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October 2, 2009

Deerin Babb-Brott, Director
Massachusetts Office of Coastal Zone Management
Re: Draft Ocean Management Plan
251 Causeway Street, Suite 800
Boston, MA 02114

Dear Mr. Babb-Brott:

On behalf of the Provincetown Center for Coastal Studies, I commend you and the team of Executive Office of Energy and Environmental Affairs (EEA) staff for a remarkable effort of developing this draft Ocean Management Plan for Massachusetts' waters. Although the timeframe was short, the data collection related to the development of the Plan was well done and rigorous. Contributions by some of the best scientists in their fields enhance the quality of the draft plan, as do the contributions of the many stakeholders and interested citizens who attended listening sessions and other public forums. Staff of the Provincetown Center for Coastal Studies (PCCS) reviewed the plan (MOMP) and offer the following comments provided in the context of *improving* the MOMP.

Ecosystem Status

We recommend that EEA include a more detailed discussion of the target conditions with regard to ecosystem status. While the dynamism of the system is acknowledged in the draft MOMP, what the target *should be* is by implication here established as "today's" baseline.

Although the draft MOMP acknowledges that we are dealing with a heavily impacted system, it does not address the range of baselines that could be used to describe the status of resources which the plan is seeking to address. Acknowledging the state of the target is essential to setting and achieving management goals and allows for later modification of baseline condition.

Sources of Data and Data Assessment

PCCS recommends that the next iteration of the MOMP include:

1) A more comprehensive focus on the interconnectedness within the ecosystem, specifically:

    a) Consideration of the role plankton production, seasonality and distribution

Productivity, seasonality and distribution of plankton in the water column will be important considerations in evaluating alternative energy projects, such as tidal turbines, and sand and gravel extraction.

On-going habitat studies in Cape Cod Bay by the Provincetown Center for Coastal Studies provide additional information on the conditions that are believed to cue the movements and activities of North Atlantic right whales in Cape Cod Bay and adjacent waters. One example of many that demonstrates the importance of considering plankton production in developing management strategies is demonstrated by results of PCCS right whale research, which indicates that "…zooplankton may be seen to 'control' the distribution and occurrence of the whales within the federally designated North Atlantic Right Whale Critical Habitat. Therefore, the characteristics of the zooplankton resource may be used to monitor and predict the movement, aggregation, and behavior of the whales, thereby informing management" (Leeney *et al.* 2008).

b) Consideration of historic data

As noted above, the definition of baseline frames the analyses and determination of management approaches. PCCS recommends the use of historic data to define not only the baselines, but also the habitats and conditions that are to be considered in the compatibility assessment and evaluation of projects. One example is the historic record of eelgrass distribution. The state Department of Environmental Protection mapped eelgrass beds in 1995, 2001, and 2006 and documented the loss of over 8,000 acres of eelgrass over those 11 years. However, rather than identifying the 1995 distribution of eelgrass, representative of habitat capable of supporting eelgrass as an SSU, the draft MOMP appears to use only the 2006 distribution.

c) An expanded assessment of sediments, seafloor rugosity and seasonality and their relationship to habitat suitability

While the draft MOMP identifies hard/complex bottom areas as a special, sensitive or unique (SSU) habitat, the habitat analyses in the plan are generally based on the current presence of organisms. PCCS believes that a fuller assessment of habitat suitability is appropriate and important to future ocean planning efforts, as noted in the discussion on potential habitat mapping in the Baseline Assessment section of the plan.

Managing a seasonally evolving resource with snapshots of data that have no seasonal annotation might lead one to misinterpret the state of the ecosystem or misidentify transient or ephemeral resources. For example, if one were to look off the coast of Plymouth in the summer there might be a sandy bottom; come December the thin layer of sand is gone and an exposed rocky bottom is seen. Annotating this seasonality within the metadata for certain resources will be critical in the future.

