BOEM Bureau of Ocean Energy Management

Marine Minerals Program

Intersections with Coastal Resilience

April 3, 2024

Long and Bucatari | Committee on Offshore Science and Assessment Meeting

What is Resilience?

"The capacity to withstand or to recover quickly from difficulties; toughness"
(Oxford Languages)

"The ability of a natural system to return to a prior condition after disturbance"
(Millar et al., 2007)

"[T]he ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions."
(DOI Climate Action Plan, 2021)

"A capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment"
(USGCRP, 2019)

What will it take to become a resilient coast?

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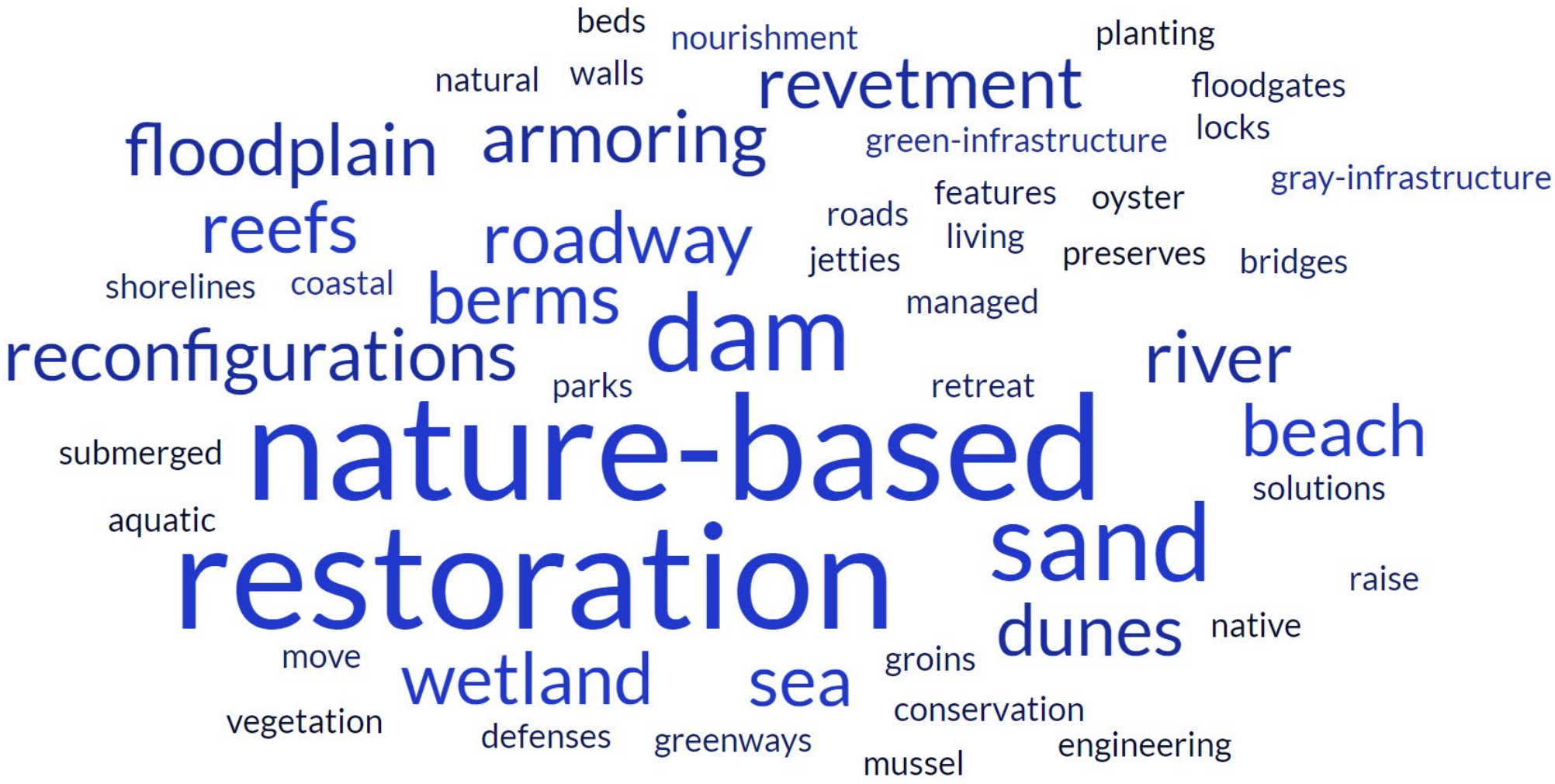
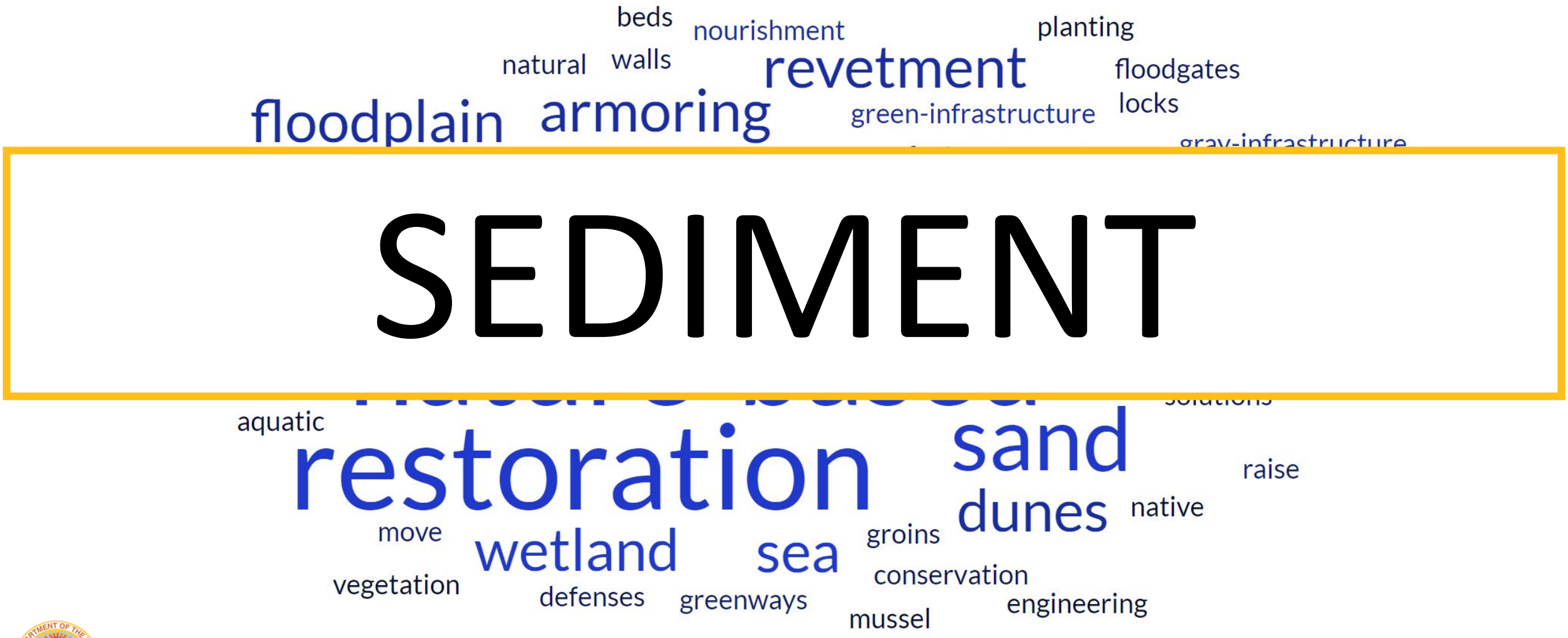
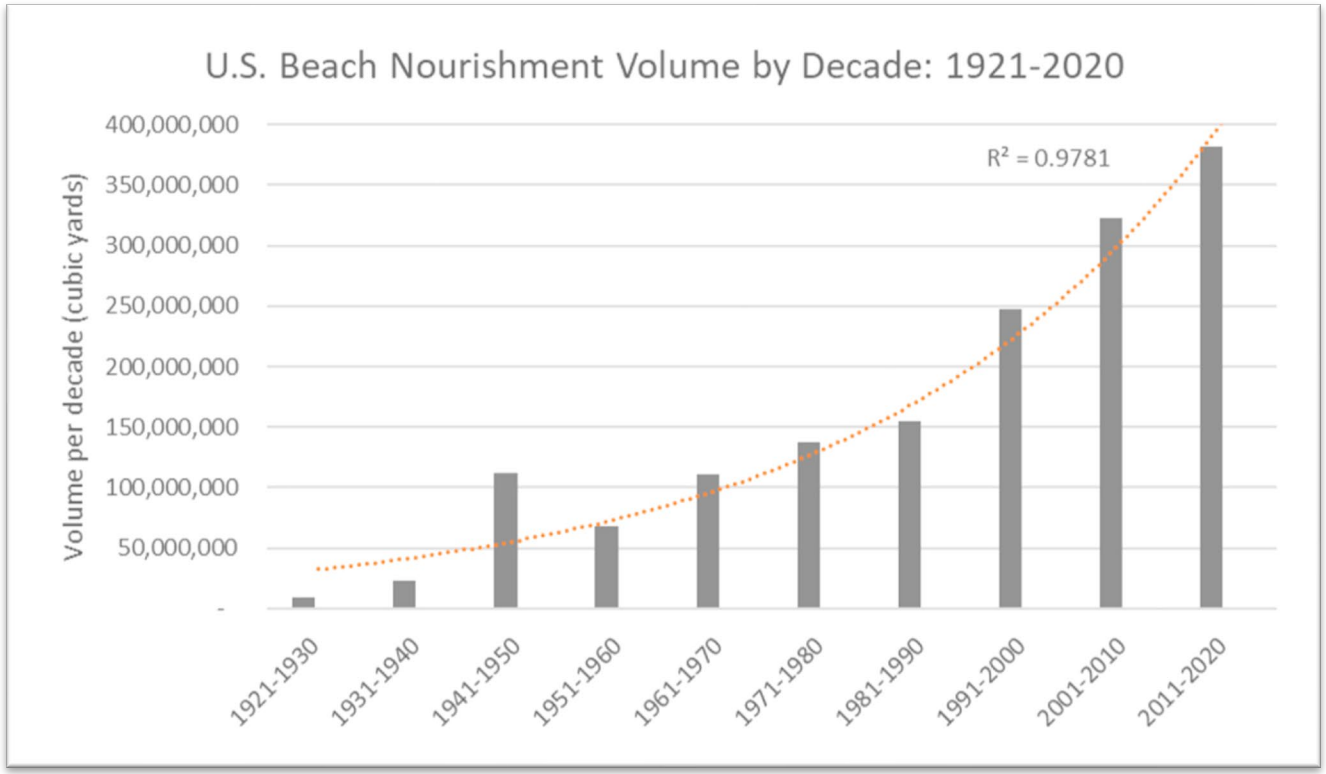


