Marine Spatial Planning:
A Tool for Implementing Ecosystem-Based Management

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"To succeed in protecting the oceans, coasts, and Great Lakes, the United States needs to act within a unifying framework under a clear national policy, including a comprehensive, ecosystem-based framework for the long term conservation and use of our resources".

President Barack Obama

June 12, 2009

Creation of the Ocean Policy Task Force
“EBM is an approach that provides a comprehensive framework for marine and coastal resource decision making. In contrast to individual species or issue management, EBM considers a wider range of relevant ecological, environmental and human factors bearing on societal choices regarding resource use”.

**Characteristics:** (1) geographically specified, (2) adaptive, (3) accounts for ecosystem knowledge and uncertainties, (4) multiple simultaneous drivers, (5) strives to balance diverse societal objectives, (7) incremental, (8) collaborative
MSP is:
A comprehensive, ecosystem-based process through which compatible human uses are objectively and transparently allocated to appropriate ocean areas to sustain critical ecological, economic and cultural services for future generations.

The goals of MSP are:
To maximize societal benefits of ocean uses, while minimizing impacts on ecologically sensitive areas and species and reducing conflicts between incompatible activities sharing marine locations.
Coastal and Marine Spatial Planning: Implement comprehensive, integrated ecosystem-based coastal and marine spatial planning and management in the United States.
Key Elements to a MSP Framework

• A Coherent Definition of MSP
• Geographical Extent
• Regional Planning Structure
• Enforceability
• Stakeholder Participation
• National Goals for Plans
• Capacity Building
• Technical Support & Infrastructure
Critical NOAA Capabilities Supporting Marine Spatial Planning

**Enabling Capabilities**
- Data Collection & Analysis
  - Ecosystem Dynamics Research
- Legal Mandates & Unique Mission
  - Mandate Coordination

**Decision Support Tools**
- Visualization
- Valuation
- Scenario Analyses

**NOAA Spatial Planning**
- Data Integration
- 4-D Analysis
- Interjurisdictional Coordination
- Convening/Coordination

**Balancing Biodiversity Protection & Sustainable Use**
- Fishery Management (MSRA)
- Protected Species BiOps & Consultations (ESA, MMPA)
- National Marine Sanctuaries (NMSA)
- Coastal Zone Management Act (CZMA)
- Etc.

**Legal Mandates & Unique Mission**
- Regional Compacts (States)
- Interagency Collaboration (Federal)
- Tribal Interests

**Enabling Capabilities**
- Integrated Ocean & Coastal Mapping (IOCM)
- Integrated Ocean Observing System (IOOS)
- Living Marine Resources Assessments
- Integrated Ecosystem Assessments (IEA)
- Human Use Patterns

**Decision Support Tools**
- Spatially Explicit Data
- Ecosystem Modeling
- Gap Analysis

**Mandate Coordination**
- Regional Compacts (States)
- Interagency Collaboration (Federal)
- Tribal Interests
Coastal & Marine Spatial Planning: Technical Requirements

Enhanced Mapping & Cadastre
Ocean Habitat Characterization Studies
Monitoring
Enforcement
Hydrodynamic Models
Living Marine Resource Assessments
Characterization of Human Use Patterns
Integrated Ecosystem Assessments (IEAs)
Biogeographic Assessment Approach to Support CMSP

Biogeographic Data Layers

- Imagery
- Patterns of Human Use
- Bottom Type
- Bathymetry
- Oceanography
- Species Distributions (many layers)

Combine Biogeographic Layers for Analysis

Example Integrated Biogeographic Analyses*

- Species Richness
- Threatened Habitats

Analytical Products to Meet Management Objectives

- Evaluate internal zone boundaries relative to biological resources
- Explore options for reducing ecosystem threats
- Evaluate alternative management strategies

* Specific analyses targeted to management needs
Mapping and Cadastre

Multibeam Bathymetry & Estimated Depths

Bathymetric Position Index

Enhanced Mapping

Multiple Use Marine Cadastre
Living Marine Resource Assessment

Alaska - Known Locations of Deep-sea Corals

Distribution of Illex illecebrosus captured during the 1978 NEFSC autumn bottom trawl survey in relation to bottom temperatures.
Human Use Characterization

Vessel Hours
- 1-8
- 9-25
- 26-63
- 64-145
- 146-309

Vessels Hours
Commercial Fishing Use
Hydrodynamic and Ecosystem Modeling

Hydrodynamic Model

Temperature, Velocity

Ecosystem Model

Human Activity

Community submodel

Food web

Habitat

Hydrographic submodel

Climate, oceanography

Biogeochemistry

Fishery submodel
### Coastal & Marine Spatial Planning (CMSP) Integrated Ecosystem Assessments (IEA)

