Environmentally-Sound Approach to Using Outer Continental Shelf Sand Resources

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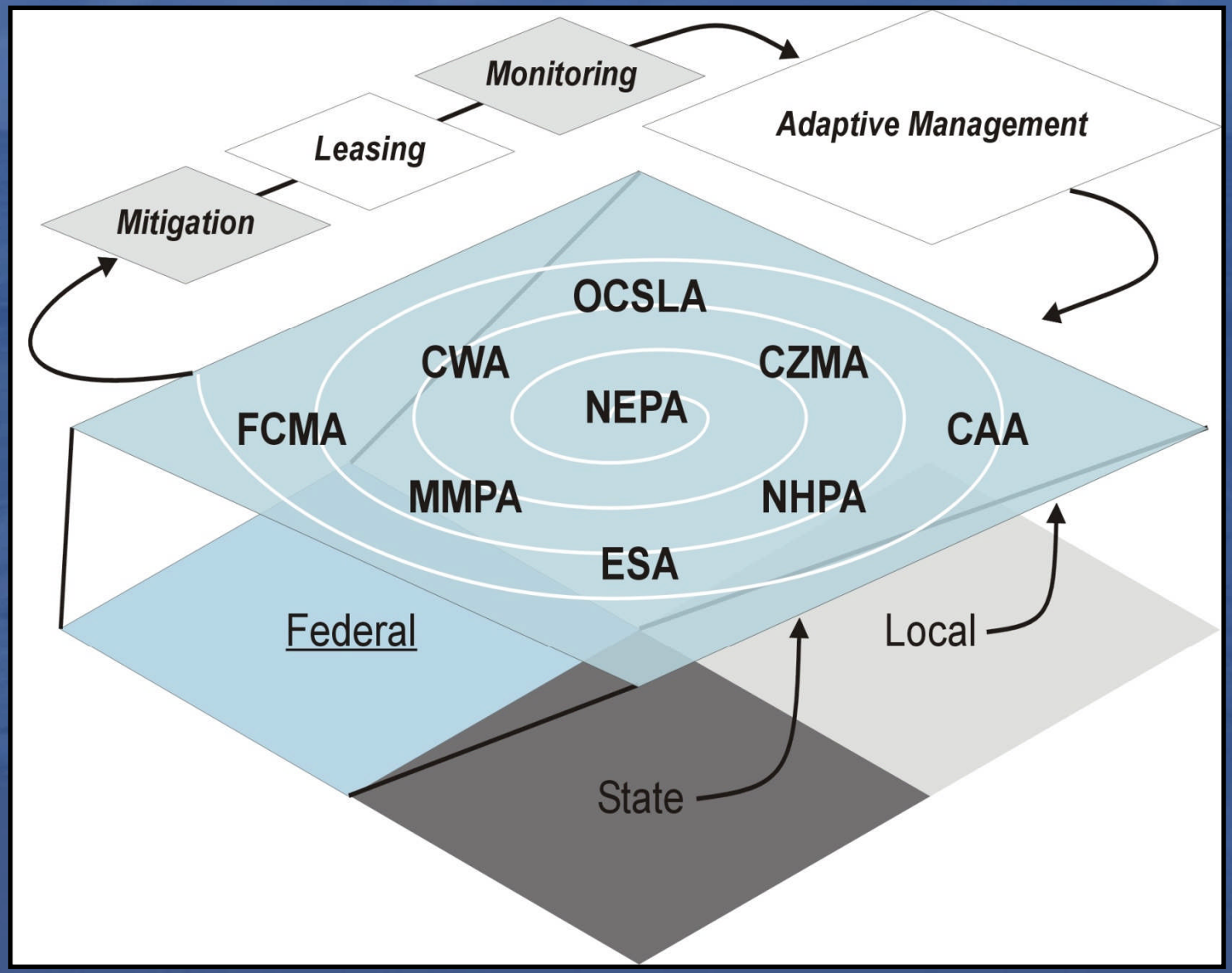
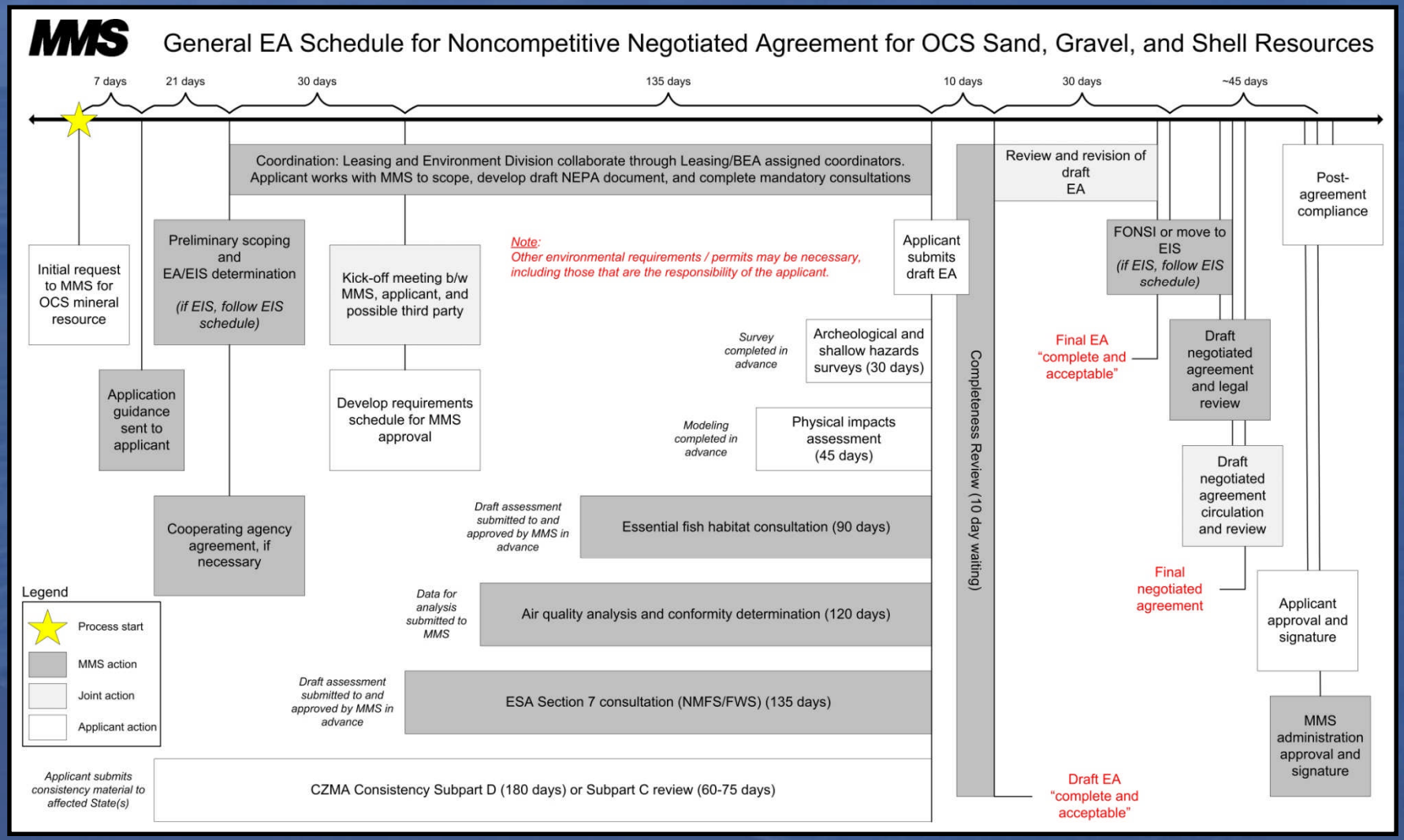
Loop of Environmental Responsibility