What will it take to become a resilient coast?



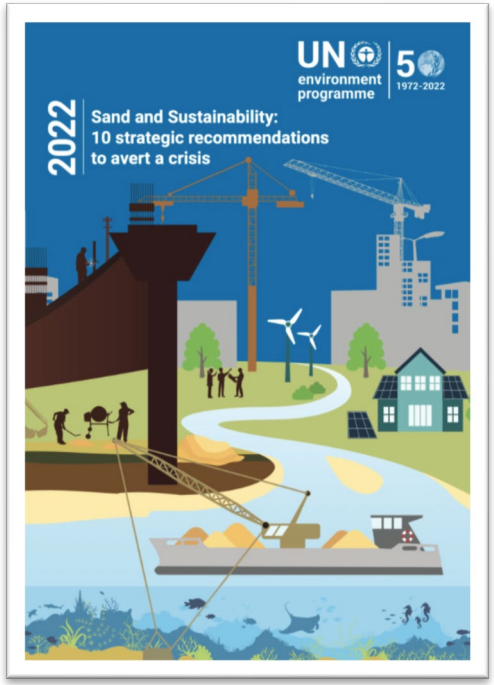
Growing Demand and Competing Uses for a Finite Resource

"A Century of U.S. Beach Nourishment"



(Elko et al., 2021)

- Recognize sand as a strategic resource that delivers critical ecosystem services
- Map, monitor, and report sand resources for transparent, science-based and data-driven decision-making

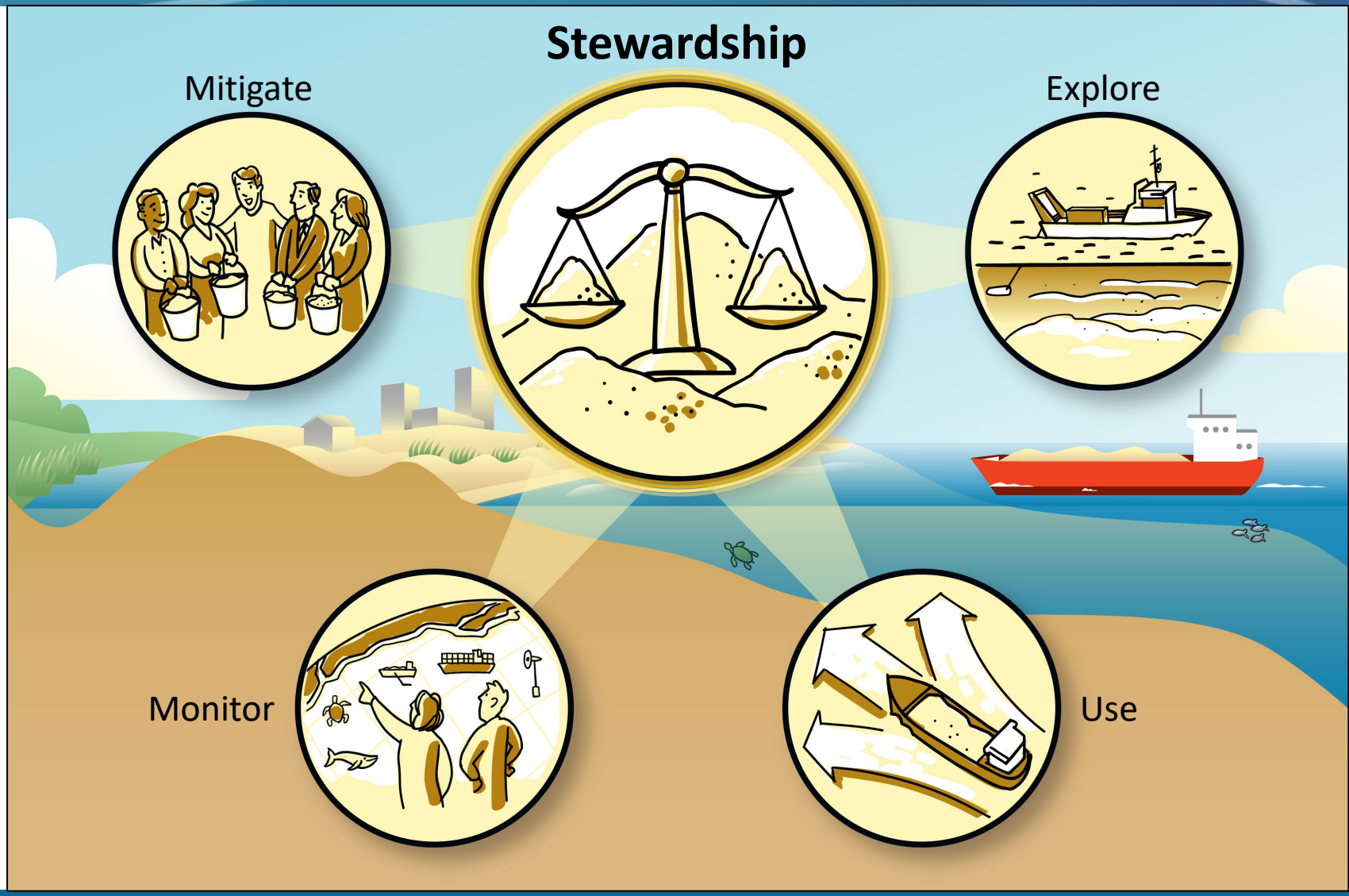


"The ongoing failure to safeguard sand as a strategic resource is a significant multi-generational crisis that threatens the entire global response to climate change (UNEP, 2022)"

