

# Gulf of Maine NEWS

Regional Association for Research on the Gulf of Maine

Winter 1994

## Some Thoughts about Defining Habitat

David Stevenson, Maine Department of Marine Resources

Everyone these days seems to be talking about habitat. In the marine arena, an amendment to the Magnuson Fishery Conservation and Management Act (the federal law that established U.S. jurisdiction and management authority for fishery resources within the 200 mile limit) is being drafted that would protect certain important fishery habitats, and the regional Fishery Management Councils and the Atlantic States Marine Fisheries Commission are, or soon will be, required to include descriptions of habitat, habitat quality, and environmental requirements in fishery management plans for exploited species.

Closer to home, the Gulf of Maine Council on the Marine Environment has drawn up an Action Plan that calls for the protection, restoration, and enhancement of fish and wildlife habitats, the Regional Marine Research Program has developed a ten year research plan that encourages, among other things, research proposals that address the effects of "natural

and human-induced changes to the physical environment on ecosystem structure and function" and RARGOM is planning a workshop in April to define and prioritize habitat-related research needs in the Gulf of Maine. Despite all the attention on habitat, however, a lot of marine scientists, environmental managers, and fisheries managers have a pretty vague idea of what is meant by the term. It turns out that there are some good reasons for this confusion.

Habitat means different things to different people because definitions vary according to the use that is made of the concept. However the term is defined, it refers to the ecological relationship that exists between a species, or a community of species, and its environment. It is helpful to consider habitat as "the local structural component of the environment which attracts organisms and serves as a center of biological activity." The separation of structure from other environmental factors that limit or control biological activity (see figure on next page), focuses attention on physical features of the environment which display a definite organizational pattern. In the more conventional view, these may be kelp beds, marshes, inter tidal mud flats, or offshore ledges; less obvious examples are fronts separating different water masses or plumes of turbid, low salinity water produced by large rivers. Environmental properties such as temperature, salinity, and nutrient (food) availability may greatly influence the use or value that a species makes of its habitat. In this context, therefore, knowledge of a species' environmental requirements (or tolerances) is critical to understanding the nature of its interaction (or dependence) on certain habitats.

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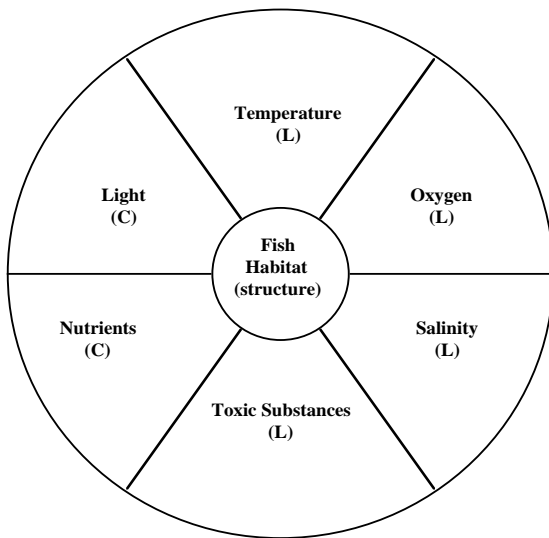
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Habitat continued

Trying to define and describe marine habitats is further complicated by the fact that different life history stages occupy different habitats, many organisms move around, and habitat definitions change as more is learned about the environment and the interactions between a species, or a community of species, and its environment. Also, habitat boundaries may change as populations grow or diminish in size and as environmental conditions which define a habitat change. In the case of an open water, pelagic, habitat like a convergence zone between two water masses, the habitat itself may not remain stationary or even persist for very long.

Research is needed to further define the ecological relationships that exist between individual species, or groups of species, and their environment, and to evaluate habitat quality and the interactions between habitats. Until more is known about the role of habitat and the biological responses of organisms to controlling or limiting environmental factors, fishery managers will not be able to predict whether actions taken to protect or improve habitat will have any beneficial effect on species survival, reproductive success, or productivity.