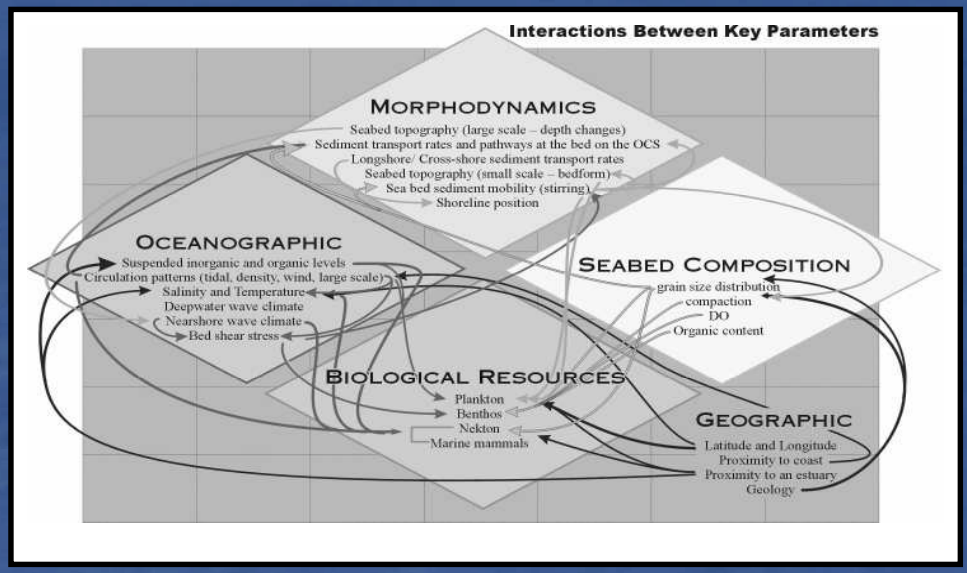


Environmental Review Process

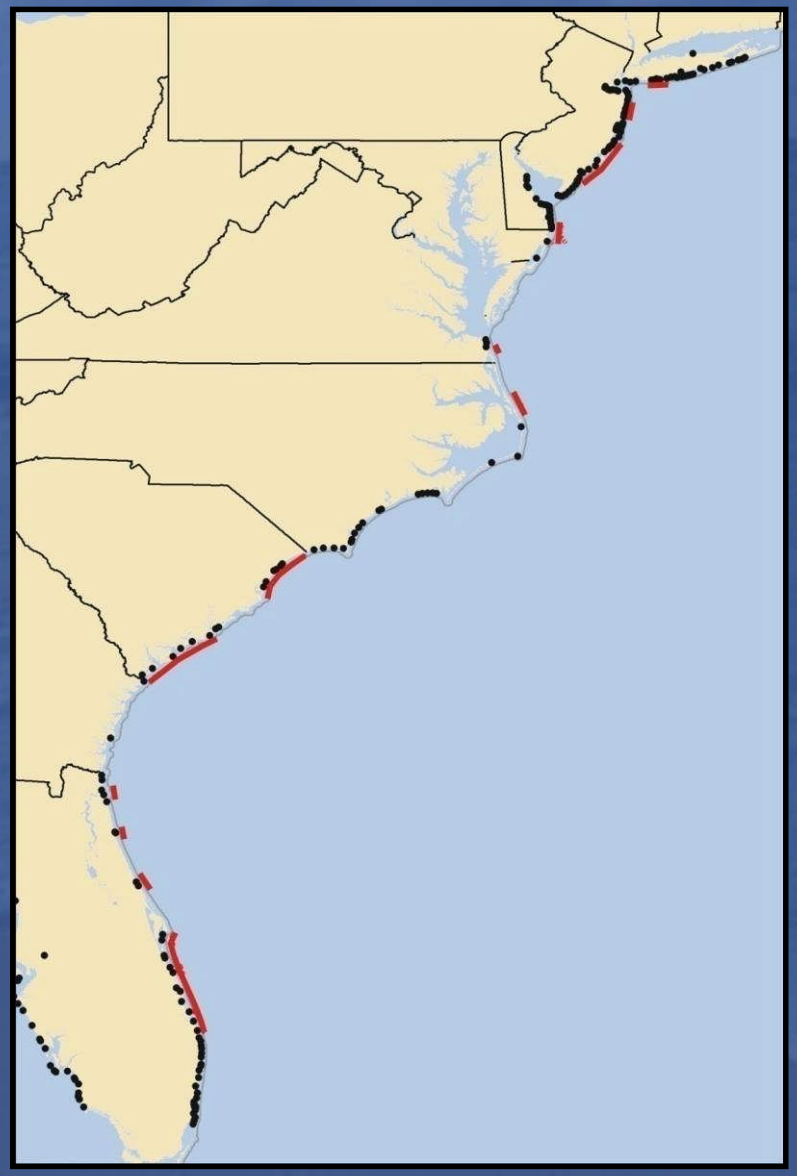


Key Environmental Parameters

- Physical Environment
  - Hydrodynamics and sediment transport
  - Shoreline change
  - Water quality
  - Air quality
- Biological Environment
  - Benthic habitat
  - Benthos
  - Nekton
  - Protected species
- Socioeconomic Environment
  - Cultural resources
  - Recreation and tourism
  - Recreational and commercial fisheries