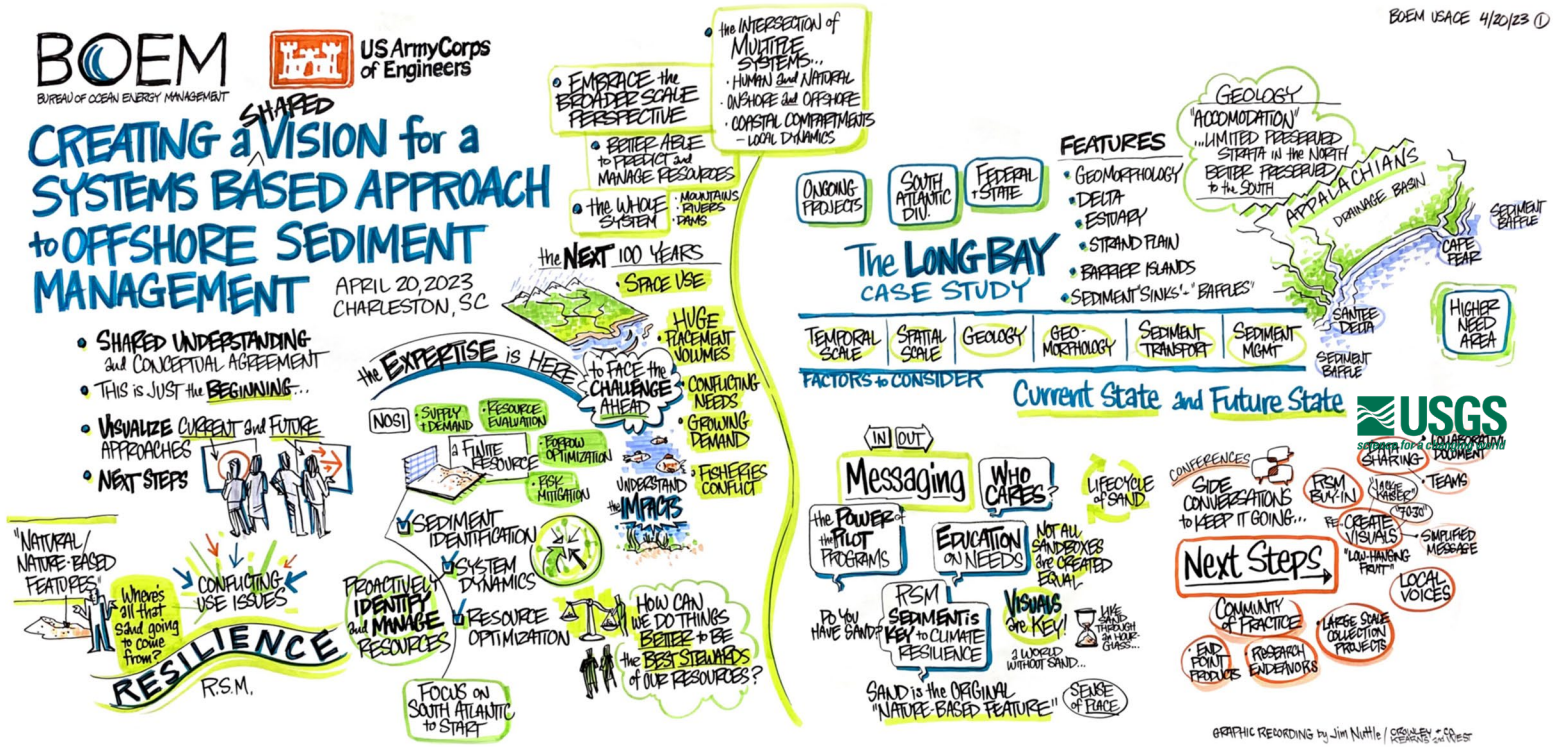
MMP's Role in Coastal Resilience

Marine Minerals Program (MMP) ensures stewardship of sand and the environment by:

- Help finding where OCS sand is (and is not)
- Facilitating use of OCS sand
- Monitoring sand supply, demand, and use, as well as environmental conditions and potential impacts
- Help mitigating conflict along the way



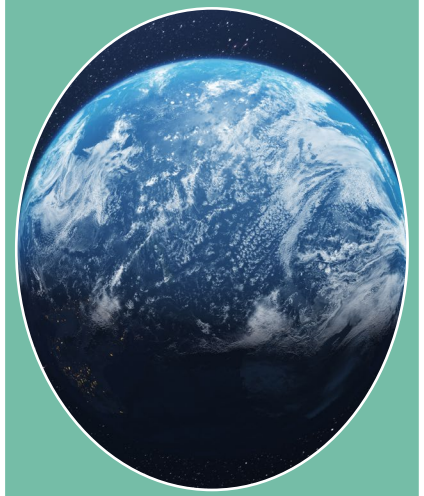
Facilitated Discussion using Collaborative Design Techniques



Workshop Objectives

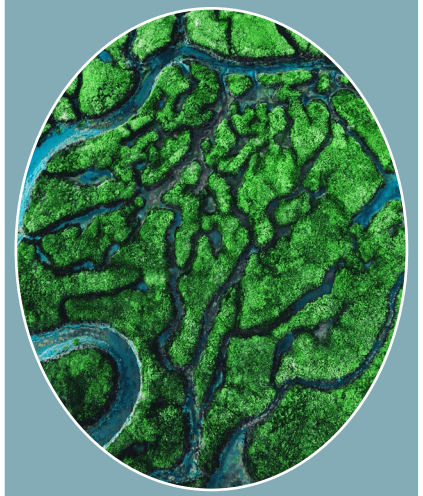
- Establish a shared understanding
- Reach consensus on a working definition
- Visualize complex concepts
- Explore tangible next steps