2) <u>Minimum requirements for assessing particular areas of the seafloor for certain types of actions</u>

Given the myriad data sources and the likelihood of using data for purposes other than initially conceived (e.g. usSEABED), some guidelines for understanding the appropriate scale and resolution should be considered. Converting or normalizing data for one purpose may decrease the usefulness of those data for other purposes. Standardizing minimum requirements for different assessments of

ocean resources would improve the quality of project proposals within ocean management areas, review given to those projects and the overall management of those resources.

Use of the best available data may not be sufficient if the best available data aren't appropriate to assess risk associated with the proposed activity. Project proponents should be informed as to what is required to reasonably assess potential impacts to ocean resources.

Ecological Valuation Index (EVI)

As part of our review of the EVI methodology and discussion in the draft plan, PCCS noted the need to explore ways to incorporate ecosystem complexity into the EVI. We suggest that important oceanographic processes occur over different spatial and temporal scales. PCCS recommends inclusion of these elements in the over-all EVI:

1) Temporal components

The EVI created for the draft MOMP focuses exclusively on spatial criteria and neglects the temporal nature of ecosystem function. Seasonal attributes are the building blocks of ecosystem processes, dictating biological processes, influencing oceanographic processes and occuring at different spatial scales. Since the importance of portions of the ocean planning area vary depending upon season, seasonal EVI maps should be created.

2) Oceanographic processes

The EVI neglects to reflect the oceanographic processes that are essential to the recruitment of many fish and invertebrate genera evaluated with the EVI (Maravelias *et al.* 2000). Literature shows that larval transport and recruitment are necessary elements of ecosystem-based management for marine habitats (Botsford *et al.* 2003; Gerber *et al.* 2003; Larnell *et al.* 2006; Lubchenco *et al.* 2003). Oceanographic function and biological productivity are inextricably linked; seasonal currents, nutrient distribution and water column structures are vital to larval dispersion and recruitment, primary productivity, and other aspects of biological stability in an ecosystem (Runge *et al.* 1999; Townsend, 1992; Tremblay and Sinclair, 1992).

The EVI criteria that could be prescribed to an area (defined by a number of meters square) in a given season could include areas of frontal activity, areas of upwelling or mixing and areas of strong circulatory activity/advection from other areas. This would allow managers to see the importance of different oceanographic and biological processes at different times of the year, and prevent the disturbance of key ecological functions particular to seasonality.

3) Spatial data

PCCS recommends further refinement of the ecological valuation by integrating available spatial data. The current EVI notes that all fish and all marine mammal species were binned to create single data layers. For fishes, this binning eliminates the diversity of fish distribution, i.e. demersal vs. pelagic, and the distribution and behaviors of juveniles. Other spatial data that should be considered are the cod conservation zone and the spawning area closures embodied in Division of Marine Fisheries regulations. Similarly, binning eliminates or distorts the distribution and behaviors of individual marine mammal species. For example, North Atlantic right whales and humpback whales utilize Massachusetts ocean waters and adjacent federal waters at different times, with some overlap in late spring and early fall.

4) Inclusion of special historical habitat, designated for restoration and/or preservation in the EVI

Since the EVI is a tool for identifying "special, sensitive or unique estuarine and marine life and habitat," a GIS layer dedicated to historically important habitats ought to be included as part of the EVI. The EVI in the draft MOMP bases its analysis on a highly altered ecosystem, thus falling victim to the classic "shifting baselines" conundrum (Perry and Ommer, 2003). By including an "historic habitat layer" in the EVI analysis managers would be able to target restoration projects necessary not only for sustaining the depleted state of Massachusetts marine resources (including fisheries), but to enhance them. Furthermore, these special historical habitat SSUs could then be considered for focused scientific investigation, fishing gear experimentation and the like.

5) Assessment of habitat value

PCCS believes it is more appropriate to consider species in the context of their habitat rather than to measure habitat distribution against the whole planning area, as practiced in applying the criteria spatial rarity and population of regional significance. The EVI should use more than rugosity as a measure of habitat value, such as historic habitat, spawning and nursery areas, as noted above. PCCS suggests that the four criteria used in the EVI could be used to assess and score habitat value.