**Needs enabling capabilities**
- Ecosystem dynamics research
- Data integration and analysis

**Needs decision support tools**
- Spatially explicit ecosystem data
- Ecosystem modeling
- Scenario analysis
- Gap analysis

**Needs coordination through**
- Regional compacts between governments
- Interagency collaboration at multiple levels
- Tribal interests

**Provides for capability needs**
- Understand ecosystem with models
- Integrate ecological and social data

**Provides for decision support tools**
- Integration of spatial data
- 3-D ecosystem models
- Evaluation of tradeoffs
- Gap analysis through scoping process

**Provides coordination (e.g.)**
- West Coast Governors Agreement supports California Current IEA
- Puget Sound IEA brings together local, state, federal, and tribal agencies represented in Puget Sound IEA
Current examples of activities within NOAA that support Coastal and Marine Spatial Planning

- Most have fairly specific goals
  - Protected species management
  - Sanctuaries and monuments
  - Fisheries
  - Offshore energy
  - IOOS

- May be comprehensive
  - Pilot project for San Pablo Bay, CA
Examples of CMSP: Protected Species

Rotate shipping lanes 12° to an area where right whale density is historically lower.

Up to 58% reduction in risk of ship strikes

Whale density
- Red = highest density
- Blue = lowest density
Examples of CMSP: Sanctuaries

Channel Islands National Marine Sanctuary

Complex Marine Spatial Planning Regime and Designation
Examples of MSP: Fisheries Regulations

67% of the U.S. EEZ is closed to trawling

Through the Magnuson Stevens Fishery Conservation and Management Act (MSRA), NOAA can restrict all or some fishing methods from areas in order to achieve sustainable management of fished natural resources, e.g. prohibiting bottom trawling in many deep coral habitats.
Examples of Non-Comprehensive CMSP: Rhode Island

Ocean Special Area Management Plan

- reducing its carbon footprint
- renewable energy resources
  - primarily offshore wind
- meet 15% of state’s energy needs
- sea-level rise policy for coasts
Planning for Wave Energy Usage in Oregon

- Two ocean issues
  - designation of marine reserves
  - siting wave energy facilities
- An executive order
  - prepare plan for ocean energy development
  - adopt as part of the Oregon Territorial Sea Plan
Coastal & Marine Spatial Planning California

Pilot Project for San Pablo Bay, California

- investigate the feasibility of comprehensive zoning
- Prepare a management framework
  - to minimize conflicts
  - to maximize efficient use
  - to address and manage current and potential cumulative impacts
Coastal & Marine Spatial Planning: National or Regional Scale?

National

- Top-down mandate
- Set the framework for integration of regional CMSP work
- Determine standards for data
- Ensure interoperability across regional efforts

Regional

- Bottom-up driven
- Demonstrate ability to work across NOAA as a model to work across agencies
- Regions will have to organize and co-ordinate efforts
- Regions will have different compelling issues
Coastal Large Marine Ecosystems and Regional Governance Organizations of the United States

- West Coast Governors Agreement
- Gulf of Mexico Alliance
- Great Lakes Regional Collaboration
- Northeast Regional Ocean Council
- Mid Atlantic Regional Council on the Ocean
- Southeast Regional Ocean Council
- Pacific Islands Ecosystem Complex
- Alaska Ecosystem Complex
- California Current
- Gulf of Mexico
- Caribbean Sea

Legend:
- US EEZ
- Regional ecosystems
CMSP Evolving Perspectives

- Objectives of CMSP not yet well articulated
- 3rd and 4th dimensions important (not just static maps)
- Critical Science
  - Ecosystem-relevant spatial planning tools
  - Market & non-market valuation of ecosystem services
- Asymmetric benefits & costs
  - Make governance using multiple sectoral statutes difficult
  - Multi-agency problem (interagency challenge)
  - Resource Rent Problem
- Integrated governance system does not exist
  - Need to explore “soft” vs. “hard” governance & planning
  - Conflict Resolution Mechanisms
- Important opportunities for “Sector Stacking” (e.g., aquaculture & energy). How can we promote this as a national priority?
spatial management

an historical perspective:

“...indications at the present time are that neither knowledge of the mechanisms of dispersion nor accuracy of data and commercial statistics is sufficient to justify the labour involved in rigorous treatment...[but] the method enables working solutions to be obtained.”

R.J. H. Beverton and S. J. Holt, 1957