<sup>1</sup> This definition of habitat, as well as most of the other thoughts summarized here, have been borrowed from a chapter entitled "What is coastal fish habitat?" by David Peters and Ford Cross in a 1992 publication of the National Coalition for Marine Conservation "Stemming the Tide of Coastal Fish Habitat Loss," edited by R.H. Stroud. These authors, in turn, utilized concepts presented originally by Ryder, R.A. and S.R. Kerr (1989), Environmental priorities: placing habitat in hierarchic perspective, in C.D. Levings, L.B. Holt and M.A. Henderson (eds.), Proceedings of the National Workshop on Effects of Habitat Alteration on Salmonid Stocks, Can. Spec. Publ. Fish. Aquat. Sci. 105:2-12.



Major environmental properties which limit (L) or control (C) utilization of coastal fish habitat (modified from Ryder and Kerr 1989).

## A Characterization of Maine's Marine and Estuarine Benthic Habitats

Betsy Brown, Colby College

The Maine Natural Areas Program (MNAP) conducts statewide inventories and monitoring efforts to document the location, condition, and status of Maine's biota. As part of this program, MNAP, in conjunction with the Maine State Planning Office, initiated the Marine Conservation Project in July 1993, to inventory Maine's marine and estuarine ecosystems. Part of this Project involves developing a classification system for identification, and eventual management, of marine and estuarine conservation areas. The initial phase of the Project had two main goals: to define a hierarchical system for classifying marine and estuarine habitats and to identify those habitats that exist in Maine. Accurate, comprehensive, and up-to-date information about natural areas is necessary for informed decision-making.

In December 1993, the results of the initial five-month effort were released from MNAP in a report entitled, *A Classification System of Marine and Estuarine Habitats in Maine: An Ecosystem Approach to Habitats. Part I: Benthic Habitats. First Iteration* (copies may still be available by contacting MNAP, State House Station 130, Augusta, ME 04333). To complete this report, habitats were identified through review of literature and data sets and through discussions with marine scientists.

In 1990, Megan Dethier wrote in her classification of marine and estuarine habitats of Washington State, "An effective classification system must weigh ecological reality (and complexity) against the need to remain tractable." Factors considered important to identifying a system were a need for "ecological reality," consistency within levels of the classification, utility to many types of people (e.g., scientists and managers), and ease of incorporating habitats not yet identified.

The marine and estuarine habitats were defined by identifying those places where organisms live. Hierarchical levels of the classification are as follows: system (biome types), subsystem (tidal regimes), class (substrata), subclass (energy levels), modifiers (as needed), diagnostic species, and common species. The marine and estuarine biome types were retained at the first hierarchical level because estuarine represent valid transitional habitats between marine and freshwater habitats and differ from marine habitats, a distinction that is internationally recognized.

This study also fulfills part of the longer term objective of establishing management goals for the marine and estuarine habitats of Maine. To achieve these goals, several steps are involved. The first step is to identify what habitats that exist in Maine for benthic and eventually pelagic areas. Another step is to identify the distribution and ecological roles of organisms occupying these habitats. Inventory of habitats is

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important to ensure that information in the literature is updated and kept current. Yet another step is to assess the distribution of the habitats in Maine.

Simultaneous with or subsequent to the enumeration and assessment of habitats, consideration needs to be given to evaluation of the patterns that emerge from the study and development of criteria for appropriate management of these habitats. Completion of these steps is critical to management of these habitats because these steps provide valuable scientific data upon which decisions can be made.

Of the benthic habitats identified to date, 34 were marine and 25 were estuarine. Of the marine habitats, 13 were intertidal and 21 were subtidal. Of the estuarine habitats, 12 were intertidal and 13 were subtidal.