Key Elements of Managing the Ocean Planning Area

1) Improve the ability of people to use the MOMP documents and supporting materials

The next iteration of the plan should clarify how:

a) Each tool in the plan is to be used by decision-makers in the future
b) The technical reports will be used in the implementation of the plan

The next iteration of the plan should make explicit that:

1) Every reasonable effort should be made to use and/or obtain site-specific data to assess impacts of a proposed project, particularly data used as input into a model to assess impacts.

These efforts should be commensurate with the size and potential impact of the project.

2) If no data are available then the impact of the project cannot be quantified and should not be allowed to go forward until such time as appropriate data are available

Science Framework

PCCS recommends:

1) Inclusion of a preliminary list of priorities among the science and research needs in the next iteration of the plan.

These preliminary priorities would give citizens an idea of where the state believes investments of public and private funds should be made to support management of the state's ocean resources. Funders may also give extra weight to proposals that support the state's science and research priorities.

2) Recognition of the influence of the coast- the area where the land and sea interact -on the ocean planning area, from both an ecosystem and human impacts perspective

a) Companion coastal management plan

An aspect of the Oceans Act and thus the draft Plan that we find troublesome is that the landward boundary of the geographical area is stated to be a line 0.3 nautical miles seaward of mean high water. Of course, such a boundary greatly simplifies the development of an "ocean" management plan by excluding most of that part of the ocean in which the sea interacts with the land and human activities are usually most intense – the coast - since these interactions can be (1) very complex, frequently involving non-linear processes, and (2) very political due to such contentious issues as property rights.

However, this exclusion makes difficult the management of resources that are common to both the "ocean" and the coast. For example, the plan includes discussion of the potential impacts of sand and gravel mining on the ocean environment, but since beach nourishment is a major use of offshore resources, one would also need to know the impacts of placement of the amount and type nourishment material on the coastal environment prior to initiating such a project.

The Regional Sediment Resource Management Workgroup's report noted that: *"The most landward 15 foot contour has been used to exclude nearshore sand and gravel deposits for the purposes of resource extraction due to the potential for significant impacts to shorelines."* The impacts of removing sediment from beyond the 'depth of closure' to surrounding coastal areas are not well understood. Using the 15 foot contour to delineate a rough approximation of the depth of closure is much too simplified an approach, and can lead to misuse or misunderstanding.

The Workgroup also recommended the development of high resolution, validated circulation, sediment transport, and inundation models for all of the sub-regions of the ocean planning area, to address the threat of increasing intense storms in the long-term. These models could be integrated into a coastal management plan.

Development of a companion coastal management plan would provide information on relevant physical processes and habitat characteristics for the many varied Massachusetts coastal reaches. Wave climate and tidal characteristics would be included, as would the rate and direction of net littoral sediment transport. Also the geological and sedimentological characteristics of those areas, including erosion and accretion rates and natural sources and sinks of sediment, would be needed. Then, too, information should be provided concerning coastal engineering structures or activities that would be required for decisions on specific beach nourishment projects.

b) Repeated pre- and post-storm surveys of one or more areas to better understand how these areas in fact respond to storms

A multi-disciplinary group such as Regional Sediment Resource Management workgroup could determine areas to study that would be of most interest to the larger goal of understanding how the managed areas respond to storm events. This would inform the management plan and be of great interest to other management entities and the scientific community.

Additional Comments

1) The size of the Gulf of Maine humpback whale population used in the EVI should be approximately 900 individuals as noted in the Baseline Assessment section (BA-49).

"Three different but overlapping estimates of abundance for the Gulf of Maine population were calculated. Mark-recapture data from 1992/93 gave an estimate of abundance of 652 (CV=0.29); however, this estimate is likely biased because of heterogeneity in sampling and in animal distribution. Photo-id data also provided a minimum population estimate of 497 humpbacks known to be alive in 1997; this estimate is also likely to be negatively biased because of heterogeneity. Finally, line-transect surveys conducted in 1999 yielded estimates of 816 (CV = 0.45) or 902 humpback whales (CV=0.41, including a portion of the eastern Scotian Shelf stratum); these transect-based estimates are more consistent with the number of humpbacks (1,273, including dead animals) in the current photo-id catalogue for the Gulf of Maine. Overall, the size of the Gulf of Maine population is likely to be in the high hundreds, but no more precise estimate can be calculated at this time" (Clapham et al. 2003).

