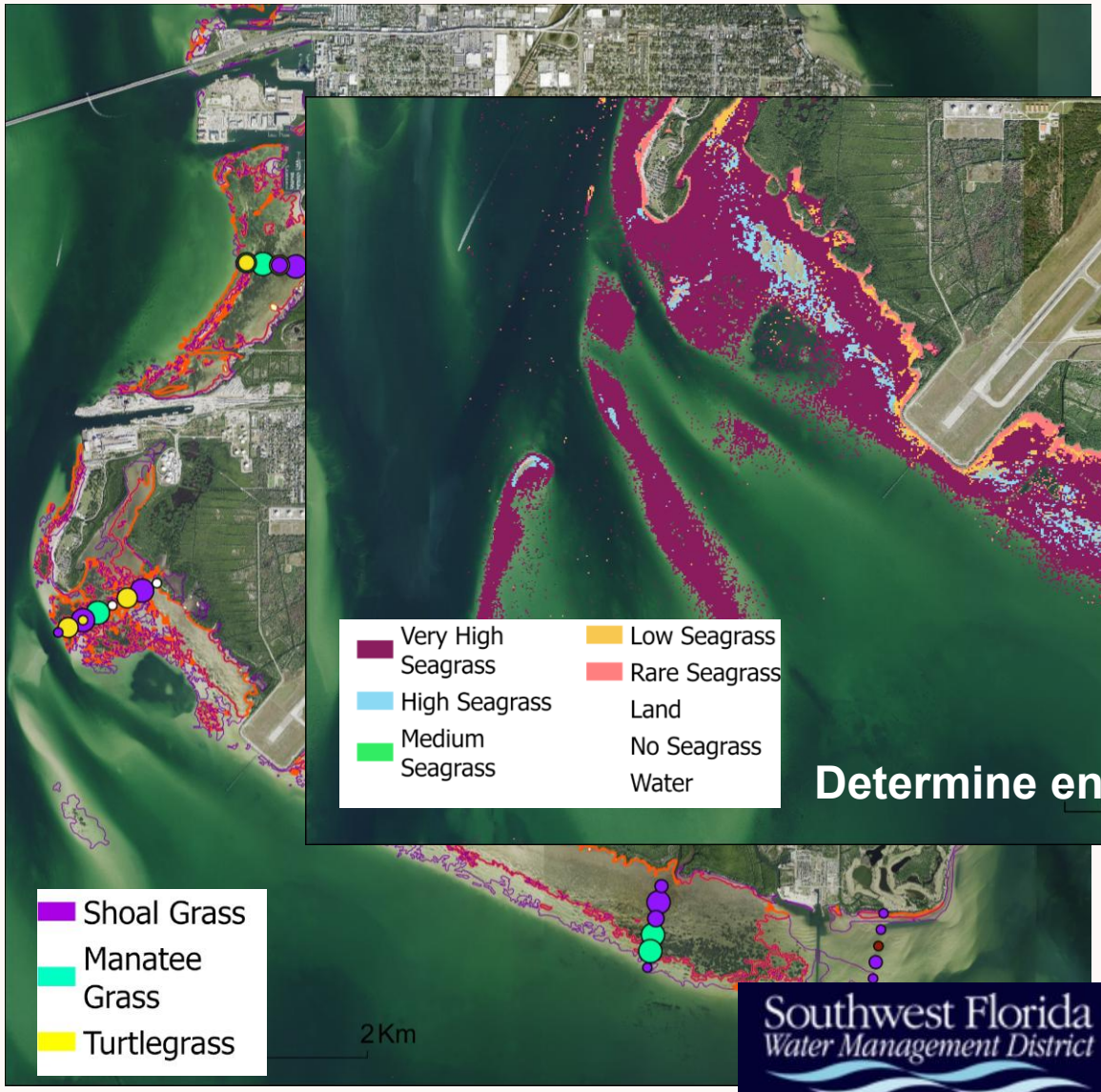
Tampa Bay Seagrass Transect Dashboard

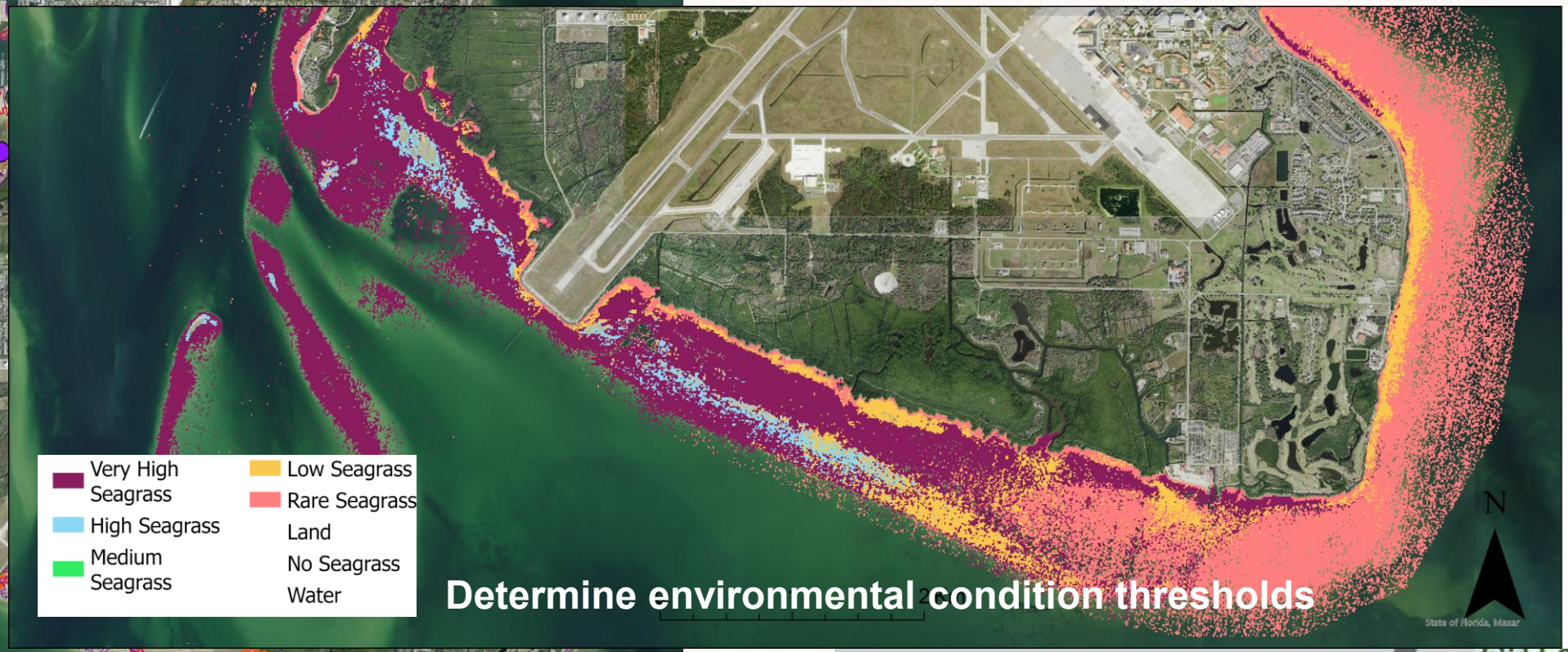
CONSEQUENCE ANALYSIS: EXAMPLES

OBJECTIVE: MAXIMUM EXTENT OF POTENTIAL SAV HABITAT



Overview: draft analysis

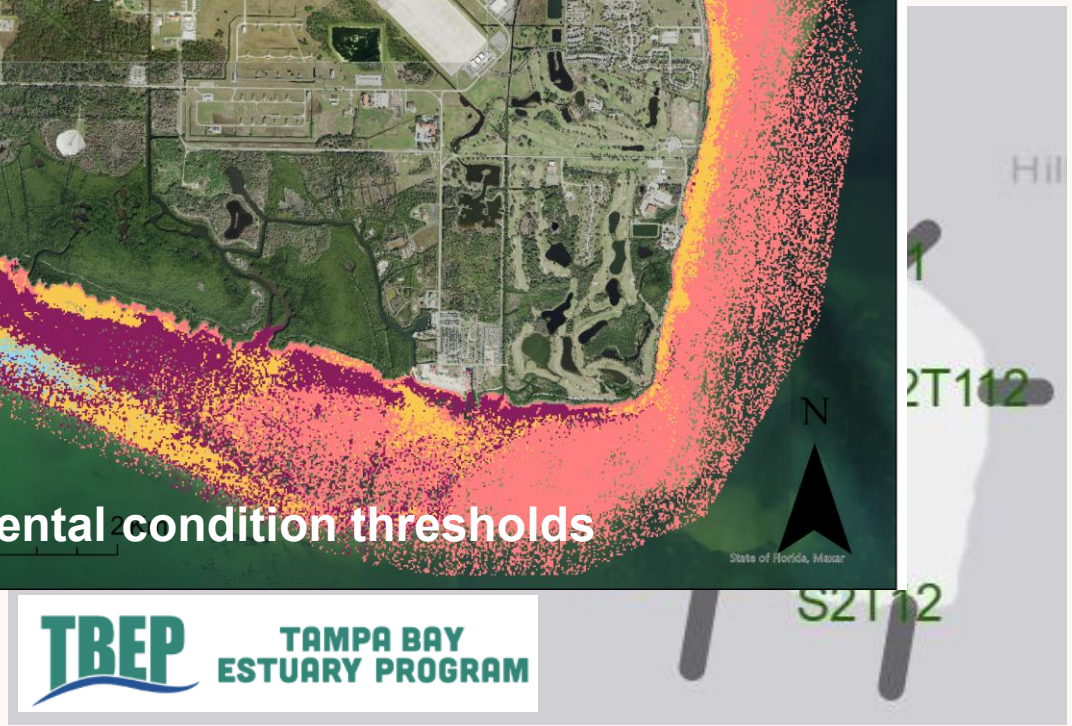




Determine environmental condition thresholds

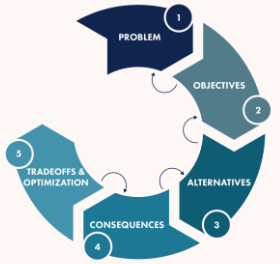
Southwest Florida Water Management District

data



Tampa Bay Seagrass Transect Dashboard

CONSEQUENCE ANALYSIS: CONSTRAINTS



- **Sediment sourcing**