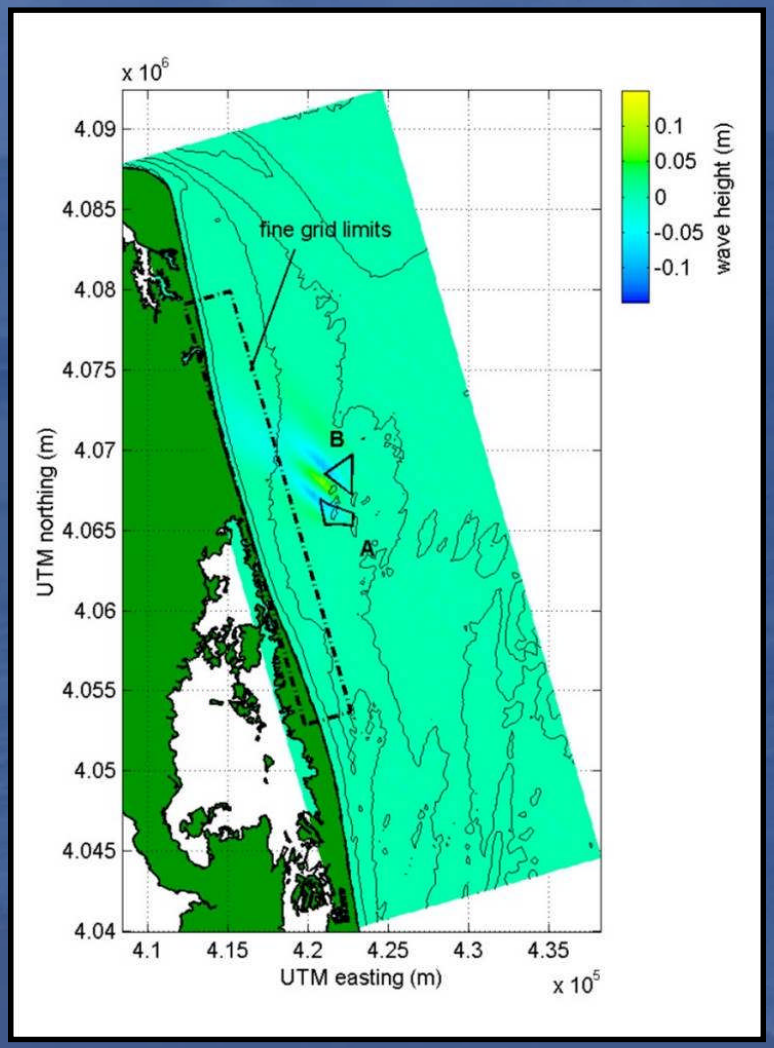


Atlantic Coast Environmental Research

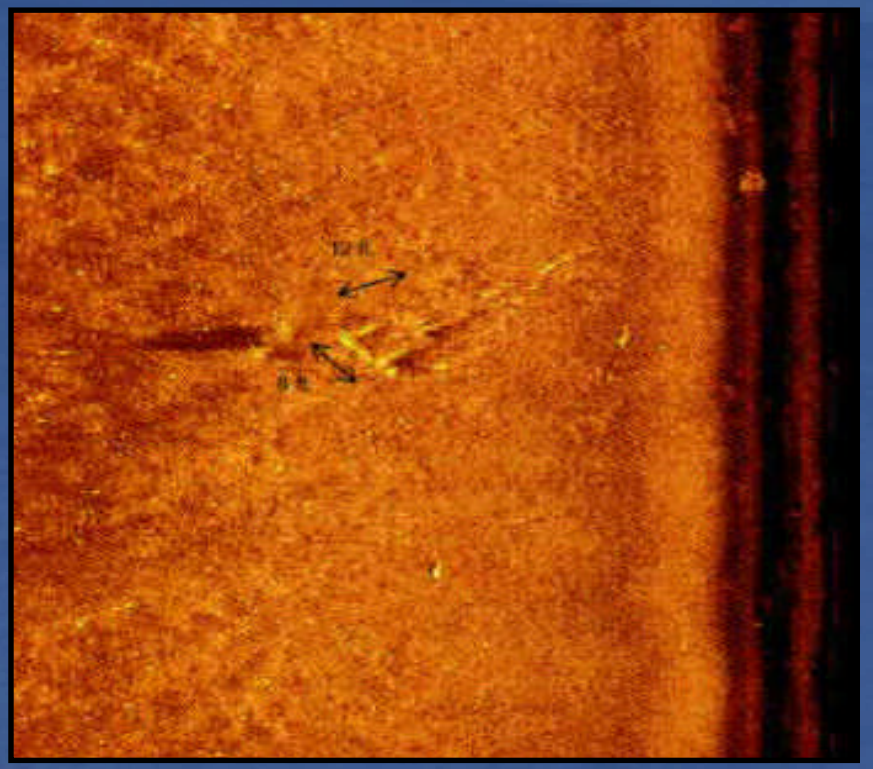


- Historic/Planned use of OCS Sand Resources
  - Assateague Island, MD
  - Wallops Island, VA (TBD)
  - Dam Neck, VA
  - Sandbridge Bach, VA
  - Topsail Beach, NC (TBD)
  - Myrtle Beach, SC
  - Duval Co., FL
  - Volusia Co., FL (TBD)
  - Patrick AFB, FL
  - Brevard Co., FL
  - St. Lucie Co., FL (TBD)
  - Martin Co., FL (TBD)
- > $5M directed towards environmental, site-specific research in Mid- and South Atlantic Bight since 1995