2) In Appendix A of the Science Framework, add the following PCCS research programs:

Humpback Whale Research Program: Assessment of western North Atlantic population of humpback whales, with focus on population structure, age determination and stock structure.

North Atlantic Right Whale Research Program: Current research includes aerial surveillance, habitat and food resource monitoring and investigation into the acoustic behavior of right whales

Land-Sea Interactions Program: Research quantifies the physical characteristics and change of the outer Cape Cod coast through two projects: 1) re-surveying 19th Century cross-shore transects (Chatham to Provincetown) to determine century-scale coastal change and sediment budget, and 2) nearshore mapping of Cape Cod Bay seafloor shallower than 10 m for resource and habitat characterization.

3) Edit the description of the Cape Cod Bay Monitoring Program to read: ">40 stations are sampled bi-weekly (April – October): temperature, salinity, dissolved oxygen, **pH,** turbidity, chlorophyll a, and nutrients from Provincetown to Duxbury. **Also** includes research on eelgrass ecosystems **and monitoring invasive species."** ~~coastal geology and salt marsh restoration.~~

I hope these comments are useful in refining the next iteration of the Massachusetts Ocean Management Plan. I encourage you to contact any of the PCCS if you have questions or would like additional information.

Sincerely,

Richard Delaney
Executive Director

Additional Sources of Information

Anon. 2006 Ecosystem Relationships in the Gulf of Maine—Combined Expert Knowledge of Fishermen and Scientists. NAMA collaborative report 1:1-16. www.namanet.org

Atlantic States Marine Fisheries Commission Submerged Aquatic Vegetation Policy ASMFC Habitat Management Series #, 1997 http://www.asmfc.org/publications/habitat/savpolicy.pdf

Center for Coastal Studies 2003 Review of State and Federal Marine Protection of Ecological Resources of Nantucket Sound http://www.coastalstudies.org/what-we-do/public-policy/nantucket-sound.htm

Leschen, Alison S., Ross K. Kessler, and Bruce T. Estrella. Eelgrass Restoration Project (July 1, 2004-October 31, 2007) http://www.mass.gov/dfwele/dmf/programsandprojects/hubline/hubline_5yr_eelgrass_restoration.pdf

PCCS Annual Reports to DMF on Right Whale Work- Surveillance, Monitoring and Management of North Atlantic Right Whales in Cape Cod Bay and Adjacent Waters, Final reports for the years 2006, 2007 and 2008 http://www.coastalstudies.org/what-we-do/right-whales/rwreports.htm

Young, David K. ; Hobson, Katharine D. ; O'Connor, Joel S. ; Michael, Allan D. ; Mills, Margaret A. 1971. Quantitative Analysis of the Cape Cod Bay Ecosystem, September 1971. National Technical Information Service: http://www.ntis.gov/ Accession Number: AD0732791

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Gerber LR, Botsford LW, Hastings A, Possingham HP, Gaines SD, Palumbi SR *et al.* (2003) Population models for marine reserve design: a retrospective and prospective synthesis. Ecological Applications; 13 (1): S117-37.

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Perry RI, Ommer RE (2003) Scale issues in marine ecosystems and human interactions. Fisheries Oceanography, 12 (4-5): 513-522.

Runge JA, Castonguay M, De LaFontaine Y, Ringuette M, Beaulieu JL (1999) Covariation in climate, zooplankton biomass and mackerel recruitment in the southern Gulf of St. Lawrence. Fisheries Oceanography, 8 (2): 139-149.

Townsend DW (1992) Ecology of larval herring in relation to the oceanography of the Gulf of Maine. Journal of Plankton Research, 14 (4): 467-493.

Tremblay MJ, Sinclair M (1992) Planktonic sea scallop larvae (*Placopecten magellanicus*) in the Georges Bank region-broadscale distribution in relation to physical oceanography. Canadian Journal of Fisheries and Aquatic Sciences, 49 (8): 1597-1615.