As was intended, the process of preparing this first iteration of the benthic classification identified many areas where information is needed. For instance, greater knowledge exists for intertidal systems than subtidal ones, higher salinity regions of estuaries than lower salinity regions, subtidal regions accessible by divers than deeper regions offshore, common species than rare ones, widespread habitats rather than less common ones, and summer assemblages than winter ones. The remainder of this article discusses suggested future directions the MNAP project might take.

It comes as no surprise that little information exists for the rare species in Maine's marine and estuarine habitats. We need to determine if species are rare in many places or a few. We do not know if identifications are correct for rare species or if the species are rare because they have been misidentified. Specimens are usually no longer available for re-examination.

The aerial extent of the identified habitats in Maine needs to be ascertained. Assessment of this factor allows appropriate comparisons to be made among habitat types. Applying planimetry techniques, Jacobsen et al. (1987, *Estuaries* 10:126-131) increased the aerial estimations of salt marshes. In addition, definition of some habitats is unclear. Fine work in developing assemblage analysis for the Gulf of Maine has been done by several scientists. Yet, the resolution of these assemblages and their boundaries are unclear. From the work of Joseph Kelley and his colleagues, we know that the nearshore subtidal marine environment is diverse. Yet, the associated biological assemblages remain to be fully inventoried. Many habitats that were identified in the classification based on our knowledge of their physical characteristics have not been inventoried and the associated biological assemblages need better definition.

An area of concern to all habitat managers is the degree to which introduced (non-native) species prevail. Little information is available for introduced species in Maine's marine and estuarine habitats. We also know that introduced species can be found. The European oyster *Ostrea edulis* has been introduced to Maine waters as recently as 1983. A 1985 study indicated that populations of this non-native species have

survived in the wild through Maine winters. The effect of the European oyster on native assemblages remains unassessed. Another species, the common periwinkle *Littorina littorea*, is also thought to be introduced. It is widely distributed in Maine and its effect on natural assemblages is unknown. This point is not trivial as introductions of non-native species are now being regarded as potentially as serious a threat to biodiversity as habitat destruction.

One result of this work is to ask "Which habitats are most threatened and which should be protected?" Eelgrass beds are often implicated as areas that require protection. Yet, the functional role of these beds in Maine is largely unexplored and we do not know if they are spawning areas or nursery grounds as they are elsewhere. We need to know the level of biodiversity in Maine's eelgrass beds and if the assemblages associated with eelgrass beds differ in areas with bottoms of differing grain size. Kelp, rockweed, and knotted wrack are often taken for commercial purposes, and the effect of the harvesting of algae on associated assemblages of organisms needs better enumeration.

Many other benthic habitats are disturbed in Maine. Clamming and baitworm digging is so extensive in Maine that finding a natural, undisturbed mudflat community is virtually impossible. Large portions of the benthic region subtidally is dredged or trawled for various commercial fisheries. As in the case for Maine's mudflats, it is useful to ascertain the structure and function of natural, undisturbed subtidal communities to compare them to those disturbed by fisheries activities. Understanding the dynamics of natural communities is critical to decision-making about Maine's habitats. To understand the influence of human disturbance on these habitats, one must be able to differentiate between natural variability and changes due to human influence. Human influences may result in different types of effects, too. For instance, natural communities would probably respond differently to nutrient enrichment than to toxic contamination, introduction of non-native species, or habitat destruction (to name a few).

The Marine Conservation Project is in its infancy and much work remains to be done. This first effort has provided an exciting start to developing means for identifying important areas for future focus of inventory efforts. In time, the MNAP benthic classification will become more complete and a pelagic classification will be developed.