Temporal Scale



Spatial Scale

Geology



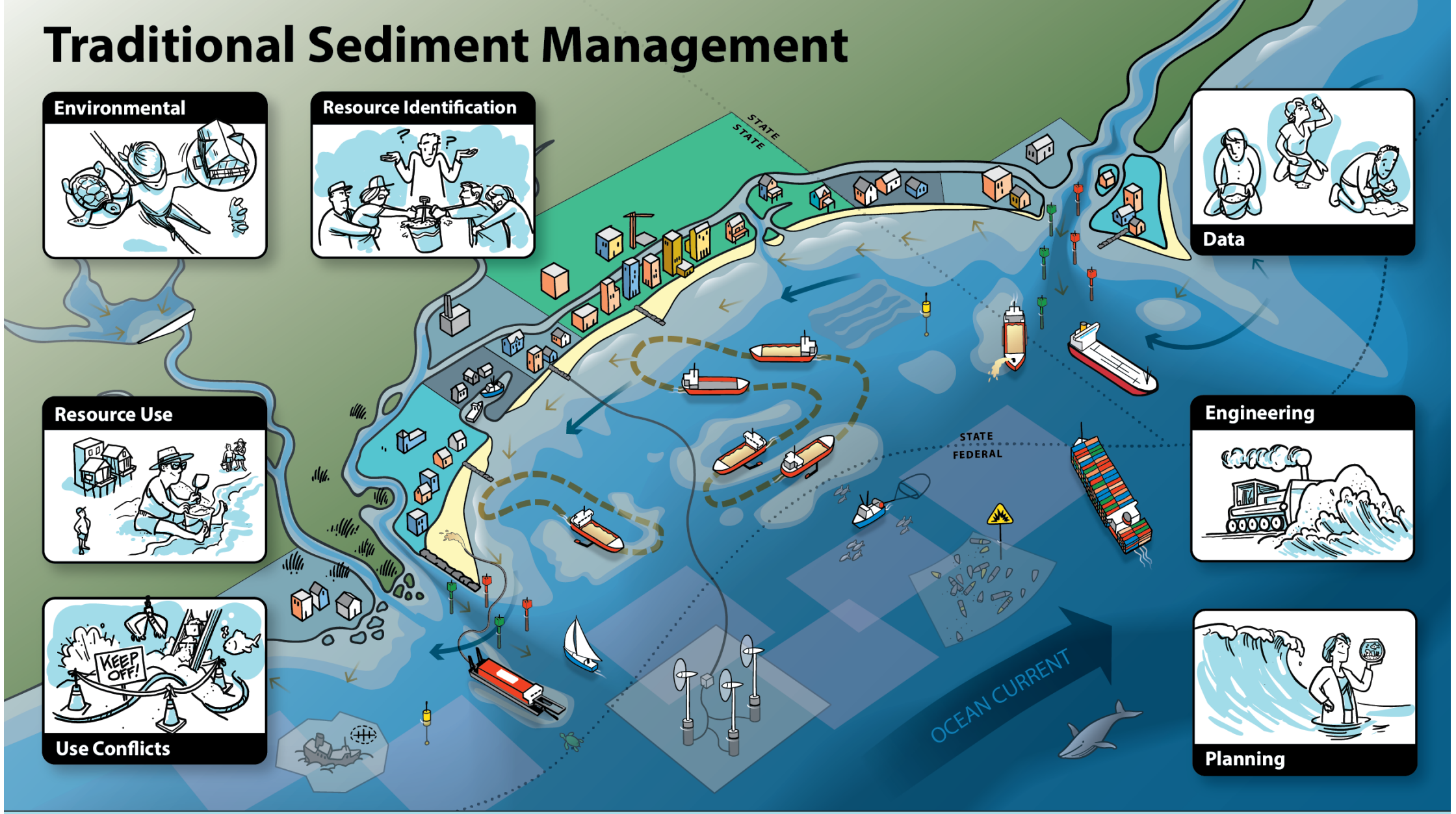
Geomorphology

Sediment Transport

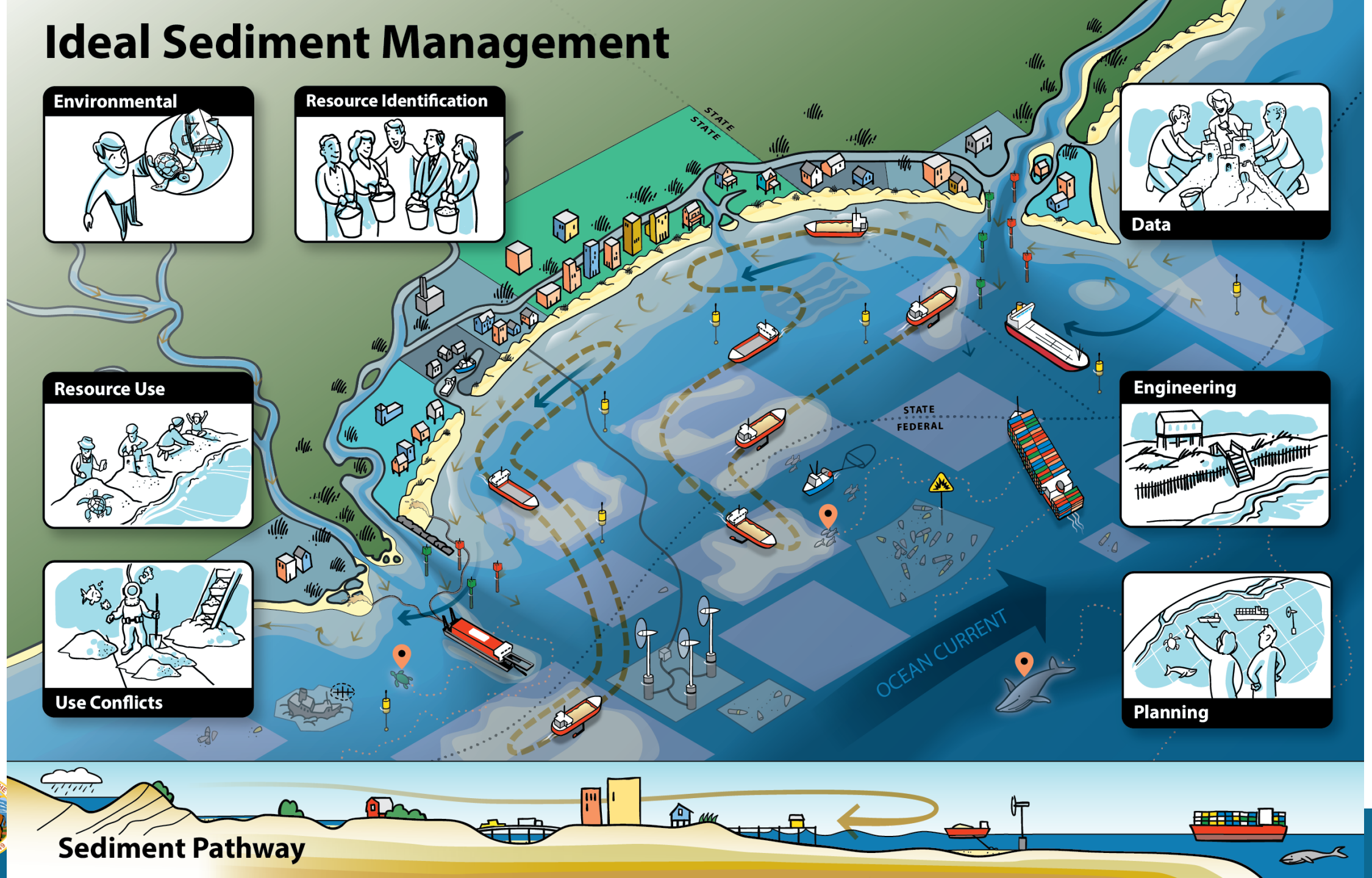
Sediment Management

Components for Consideration

Traditional Sediment Management



Ideal Sediment Management



MMP Research Themes

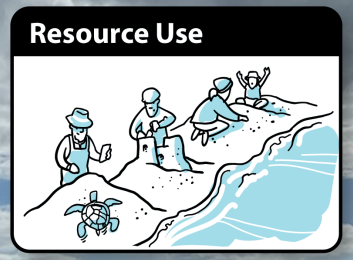
- **Supply and Demand** studies highlight need and direct spending
- **Resource Evaluation** – Geologic Framework studies inform where and why the resources are found where they are
- **Resource Evaluation** – Sediment Budget studies are used to anticipate effects of sediment removal and placement
- **Risk Mitigation** studies inform how to manage the resource in the least impactful way for all stakeholders
- **Borrow Area Optimization** studies maximize efficacy and minimize losses

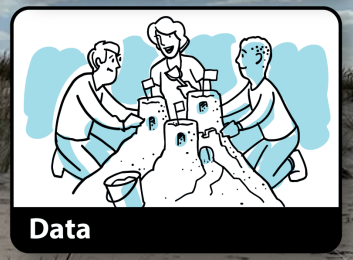
Mapping MMP Research to RSM Management Themes

