



Ecosystem-Based Management in the Gulf of Maine: U.S. Legal and Institutional Considerations¹

Scientific Consensus Statement Defining Ecosystem-Based Management

“Ecosystem-based management [EBM] is an integrated approach to management that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers the cumulative impacts of different sectors.”

- McLeod et al., *Scientific Consensus Statement on Marine Ecosystem-Based Management (2005)*.

The Challenge: Existing and Increasing Pressure on Marine Ecosystems

More than half of the U.S. population lives along the coast—that is, more than 150 million people. In the Gulf of Maine states (Maine, New Hampshire, and Massachusetts), approximately 58% of the region’s more than nine million people live in coastal counties. According to the U.S. Census Bureau, by 2030, over 10 million people are predicted to be living in the region. In many areas, the marine environment is already overburdened by those living and working near and in the ocean and coastal areas. Because everything inland from the coastal environment runs downstream, the marine environment bears the brunt of all terrestrial activities making the challenge of marine EBM an especially complex one.

Governance bodies in the Gulf of Maine region must manage more people wanting to build in more places and more activities happening on land and at sea, while at the same time preserving and protecting the marine ecosystem services for future generations.

EBM: Management to Achieve Healthy, Productive and Resilient Ecosystems

EBM at its core recognizes that each individual activity cannot be evaluated in a vacuum, because impacts are cumulative and potentially greater than the sum of each individual activity. The people of the Gulf of Maine region must determine who gets to do what and where so as to conserve the integrity of the entire Gulf. This is not to say that the Gulf of Maine ecosystem will not or should not be impacted, but that impacts should be minimized so that the system continues to provide the desired ecosystem services now and in the future.

Key Question: How can the Gulf of Maine be managed so as to minimize individual, cumulative, and synergistic impacts on the marine environment?

1. UNDERSTAND THE ECOSYSTEM, ECONOMICS, AND SOCIAL SCIENCES

The first step is to understand the ecosystem in sufficient detail in order to make informed decisions. Ideally, all research should be coordinated and ecosystem-based. In reality, different sectors conduct different research with different objectives in mind. Often legal mandates and funding opportunities limit what is researched and how research is conducted. Information may come from academia, federal or state agencies, the private sector, or non-governmental organizations. It is important to point out that

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while information gaps do exist as described below, a lack of information should not be used to justify inaction. Decisions are and should be made based on the best available information.

Two approaches to address ecosystem information gaps are possible: (1) conduct ecosystem-based research; and (2) pull together sector-based research to understand the ecosystem. Both approaches will likely be needed in order to develop an appropriate understanding of ecosystems and impacts that can inform decisions on how to use the coastal and marine environment in a way that minimizes cumulative/synergistic impacts.

Information Needs

- Biological information both on habitats and on how marine habitats are used by different organisms in order to prioritize conservation and management decisions
- Understanding about how activities in one sector affect the resources in another (e.g., how does coastal development affect coastal or oceanic fisheries habitat?)
- Resources or land use carrying capacity
- Life cycle or historical fluctuations in species populations
- Economic valuation of ecosystem services
- Social science research to understand how people use and need ocean and coastal resources

Examples of Marine Ecosystem Research Programs in the Gulf of Maine

- Gulf of Maine Mapping Initiative
- Gulfwatch
- Ocean Observing Systems: Gulf of Maine Ocean Observing System (GoMOOS) and Northeastern Regional Association of Coastal Ocean Observing Systems (NERACOOS)
- Gulf of Maine Ocean Data Partnership
- U.S. GLOBEC (Global Ocean Ecosystem Dynamics) Georges Bank Projects
- Regional Association for Research on the Gulf of Maine (RARGOM)
- Recent collaboration to create pilot projects to develop the scientific basis for ecosystem-based management making use of the Multi-Integrated Model for Ecosystem Services (MIMES)
- Gulf of Maine ECOHAB (Ecology of Harmful Algal Blooms)
- Gulf of Maine Census of Marine Life
- Massachusetts Ocean Partnership Fund (providing a comprehensive analysis of scientific gaps in ecosystem-based coastal and ocean management in Massachusetts)

2. TAKE AN ECOSYSTEM APPROACH WITHIN EACH SECTOR AND JURISDICTION

The absence of a regional governance body in the Gulf of Maine does not limit the ability of each federal or state agency, non-governmental organization, or others to take the ecosystem approach to management within its jurisdiction or area of expertise.