Pre-dredging Physical Assessment



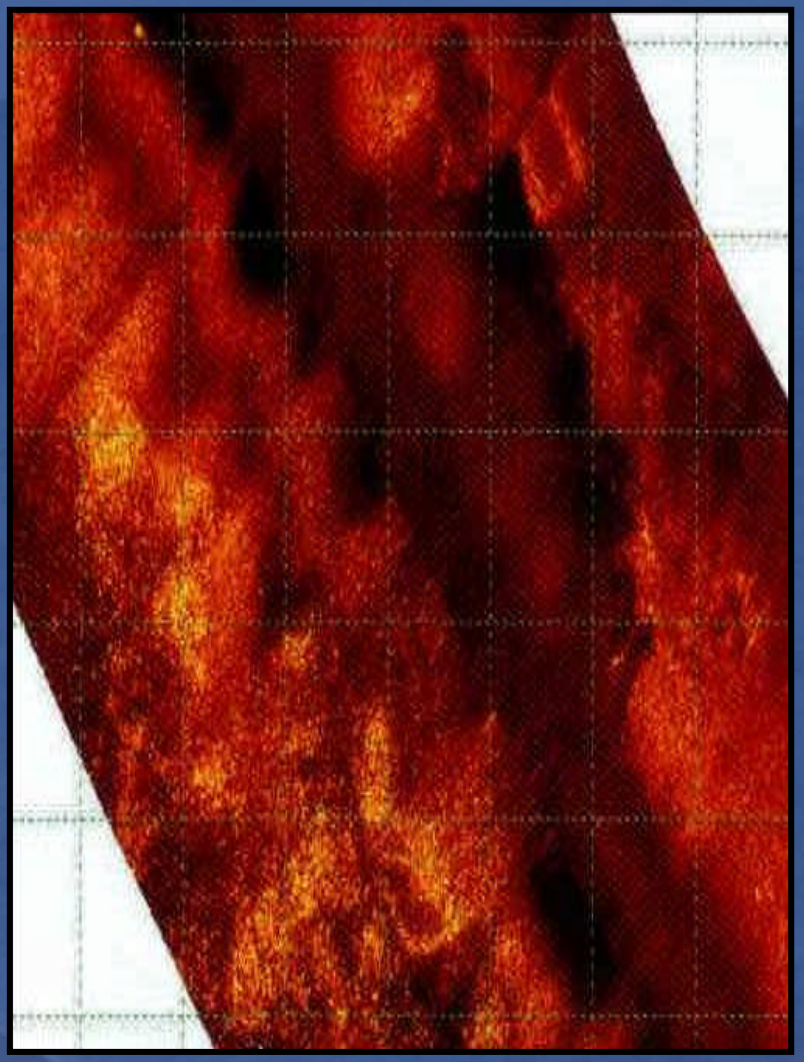
Pre-post dredging wave height isopach
(Sandbridge Beach, VA)



Archaeological target in side scan mosaic
(Myrtle Beach, SC)

Pre-dredging Biological Assessment

Pre-dredging benthic camera stillshot



Hard-bottom in side scan sonar imagery

Environmental Impacts and Mitigation

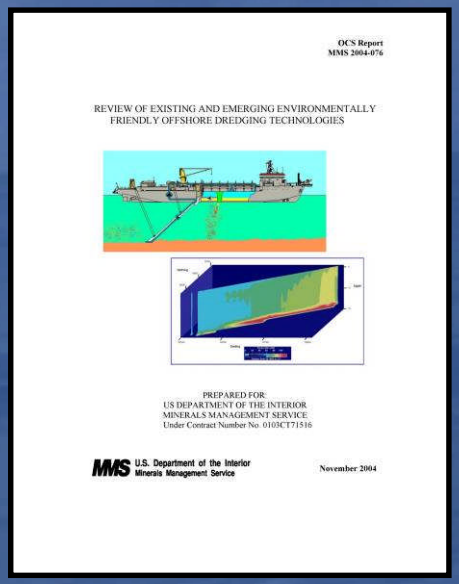
- Potential impacts (direct, indirect, cumulative) vary with resources present in affected environment
- Duration and intensity of impacts determined by location, volume, timing, dredging technology, etc.