Mapping MMP Research to RSM Management Themes

Supply & Demand

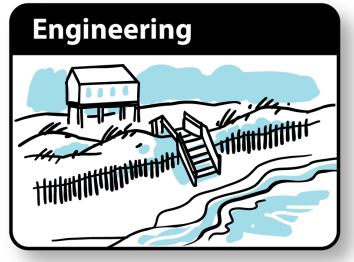
Borrow Area Optimization

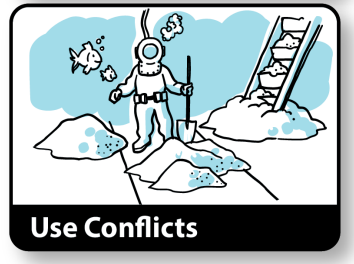




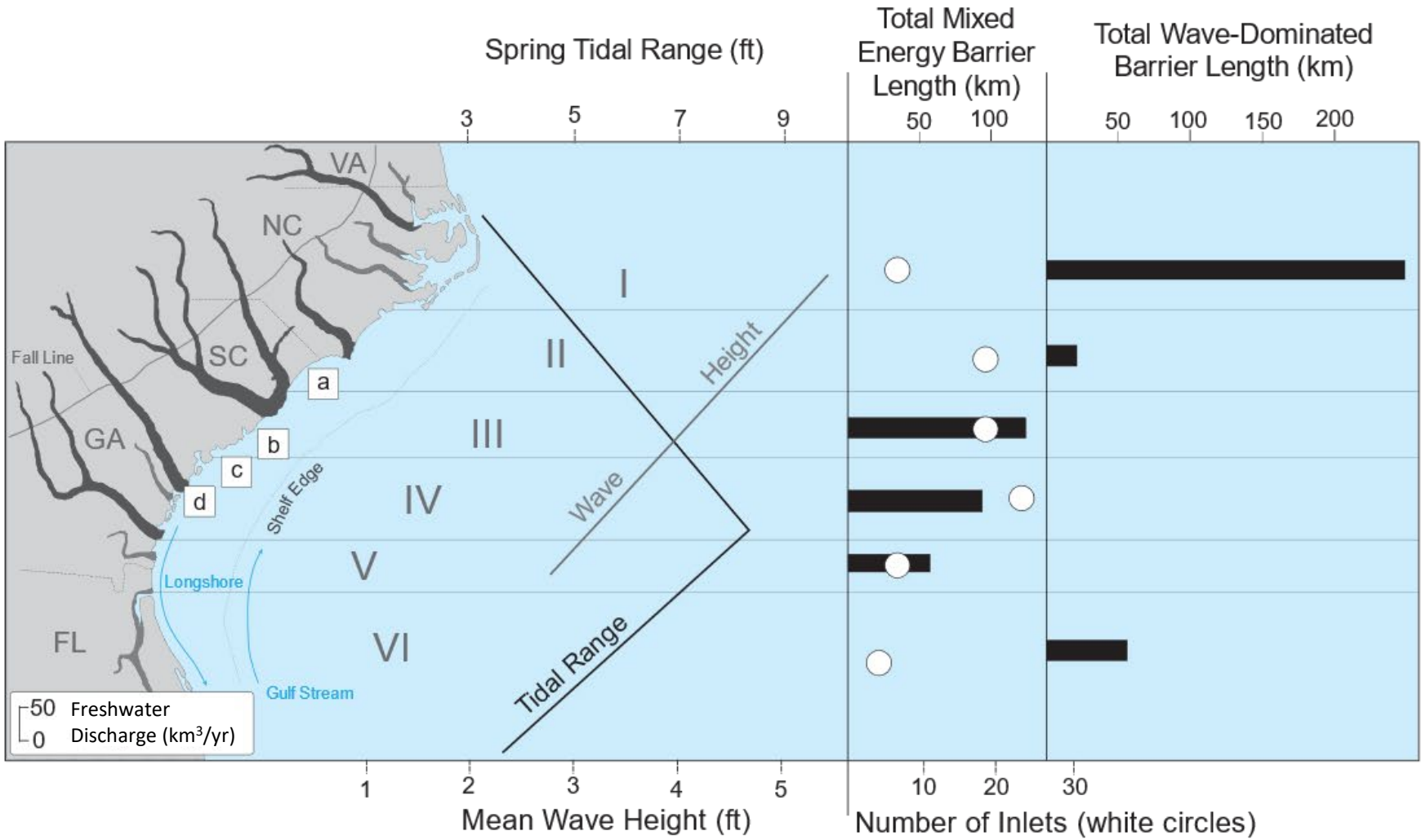
Resource Evaluation

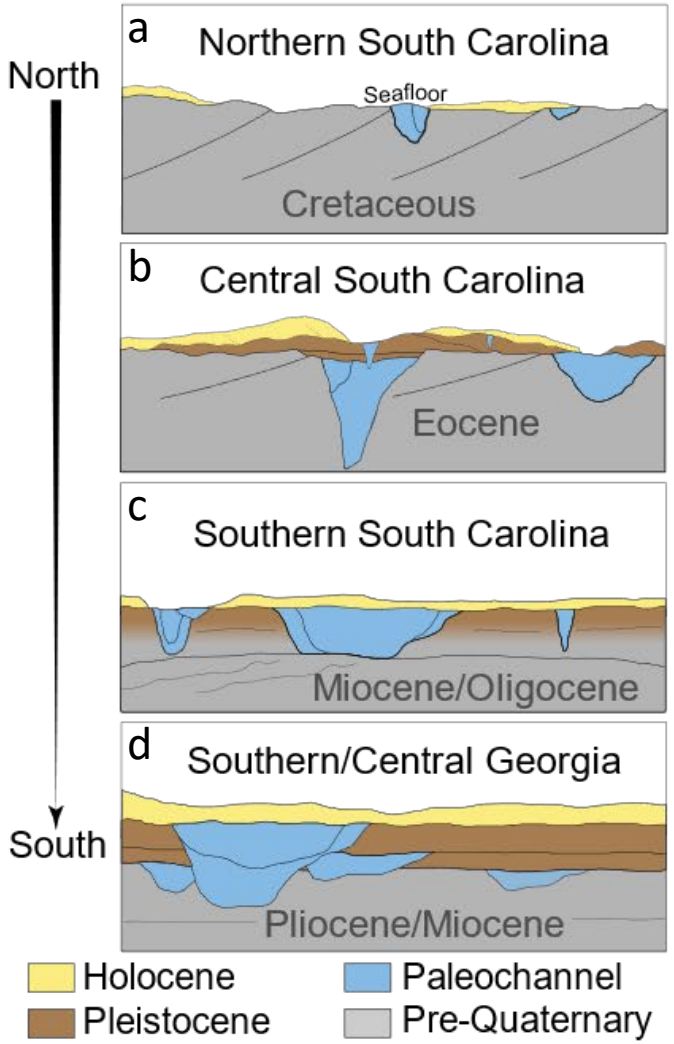
Risk Mitigation





Defining the Appropriate Spatial Scale





Long and Long (in prep) after Hayes and FitzGerald (2013), Flemming (2011) and Long et al. (2021).

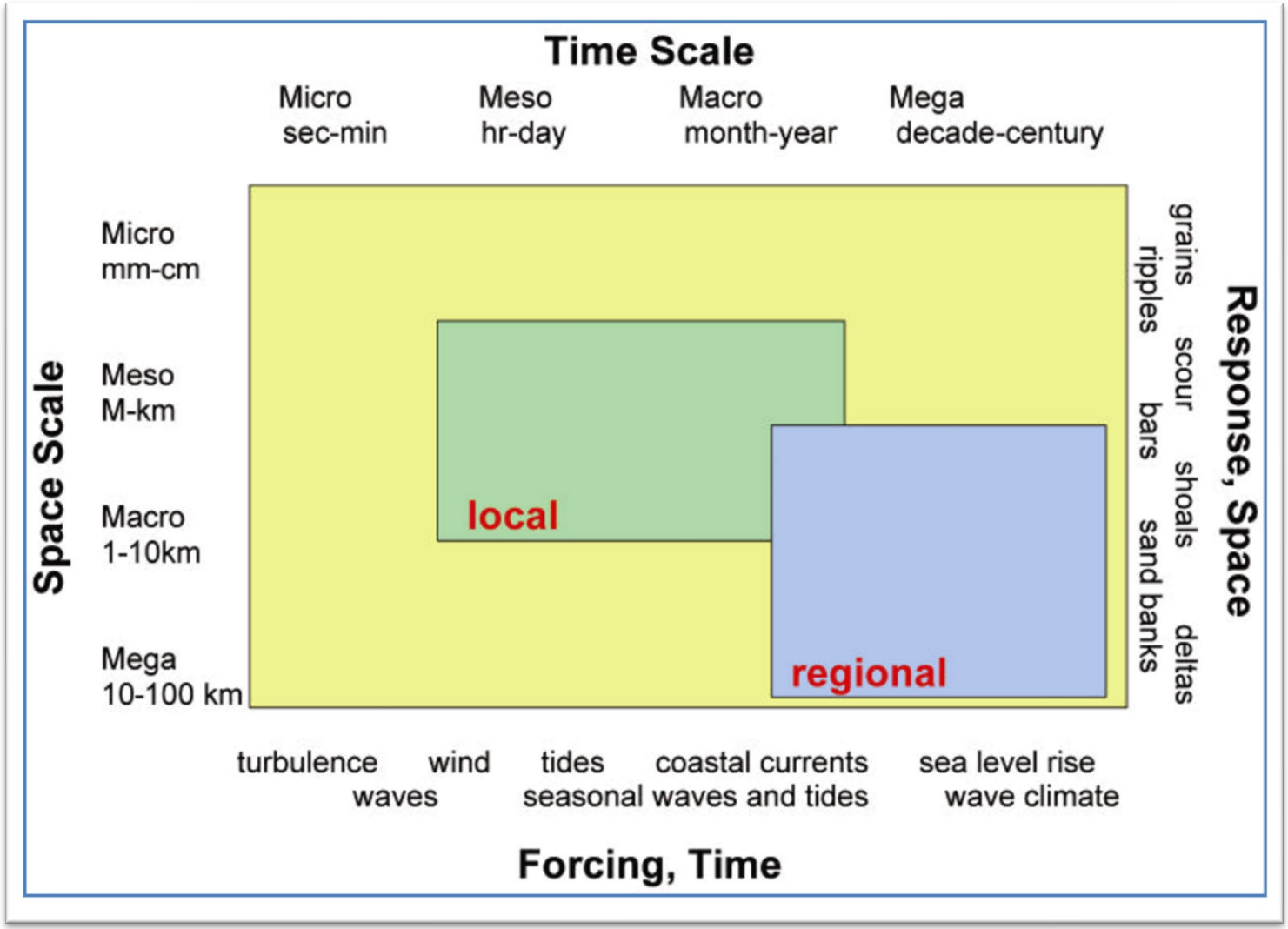
Defining the Most Effective Management Scale

Components to consider

- Physical processes
- Volume of activities
- Number of stakeholder groups

Challenges

- No unified vision for temporal or spatial scales
- Linking the onshore and offshore
- Buy-in from our stakeholders
- Overcoming the “sand plenty” perception problem



(Larson et al., 2002 adapted from Larson and Kraus, 1995)