  - Evaluating options (Tampa Harbor Deepening Project, maintenance dredging, dredge material management areas, dedicated dredging)
- **Regulatory considerations**
  - Meeting with regulatory entities, stakeholders
  - Identifying “red flags” (issues that could significantly impact regulatory processes), “yellow flags” (issues potentially requiring mitigation), “green flags” (no concerns)

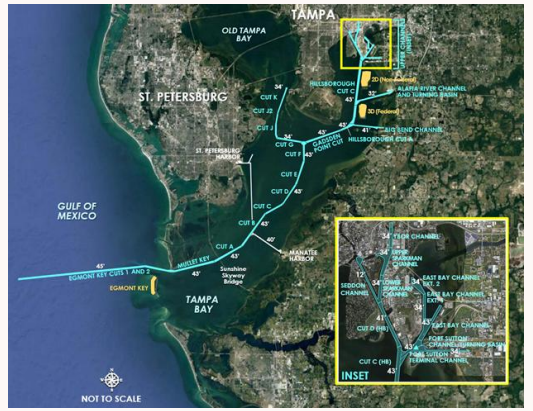
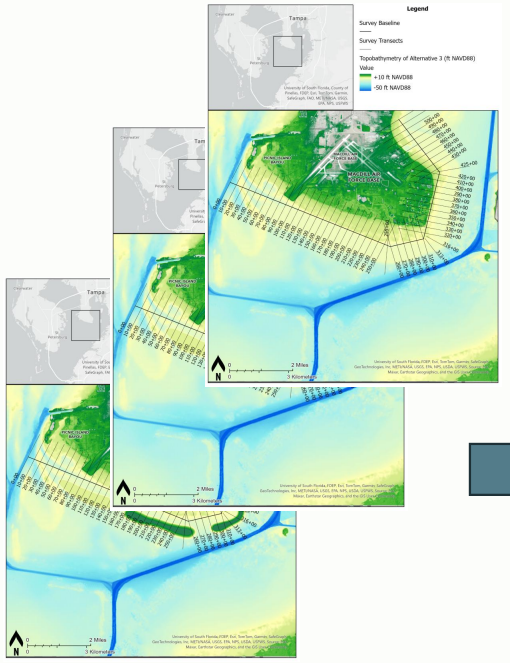


Figure 3. NMFS Essential Fish Habitat adjacent to MacDill AFB

UP NEXT: REFINE ALTERNATIVES

Alternative / Metric	Objective 1 (Wave Energy)	Constraint 1 (Sediment)	…
1			
2			
3			



Initial Set of Alternatives

- Isolate the effects of concepts types
- What are the benefits and impacts if placed at different locations?
- **What regulatory red/yellow flags, opportunities to resolve are there?**

Refined Set of Alternatives

- Scale, combine, and refine based on initial analysis

Alternative for 30% Design

45% Design

THANK YOU!

Soupy Dalyander
sdalyander@thewaterinstitute.org