Innovative Ecosystem Approaches

- **Beginning with Habitat** Program in Maine conducts GIS mapping of habitats, including riparian habitats, and makes conservation recommendations. It is a partnership with several state and federal agencies and non-governmental organizations.
- **Saco River Corridor Commission** in Maine, established by the Saco River Corridor Act to prevent “intensive and poorly planned development,” is made up of municipal officers from each of the municipalities along the corridor and has the authority to regulate development of the region based on a comprehensive plan (Maine Code, Title 38, §§951 et seq.).
- **The Land Conservation Plan for New Hampshire’s Coastal Watersheds**, developed in partnership by The Nature Conservancy, Society for the Protection of New Hampshire Forests, Rockingham Planning Commission, and Strafford Regional Planning Commission, is a coastal watershed-scale plan that identified critical conservation areas and strategies to conserve natural resources.



- **Gateway Route 1 pilot project** in Maine Gateway 1 is a long-term strategic land-use and transportation planning project for the Midcoast Route 1 region in Maine. Collaboration among 22 communities and state and federal agencies, Gateway 1 explores new ways of combining transportation and land-use decision-making.
- **Down East Initiative** in Maine is a collaborative ecosystem-based management pilot project that seeks to rescale approaches to fisheries management and link fishermen and science-based knowledge systems.
- **Coastal and Estuarine Land Conservation Program (CELCP)** is a federally program that provides matching funds to states to acquire land or conservation easements to protect coastal and estuarine environments. Participating states develop conservation plans and nominate land conservation projects based on the plan. Projects are funded through a competitive grant process. The Massachusetts CZM Program has developed a plan and has received funding for the Town of Plymouth through this program.
- **The Massachusetts Estuaries Project** seeks to determine estuary- and embayment-specific nitrogen limits that will return impaired waterbodies back to conditions that foster designated uses. The project takes into account human uses (current and future), nutrient budgets, water chemistry, freshwater inputs, tidal activity, and the distribution and abundance of eelgrass and benthic macroinvertebrates. In addition, unimpaired waters are modeled to determine what levels of nitrogen input will maintain desired water quality and habitat conditions.
- **The Ecosystem Goal Team** is a cross-cutting program of the National Oceanic and Atmospheric Administration (NOAA) that seeks to protect, restore and manage coastal and ocean resources through a regional ecosystem approach to management.

3. COORDINATE AND COOPERATE ACROSS REGIONS, SECTORS, AND JURISDICTIONS

There are many regional bodies, working groups, councils, etc., that bring federal and state agencies and stakeholders together to address a variety of regional environmental issues, all of which can be linked to the ocean either directly or indirectly. Maine's Department of Environmental Protection has a 22-page document listing its collaborations, which provides one example of the level of cooperation occurring at any given time. Cross-jurisdiction or cross-sector regional collaborations often focus on education and outreach, information-sharing, coordinated research, and coordinated restoration.

Challenges

- Regional approaches may provide a foundation to make decisions, but there are few instances where cumulative impacts, especially cross-sectoral and cross-jurisdictional, are addressed through regional approaches. Decisions about who can do what, and where, still happen at the sectoral level and rarely consider cumulative impacts within or across sectors.
- In the absence of a legal mandate to act, regional governance requires strong leadership that may be driven by grassroots support or individual motivation.
- Cooperative approaches may result in great plans but lack the institutional support to fund proposed activities.

Examples of Cooperative Approaches in the Gulf of Maine

- **Regional Bodies that address marine ecosystem challenges** include the Gulf of Maine Council on the Marine Environment and the new Northeast Regional Ocean Council.
- **Regional bodies that address a subset of regional challenges** that ultimately affect the marine ecosystem include the New England Interstate Water Pollution Control Commission, New England Regional Dredging Team (Sudbury Group), New England Fisheries Management Council, Atlantic States Marine Fisheries Commission, Conference of New England Governors and Eastern Canadian Premiers.
- **Sub-Regional bodies** that address marine ecosystem challenges include National Estuary Programs (Casco Bay Estuary Partnership, Massachusetts Bays Program, New Hampshire Estuaries Project), National Estuarine Research Reserves (Wells Reserve, Great Bay Reserve).



- **State programs and initiatives** including potential state governance that would be achieved under the Massachusetts Ocean Act and the Massachusetts Ocean Partnership Fund—an existing public-private partnership seeking to implement EBM in Massachusetts.
- **Memorandums of Understanding/Agreement** are often used by agencies to enable cross-sectoral collaboration among state and/or federal agencies in the absence of legal mandates. For example, an MOA between the Maine Department of Environmental Protection, the Maine Department of Transportation, and the Maine Turnpike Authority helps the agencies collaborate to manage stormwater.
- **Grassroots or NGO-led initiatives** include FishResearch.org and Friends of Taunton Bay (with the mission “to understand and promote the health and integrity” of the ecosystem).