- Objective: minimize deleterious impacts through the implementation of impact-reducing mitigation
  - Location, temporal, or scale constraints on dredging
  - Constraints on dredging / construction techniques
  - Monitoring and remediation
  - Offset impact through enhancement of environment

Priority Concerns on the OCS

- Long-term impact to offshore hydrodynamics and wave transformation
- Irrecoverable changes in substrate character, bathymetric relief, and morphologic stability
- Damage to existing infrastructure
- Damage to archaeological and cultural resources
- Short-term and cumulative impacts from degraded water/air quality
- Sedimentation of hard bottom and other sensitive benthic areas
- Protracted loss of benthic habitat and species diversity
- Injury, death, harassment of protect species
- Spatial/seasonal conflict with commercial and recreational fisheries
- Irrecoverable alteration or destruction of Essential Fish Habitat

Environmental Mitigation Research

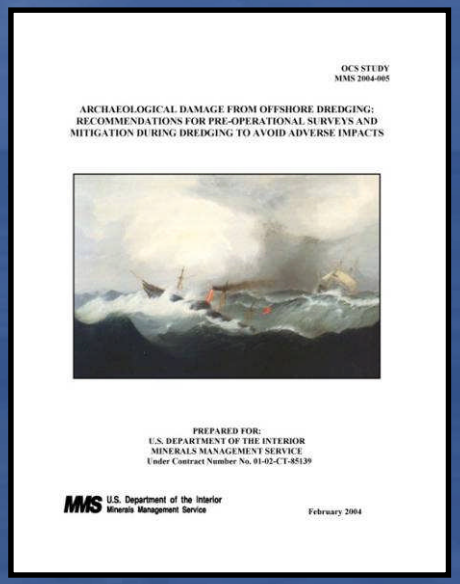

OCS Report
MMS 2004-076

REVIEW OF EXISTING AND EMERGING ENVIRONMENTALLY FRIENDLY OFFSHORE DREDGING TECHNOLOGIES

PREPARED FOR:
US DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE
Under Contract Number No. 0103CT71516

MMS U.S. Department of the Interior Minerals Management Service

November 2004

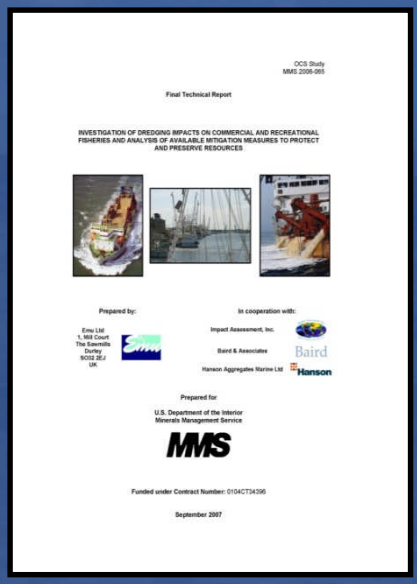

OCS STUDY
MMS 2004-065

ARCHAEOLOGICAL DAMAGE FROM OFFSHORE DREDGING: RECOMMENDATIONS FOR PRE-OPERATIONAL SURVEYS AND MITIGATION DURING DREDGING TO AVOID ADVERSE IMPACTS

PREPARED FOR:
U.S. DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE
Under Contract Number No. 01-02-CT-85139

MMS U.S. Department of the Interior Minerals Management Service

February 2004


OCS Study
MMS 2006-065

Final Technical Report

INVESTIGATION OF DREDGING IMPACTS ON COMMERCIAL AND RECREATIONAL FISHERIES AND ANALYSIS OF AVAILABLE MITIGATION MEASURES TO PROTECT AND PRESERVE RESOURCES

Prepared by:

In cooperation with:

Prepared for
U.S. Department of the Interior
Minerals Management Service

MMS

Funded under Contract Number: 0104CT34396

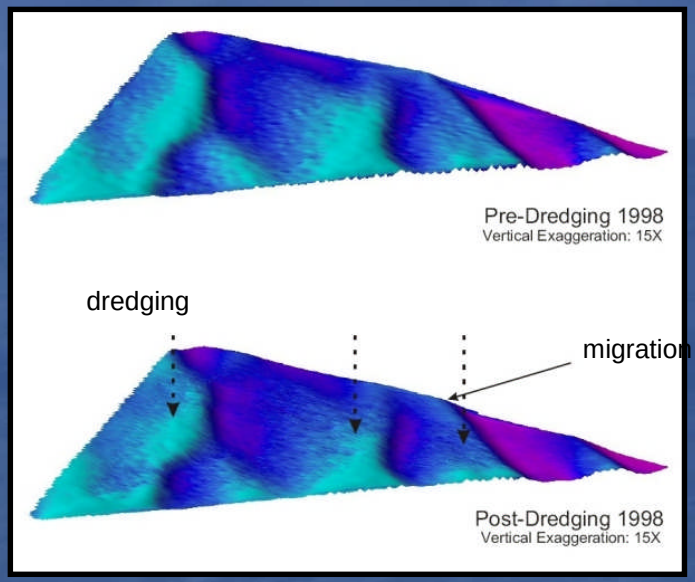
September 2007

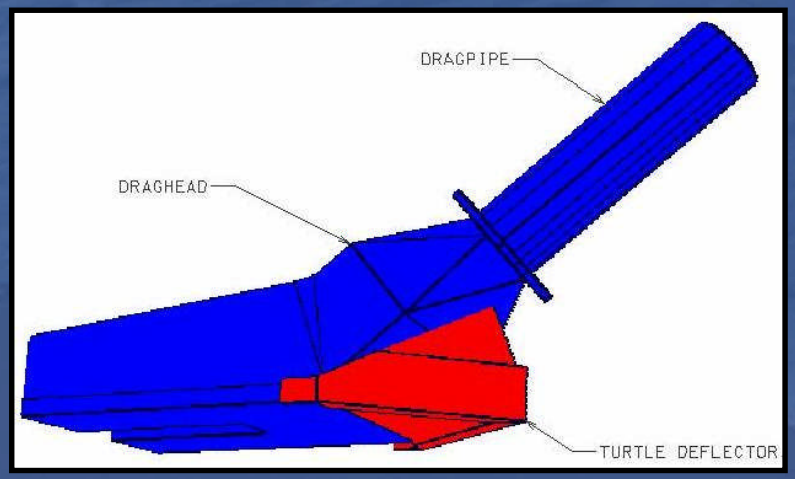
- > $2.7M invested since 1995 in mitigation research
  - State-of-the-art study to develop “Dredging Guidelines to Maintain and Protect the Integrity of Offshore Ridge and Shoal Regimes/Detailed Morphologic Evaluation of Offshore Shoals”
- Mitigation measures derived from research findings

Mitigation Measures and Impact Monitoring

- Location avoidance
  - buffers to archaeological targets, EFH, nesting protecting species, infrastructure, ordnance
- Environmental windows
  - hopper dredging, larval fishes
- Impact minimization
  - observers, dredging equipment, rotational/single use dredge areas
- Monitoring
  - dredge position/production, benthic recovery, bathymetric recovery

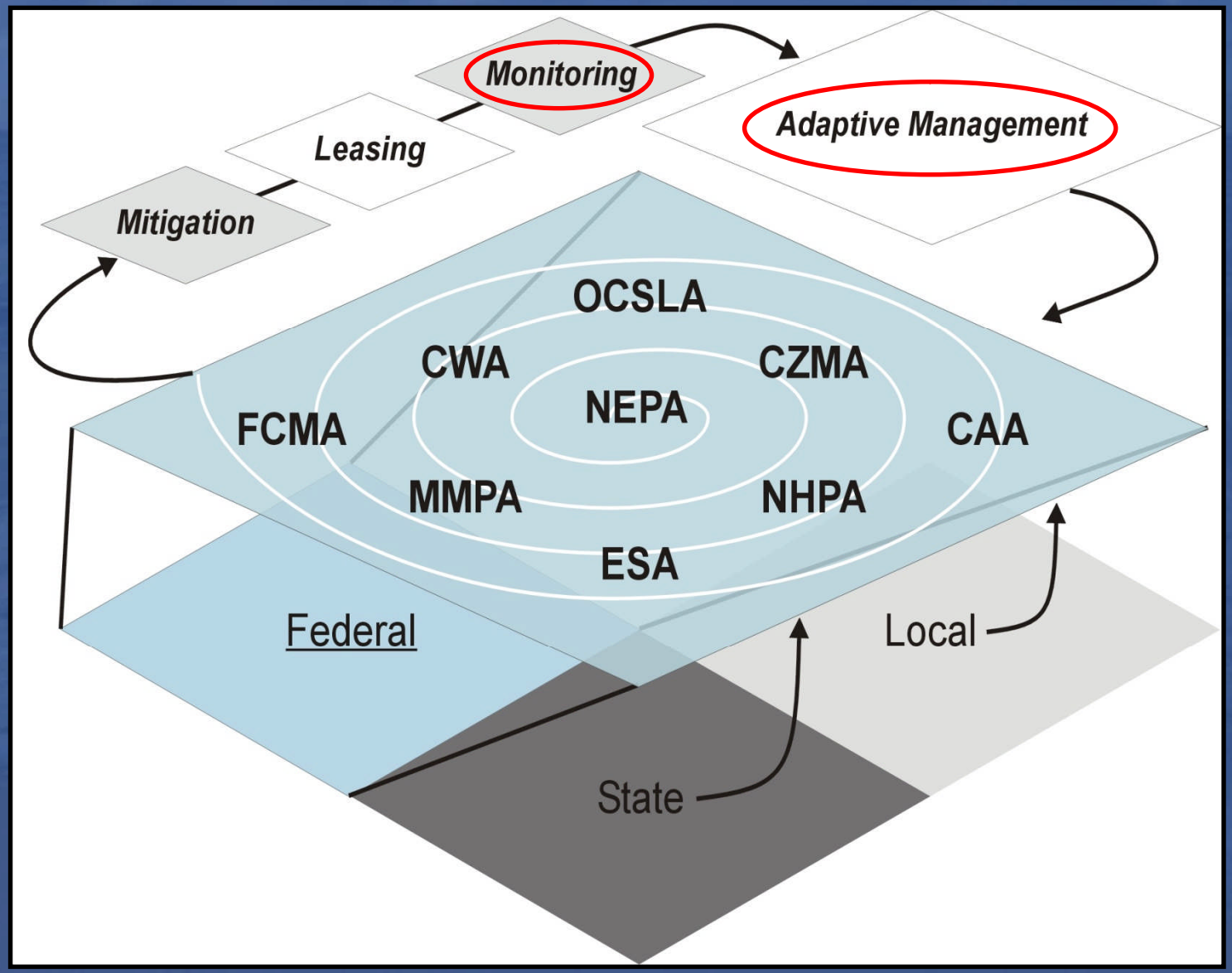
Negotiated Agreement Staple Requirements



