APPENDIX 3

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Habitat Research Priorities

I Research required to provide knowledge for a habitat-based approach to managing for biodiversity includes:

1. Determine the appropriate scale for resolving features of habitat and communities suitable for management for each habitat type. (Selection of representative habitats is required for this research component.) This work requires determining the appropriate physical parameters needed to characterize each habitat type.

2. Determine the role that biodiversity plays in maintaining ecosystem health vis a vis the functional role of biodiversity in carbon flow, contaminant cycling and sequestering of carbon/contaminants.

For each coastal habitat of concern, management needs were defined and habitat-specific research priorities identified. Primary management needs were determined by considering: 1) the degree to which habitat continues to be altered under existing management regimes; and 2) the degree to which ecological changes that result from habitat alteration are understood. Human impacts posing the greatest threat to habitat function, and for which the ecological effects are least understood, were given the highest priority. Management priorities and corresponding research needs common to all coastal habitats were identified. They are, for management:

1. Conduct Gulf-wide assessment of individual impacts, especially habitat loss.
2. Conduct Gulf-wide assessment of cumulative effects of combined impacts on habitat health.
3. Use indicators to monitor habitat health.
4. Assess the trade-off between different approaches to impact remediation.
5. Achieve comprehensive coastal watershed management and planning.

6. Determine impact of coastal zone habitat alteration on Gulf of Maine living resources(in coastal and offshore areas).

The corresponding research needs are:

1. Develop Gulf-wide, high resolution, habitat maps and inventories.
2. Determine the synergistic effects of multiple impacts on habitat health.
3. Identify and test the utility of potential indicator species, species groups, or multi-parameter indices of habitat health.
4. Determine the relative benefits to habitat functions and values of protection vs. restoration vs. creation.
5. Determine the relative impacts of different land use practices on coastal habitat functions and values.
6. Develop models to predict response of target Gulf of Maine resources (coastal and offshore) to coastal habitat alteration.

II A series of research priorities were identified that address many of the fisheries resources issues identified. These priorities are not intended to exclude other research initiatives, but are rather specific examples of the general approach taken.

1. Conduct process level laboratory research to demonstrate the importance of physical environmental features for the survival or different life history stages and field work to determine the biological and ecological effects of natural and human induced habitat modification.
2. Create maps to identify habitats at spatial scales required for research purposes.
3. Link process studies, that are necessarily conducted on a small scale, to habitat mapping exercises, to address larger scale effects.
4. Identify information gaps in life history information and in habitat-life history interactions, and conducting necessary research to fill in those gaps.
5. Develop numerical models that describe known habitat-species interactions and define potential areas of research.
6. Develop geographic information systems for the display of human population patterns, location and extent of habitats and species populations, etc.

7. Evaluate the function of refugia relative to stock enhancement efforts and other management approaches to habitat conservation and protection.

III The sediment and water quality research priorities fall into three broad categories, with a number of sub-categories in each.

1. The link between potentially toxic contaminant concentrations and biotic effects must be better established. A number of related issues need to be recognized:

a) bioavailability, efficiency of contaminant transfer and organism responses to contaminants;

b) ways in which linkages can be made through physiological or community studies;

c) need to understand how ecosystem and organisms' systems function;

d) studies should include consideration of how to eventually establish sediment criteria for toxic contaminants;

e) definition and study at various spatial and temporal scales and response times is needed (paleoecological techniques may be useful);

f) links must be established between ecosystem effects and contaminants that may not be inherently toxic, such as excessive nutrient and organic carbon loadings.

2. Transport paths must be studied to determine how contaminants move and become mobilized in the environment and subsequently become accessible to organisms.

a) routes and rates of anthropogenic and natural loading

b) contaminant distributions and concentrations

c) spatial and temporal variability and response times

d) sediment, geochemical, and biological transport and transformation processes

e) water circulation and dynamics of associated contaminants on macro and microscales

f) biological uptake efficiency and bioaccumulation

g) human physical perturbation

3. The effectiveness and net costs of remediation practices in meeting goals needs to be more clearly established.

a) Does restoration or remediation work and should we do it?

b) Can remediation strategies be developed based on manipulation to enhance transformation of toxic to non toxic contaminants and mitigate ecological effects?

c) Can alternatives to existing activities or regulations that result in contamination (e.g. dumping) be developed?

Regional Association for Research on the Gulf of Maine