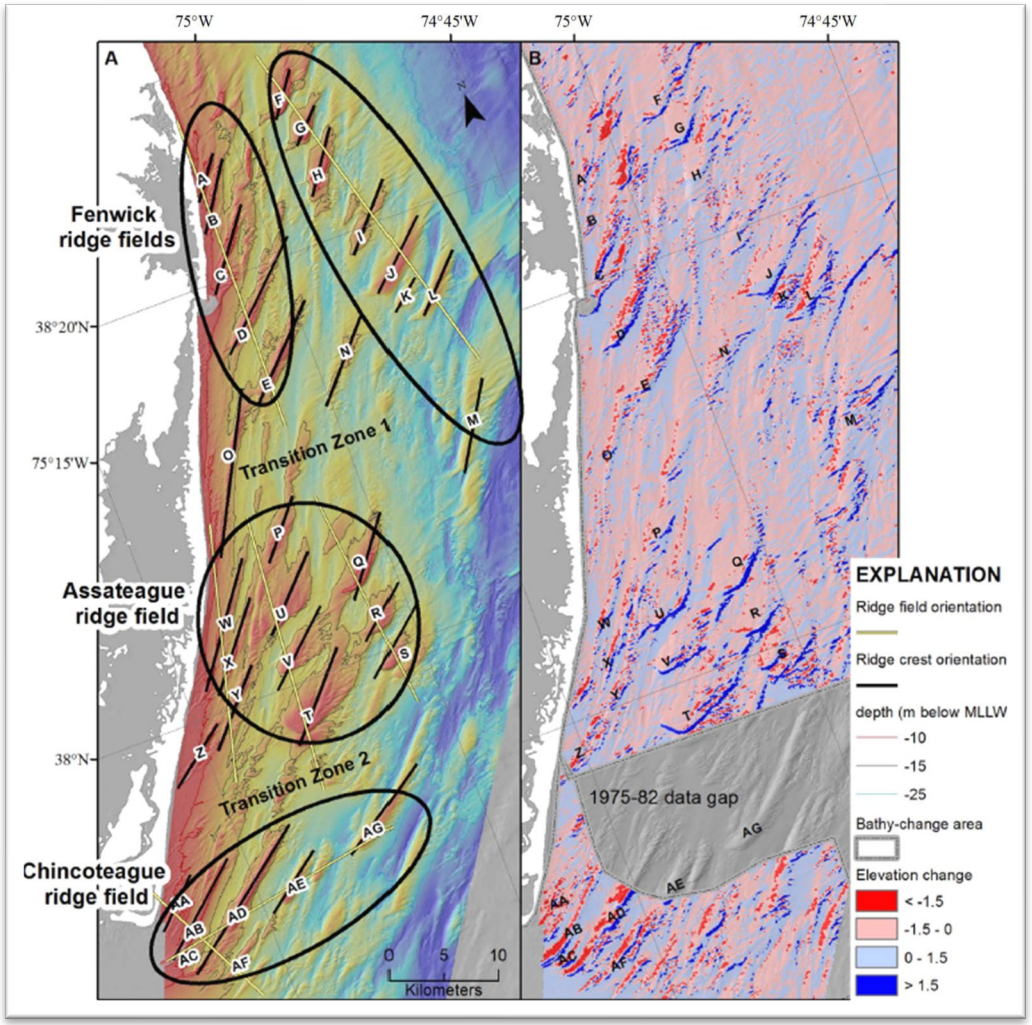
Requesting Input

- Compliments between Regional Sediment Management and Ecosystem-based Management
  - Physical processes
  - Linkage between site characterization and regional evaluations
- Next Steps for this Effort
  - Systems-based RSM Visioning: Phase 2
    - Visualizations of each RSM Theme
    - Defining roles and responsibilities
    - Defining strategies and tactics
- Recommendations for how to facilitate stakeholder buy in?
- Outstanding Technical Question: How do we determine what scales are the most effective for management both spatially and temporally?

Featured Examples of Current and Future Research Projects

Borrow Area and Resource Classification

- Need a tool to share information with a unified vocabulary for offshore sand resources
- Understand the history of used borrow areas
- Moving from our knowns (what works) out to the unknown knowns (groups of potential borrow areas)
- Building an analog database for ranges of potential outcomes (e.g. grain size, fines, etc.) to help constrain unknown/untested resources
- Contract Option to include internal and external risk factors, which facilitates regional tradeoff analyses
- Moves MMP towards reserves management



(Pendleton et al., 2017)

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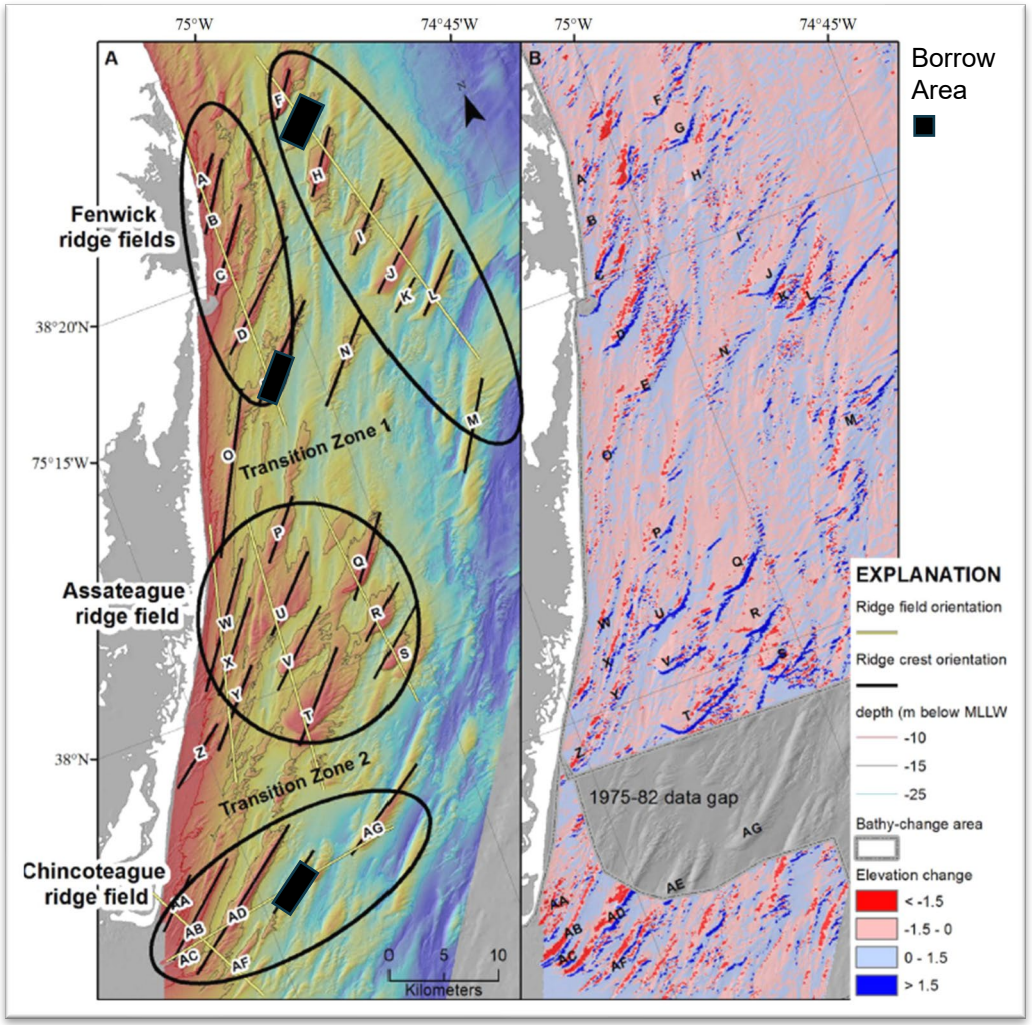
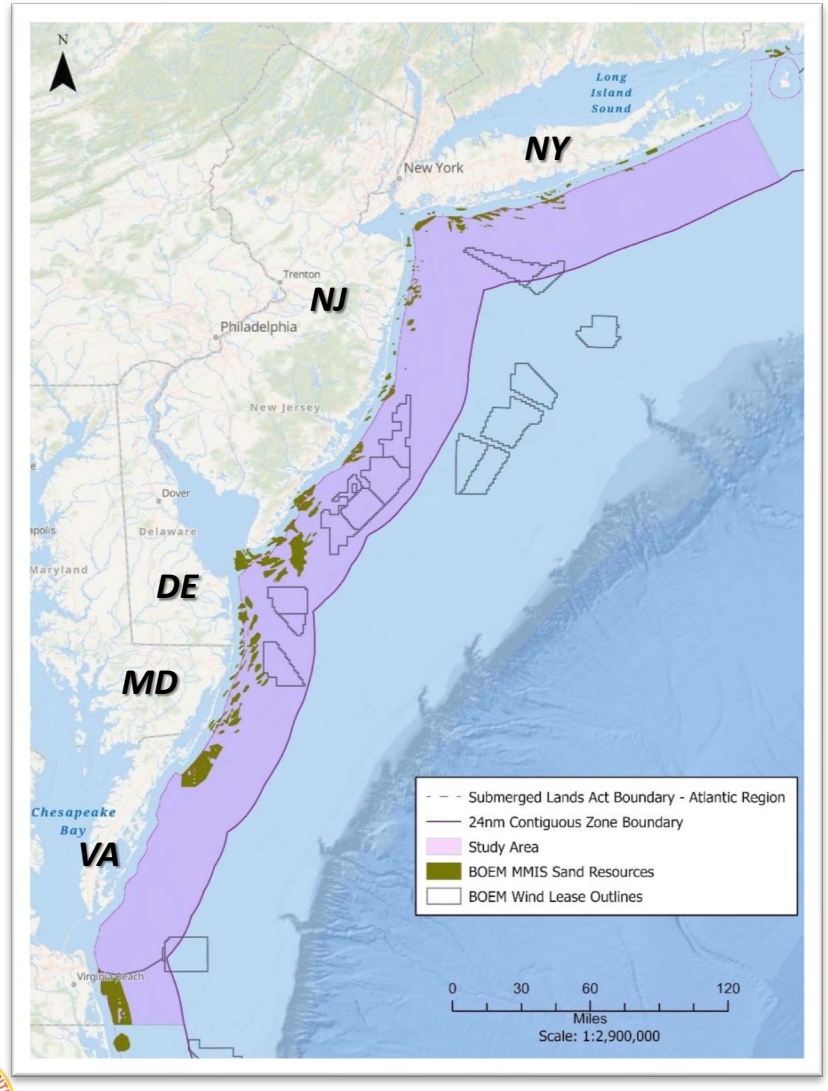