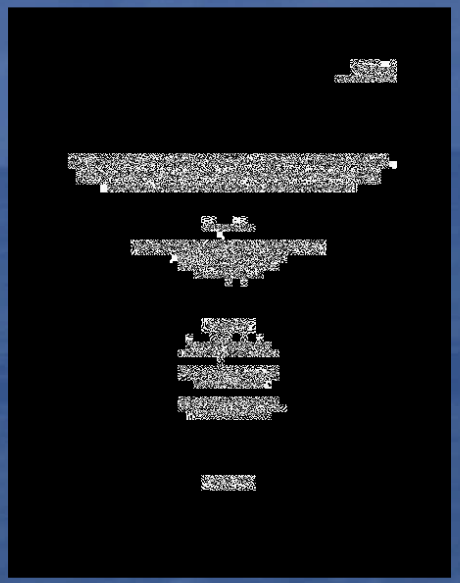


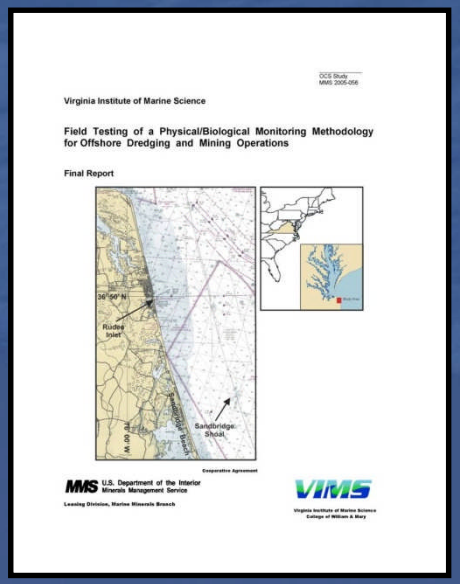
- Deflector, inflow screening (hopper dredging)
- Archaeological setbacks
- Continuous dredge location and production monitoring
- Pre- & post-dredging bathymetric surveying
- Observer monitoring/reporting
- Project completion report

Loop of Environmental Responsibility



Post-construction Monitoring





- MMS developed and tested monitoring protocol to measure impacts of offshore dredging – physical and biological protocols
  - Evaluate impacts using consistent methodology, promoting inter- and intra-project comparison
  - Ensure mitigation compliance
  - Evaluate the necessity and efficacy of mitigation measures
  - Facilitate a long-term, adaptive management approach

Environmental View of Adaptive RSM

- Early inter-governmental communication and cooperation (i.e., before alternative scoping during feasibility phase)
- Coordinate acquisition of supporting environmental information and improve data sharing
- Implement post-dredging monitoring as-needed, when cost-effective
- Develop and implement adaptive borrow area management / dredging plan for authorization period
- Develop regionally-consistent mitigation strategies consistent with regional sediment budgets and potential physical and biological impacts

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MMS's mission is to manage the ocean energy and mineral resources on the Outer Continental Shelf and Federal and Indian mineral revenues to enhance public and trust benefits, promote responsible use, and realize fair value.