4. PICK THE RIGHT ISSUES FOR THE REGION AND THE SCALE

The “right issue” is largely dependent upon the region and the scale. Of particular importance for the Gulf of Maine region are energy siting decisions (e.g., liquefied natural gas port siting) and management of living marine resources that move across jurisdictions, including both fisheries and protected species.

Challenges

- At some point, everything impacts the environment. The complexities of the relationships can quickly become mind-boggling and EBM seems to become the management of everything, soon making it meaningless. The challenge lies in picking the key issues that are most appropriately solved using regional collaboration.
- Too many objectives and action items can stall regional initiatives. A small number of achievable goals may be the best approach to achieve progress and allow expanded program development at a later point.

5. BRING THE RIGHT PEOPLE TO THE TABLE

The “right people” will depend on the issue and what is at stake in the decision.

Challenges

- Willingness and ability (both time and money) for participants to travel to regional meetings or otherwise participate in meetings. Getting the appropriate participants together may limit the size of the EBM region. Smaller-scale initiatives may have a greater chance of bringing the “on-the-ground” actors together to make decisions.
- Often missing from regional ocean governance programs are (a) local level actors and (b) important industries and the agencies that regulate them including, for example, transportation industries and transportation departments and offshore energy and mining industries and the Minerals Management Service.
- The more people that are involved, the more cumbersome the process. The usefulness of having multiple stakeholder involvement must be balanced against the weight of the process.

6. MINIMIZE CUMULATIVE IMPACTS TO MAXIMIZE ECOSYSTEM SERVICES

The biggest challenge for EBM implementation is minimizing cumulative impacts to maximize ecosystem services. Minimizing cumulative impacts is a major challenge within sectors and virtually nonexistent across sectors.

Challenges

- Project-level proposals drive decision-making at permitting agencies.
- Lack of information necessary to understand how one activity or action will affect the entire system makes it challenging for permitting agencies to effectively consider multiple impacts.
- Lack of explicit authority or mandate to consider cumulative impacts within or across sectors.
- Permitting decisions are sector-based. While agencies and the public may provide input and feedback into the permitting decision process, the final decision rests with one agency.



- If multiple sectors impact a single resource, one agency's course of action is typically limited to regulating a single sector. For example, if both water quality decline and fishing pressure cause a reduction in the number of fish, the main recourse for a fisheries permitting agency would be to limit fishing.

Existing Approaches

- **Maine Natural Resources Protection Act** finds that "the cumulative effect of frequent minor alterations and occasional major alterations of these resources [including coastal wetlands and coastal sand dunes systems, among others] poses a substantial threat to the environment and economy of the State and its quality of life" (Title 38 § 480-A). The Department of Environmental Protection has developed a "Cumulative Impact Assessment Form" to help permitting agencies evaluate proposed activities in light of other impacts (though there is no legal mandate to use the form, and the form may be limited in utility by the quality of the ecosystem information needed to support the analysis).

7. MAKE TRADEOFFS NECESSARY TO MAXIMIZE ECOSYSTEM SERVICES

Implicit in undertaking an EBM approach is the need to weigh competing objectives and make the necessary tradeoffs to ensure that cumulative impacts are limited.

Challenges

- Some issues are off the table for tradeoff discussions, for legal reasons or otherwise. These include, for example, protection of endangered species, protection of areas or items of historical significance, and issues of national security.
- There is no legal mandate to force decision-makers to make tradeoffs across sectors.
- There is a lack of scientific information available upon which to make tradeoffs based on the value of ecosystem services.
- Different stakeholders place different values on ecosystem services and have different perspectives on short-term versus long-term economic gain.

Existing and Potential Approaches

- **Massachusetts Ocean Act** would require the state to develop an ocean management plan that coordinates ocean uses in state water; create an Ocean Resources and Waterways Trust Fund to restore and enhance marine habitat and resources, create a Marine Fisheries Trust Fund for preservation, enhancement, restoration and management of fisheries; and create an ocean management advisory commission and an ocean science advisory council. The Act would require state agencies to conduct their activities in conformance with applicable provisions of the management plan. Presumably state agencies would make the necessary tradeoffs in development of the ocean management plan.

8. ADAPT TO CHANGES IN GOVERNANCE AND THE ECOSYSTEM

Adaptive management allows regions to test new ideas and make informed decisions based on past actions and their consequences. Because ecosystem information is limited and ecosystems are dynamic, reevaluation of past decisions and actions is of critical importance to achieving healthy, productive and resilient coasts.

Challenges

- Adaptive management can provoke concerns from the regulated community, which often relies on final decisions in order to have some security in its investments.
- The adaptive management review process can be long and cumbersome, making regular reevaluations challenging.
- The legal and regulatory process can also be long and cumbersome, making adaptive management using legal and regulatory tools challenging.