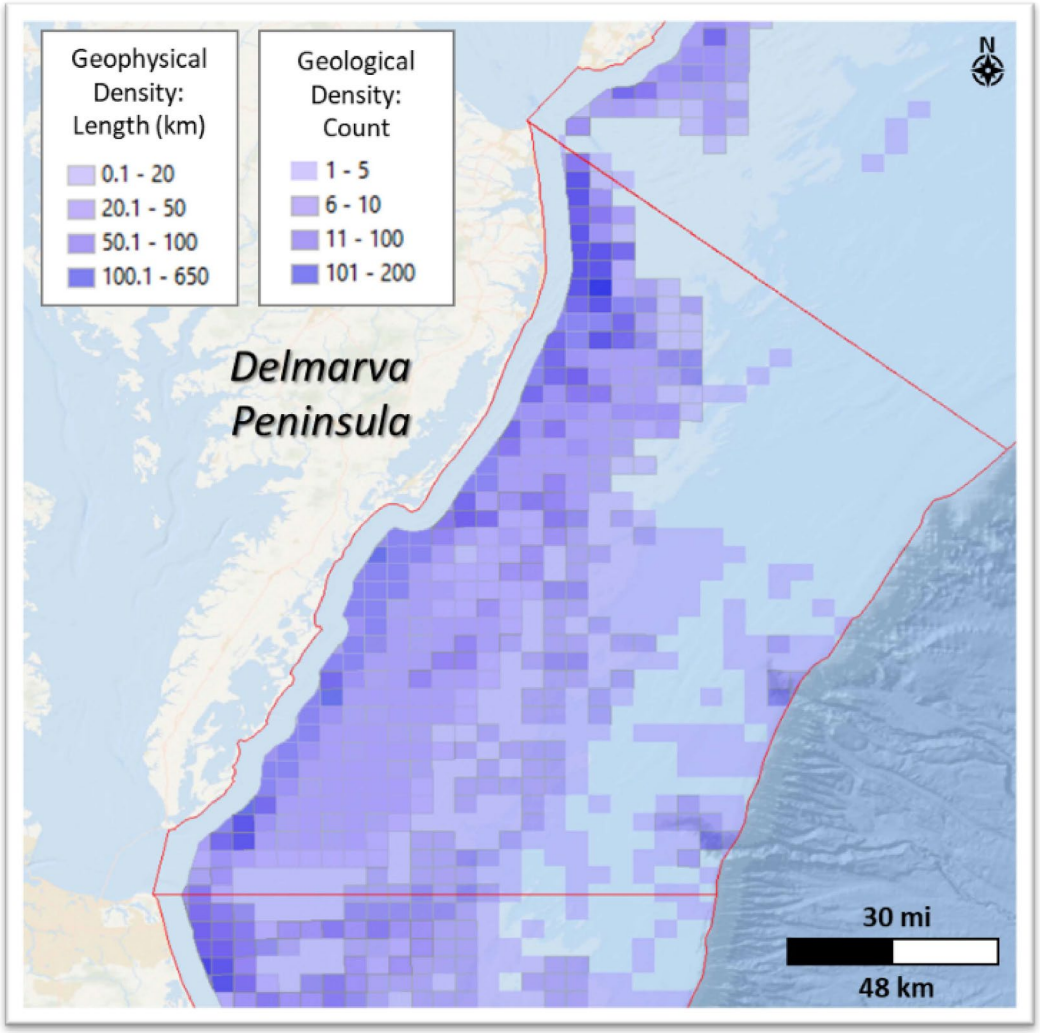
(Pendleton et al., 2017)

Mid-Atlantic Data Collection



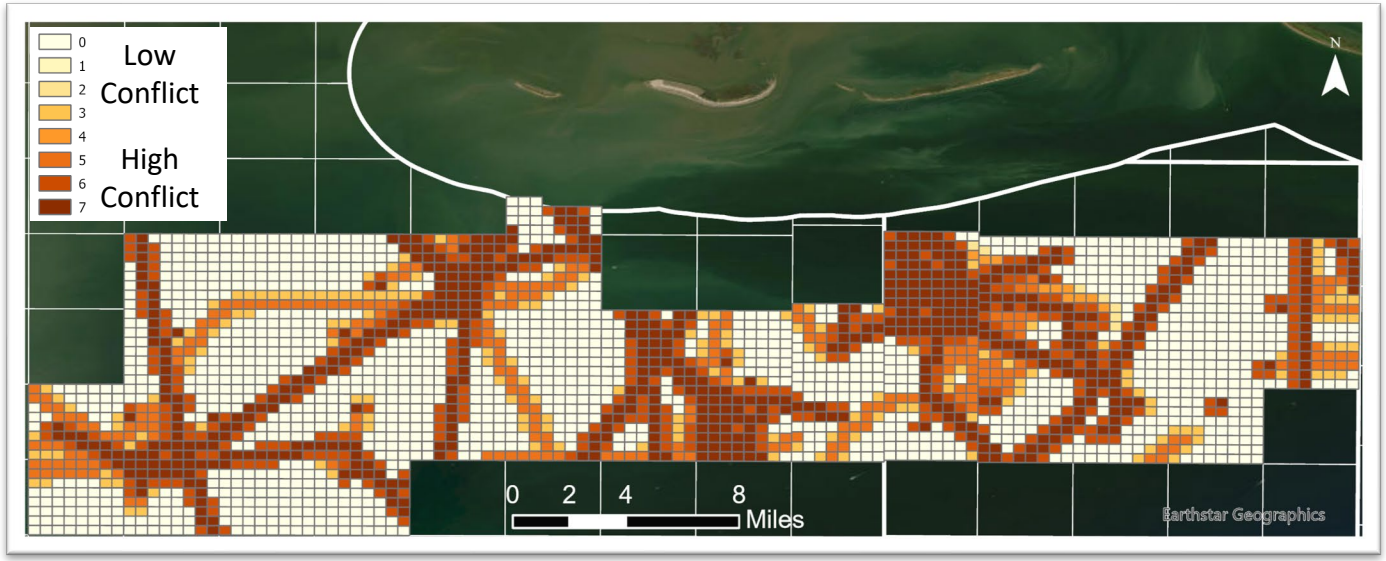
- Contract addressing sand resources needs in an area with increasing conflict
- Study Area
  - Regional extent: False Cape, VA to Montauk Point, NY
  - Offshore extent: Submerged Lands Act Boundary to the 24 nm Contiguous Zone Boundary
- Challenge
  - How do you focus data collection efforts over such a broad area with a reasonable amount of historical data?

Mid-Atlantic Data Collection



(Long, 2020)

- Developing focus areas:
  - Determine where areas exist with low data concentration and/or have poor data quality
  - Highlight areas that are the least conflicted
  - Integrate sand need assessments



(Stradley, 2019)

Environmental Studies related to Coastal Resilience

- In order to ensure stewardship of sand and the environment we need an improved understanding of the environment and how it relates to substrate
- Once coastal resilience needs are identified we need to consider trade offs with environmental resources such as essential fish habitat and to do this we need to understand baseline conditions
- The results from MMP environmental studies are used to characterize the effects of proposed dredging and design effective mitigation measures to avoid, minimize, or eliminate adverse environmental effects


OCS Study
BOEM 2013-0119

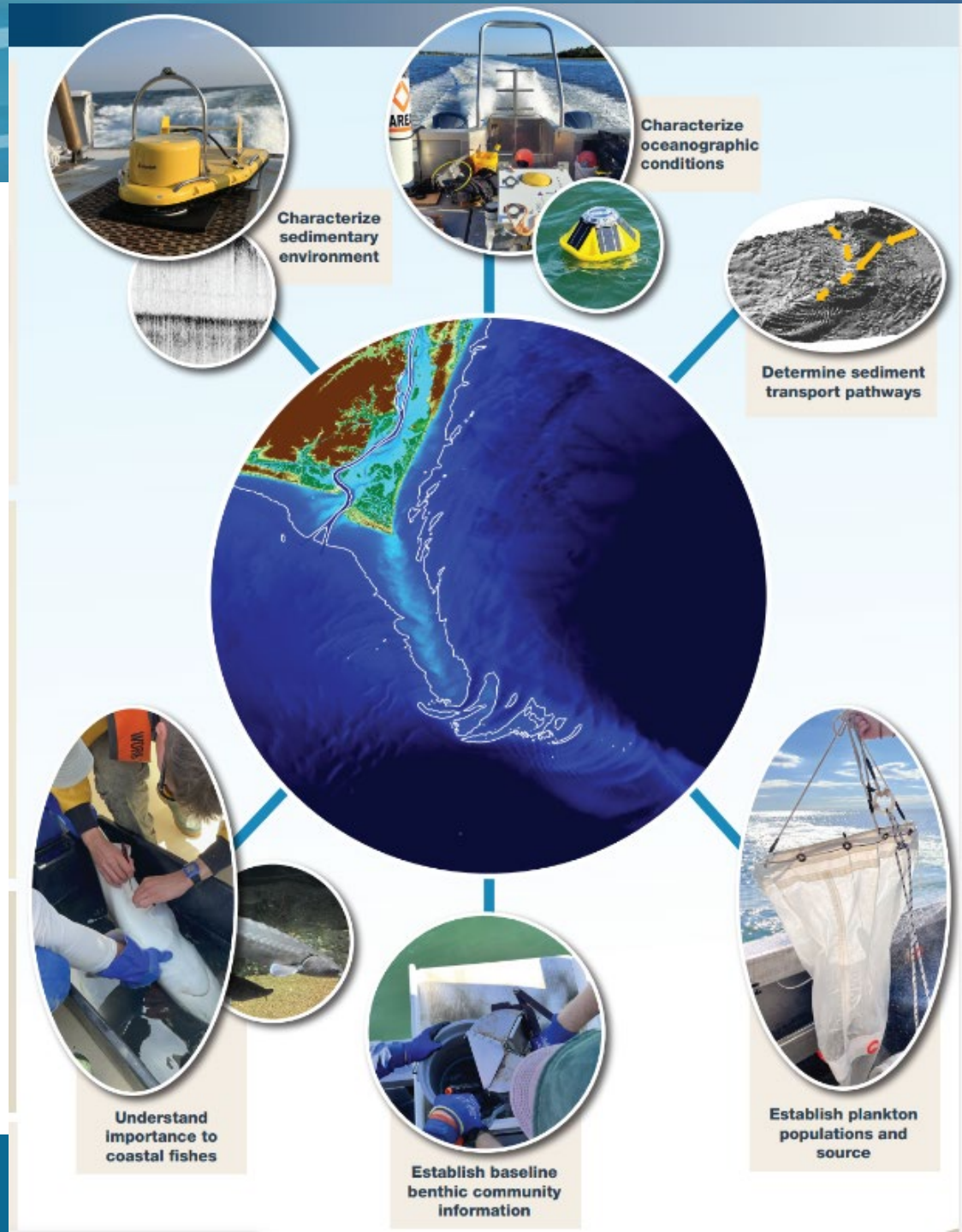
Review of Biological and Biophysical Impacts from Dredging and Handling of Offshore Sand

U.S. Department of the Interior
Bureau of Ocean Energy Management
Headquarters

BOEM

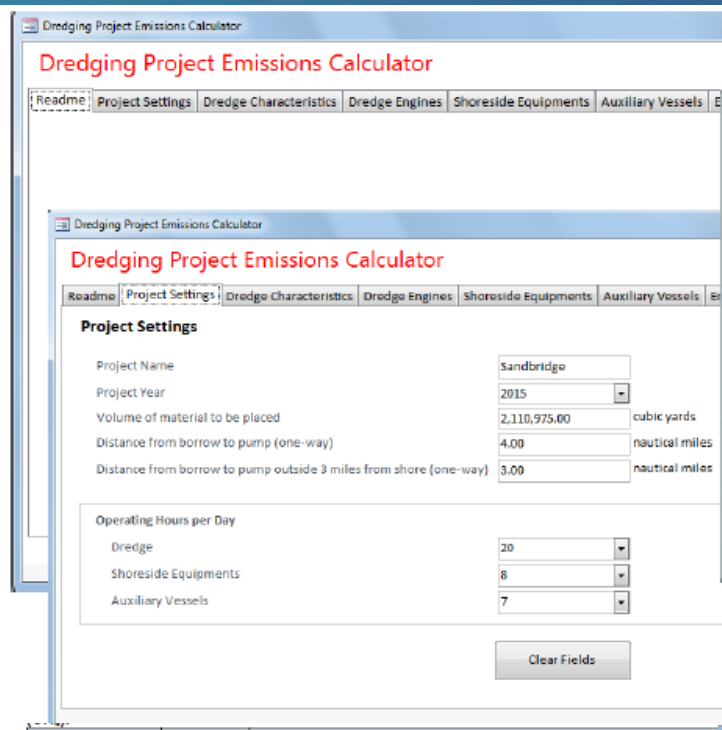
Frying Pan Shoals

- Through a cooperative agreement, UNCW is leading efforts to characterize an important sand resource at Frying Pan Shoals
- FPS is designated essential fish habitat, and there are concerns about impacts to habitat from dredging
- Long-term planning for the future of these sand resources requires improved understanding of this habitat's value
- Address specific knowledge and data gaps on:
  - Habitat and spatial distribution of key species
  - Benthic communities
  - Sediment transport pathways and rates
  - Influence of the Cape Fear River
  - Provide actionable data and modeling to examine impacts, mitigate risks, and enable long-term planning



Update to Dredging Project Emissions Calculator

- BOEM evaluates the potential impacts to air quality under its National Environmental Policy Act (NEPA) mandate. Existing NEPA requirements and guidance require analysis of greenhouse gas (GHG) and climate change effects of proposed actions under NEPA
- CEQ NEPA Guidance on Consideration of GHG Emissions and Climate Change (CEQ-2022-0005) - Agencies are to disclose and consider the effects of greenhouse gas (GHG) emissions and climate change
- Updating the MMP Dredging Project Emissions Calculator
- DPEC operational characteristics, activity profiles, loading factors, emission factors for equipment types not fully parameterized
- Add the estimation of methane emissions to the DPEC output calculations



Type	Mode	Emissions (tons)						
		HC	VOC	CO	NOx	PM_{10}	$PM_{2.5}$	CO_2
Inside State Waters								
Crew Boat		0.05	0.06	0.32	2.01	0.05	0.05	136.30
Tender 1		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tow Boat		0.11	0.11	0.72	3.69	0.08	0.07	272.61
Bulldozer		0.01	0.01	0.01	0.02	0.00	0.00	24.47
Bulldozer		0.01	0.01	0.01	0.02	0.00	0.00	24.47
Excavator		0.01	0.01	0.01	0.02	0.00	0.00	24.74
Dredge Vessel Generator	Transit	0.01	0.01	0.06	0.35	0.01	0.01	24.30
Dredge Vessel Main	Transit	0.09	0.09	1.58	6.71	0.13	0.13	432.21
Dredge Vessel Generator	Pumping	0.02	0.02	0.12	0.73	0.02	0.02	50.81
Dredge Vessel Main	Pumping	0.18	0.19	3.30	14.03	0.28	0.27	903.77
Outside State Waters								
Dredge Vessel Generator	Dredging	0.01	0.01	0.06	0.37	0.01	0.01	25.40
Dredge Vessel Main	Dredging	0.09	0.09	1.65	7.02	0.14	0.14	451.88
Dredge Vessel Generator	Transit	0.02	0.02	0.09	0.55	0.01	0.01	38.07
Dredge Vessel Main	Transit	0.1	0.1	2.47	10.52	0.2	0.20	677.13
All Locations and Sources								
Total Emissions		0.89	0.93	13.70	59.96	1.21	1.17	3973.26

Future Research Considerations

Additional research to consider examining the intersection between dredging impacts and climate change:

- Examination of the potential habitat shifts that may occur within the range of habitats impacted by offshore mineral extraction.
- Expansion of study concept to include the intersection of climate change with other potentially affected resource areas to add to our understanding of cumulative impacts (such as fisheries or sea turtles).

Outlook for the Future

- **Long-term considerations:**
  - Aim to proactively position BOEM to support coastal resilience
  - Maintain balance of resource and environmental stewardship in an increasingly crowded ocean
- **Key research themes to be addressed:**
  - Continue supporting reconnaissance-level data collection efforts and prioritize areas where demand outpaces supply
  - Promote research in trade-off analysis considering the range of ocean uses
  - Partner with state and federal agencies to unravel sediment transport processes from onshore to offshore
  - Undertake a coastal states supply and demand study
  - Future environmental studies that focus on climate change intersection with dredging

Requesting Input

- Next Steps for this Effort
  - Systems-based RSM Visioning: Phase 2
    - Visualizations of each RSM Theme
    - Defining roles and responsibilities
    - Defining strategies and tactics
- Recommendations for how to facilitate stakeholder buy in?
- Outstanding Technical Question: How do we determine what scales are the most effective for management both spatially and temporally?
- What resource areas are affected by climate change that could also be impacted by dredging?
- Are there cumulative impacts to consider related to climate change and the intersection with dredging?

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Ashley Long and Jennifer Bucatari

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