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## National Estuarine Research Reserves Plan Coordinated Monitoring Program

*Michele Dionne*, Wells National Estuarine Research Reserve

The National Estuarine Research Reserve System will begin a nationally coordinated estuarine monitoring program in the latter half of 1994. This initiative has been developed by the site research coordinators and the Technical Projects Director of NOAA's Sanctuaries and Reserves Division. The objective of the program is to answer questions about the ecology and management of coastal resources by developing a long-term data set that takes into account the important variation in hydrology and geology that exists among the nation's estuaries. All twenty-two sites (distributed by biogeographic province along both East and West coasts) will participate in this program, collecting the same data and using protocols that will allow direct data comparability. The overarching question the program is designed to answer can be stated as follows: what are the causes and scale of spatial and temporal variation in the geological, hydrological and biological elements and processes of estuarine ecosystems? We are particularly interested in using this program to test hypotheses about the influence of land use and other forms of human activity on estuarine ecology.

In 1994, we will begin the program by purchasing and deploying two underwater automatic data-loggers (YSI Instruments) for each site. Initially, we will be measuring water temperature, salinity, conductivity, dissolved oxygen, water level, turgidity, and ammonium every fifteen to thirty minutes at comparable locations within each Reserve, to measure natural baseline spatial and temporal variation in these parameters. We are particularly interested in the influence of storm events on these parameters as well.

A major emphasis in this first phase of the program is to put into place an accessible interactive national data base to store the information collected (we will be using the MOSAIC database developed by the University of South Carolina and housed at USC's Belle Baruch Marine Institute). In the second phase of the program, we will be purchasing additional data-loggers, and deploying them to measure estuarine responses to human-induced changes in geographic information system that will contain information about watershed land use. Data on biological communities will be added to the program in its final phase. We are not likely to begin this phase within the next five years. However, even with the simple parameters we will be measuring initially, by the end of the first year we will have constructed a dataset of impressive scope. The data collected will be made available in a useful form to Reserve education programs. They will develop workshops for coastal managers and planners to provide the best available information concerning causes and abatement of estuarine non-point source pollution.

## Symposium on Cod and Environmental Change held at Bedford Institute of Oceanography

*Paul Boudreau*, Bedford Institute of Oceanography

A series of meetings was held on Feb. 15-18th at the Bedford Institute of Oceanography to review our knowledge of groundfish and the environmental conditions of the continental shelf waters they inhabit in Atlantic Canada. The meetings brought together scientists and managers from the four Atlantic Department of Fisheries and Oceans Regions and National Headquarters, along with members of the Fisheries Resources Conservation Council, university scientists, industry representatives and the public. The meetings began with an open symposium on Feb. 15th that presented a general overview of cod, other groundfish species, their food and their predators. A panel discussion at the end of the day submitted the view that both fishing effort and the environment have interacted to give rise to the present situation of depressed groundfish stocks in Atlantic Canada. There was also recognition that regional processes give rise to differences among the Newfoundland Shelf, Scotia-Fundy Shelf and the Gulf of St. Lawrence areas.

Following the symposium there was a series of workshops to deal with topics in more detail and to develop a systematic approach to monitoring groundfish and their ecosystem. A session on cod physiology and bioenergetics addressed some of the more recent developments in studying the energetics of groundfish behavior, growth and reproduction. The session on the physical-chemical environment provided insights into the historical and recent trends in temperature, salinity and other oceanographic variables. Phytoplankton and zooplankton were considered in a single session that showed the need for both classical and recently developed technologies for monitoring. These include the continuous plankton recorder, satellite imaging, optical particle counter and hydroacoustics. In a session on living components the benthos, other fish species, birds, mammals as well as the role of disease and parasites on groundfish communities were discussed.

The final afternoon provided an opportunity for summation and discussion of the information presented over the four days. It was generally agreed that there is a real need for a multidisciplinary and integrated approach to environmental monitoring among the DFO Atlantic Regions. To this end it was agreed that this meeting was a very important first step towards generating the necessary linkages within and among the Regions. Recommendations for monitoring developed at the sessions will be forwarded to the Atlantic Zone Science Directors Committee as input to their planning process. For further information, contact Paul Boudreau, e mail: [boudreau@biome.bio.ns.ca](mailto:boudreau@biome.bio.ns.ca) or fax: (902) 426-8484.

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## Benthic Data Base Update Available in 1994

*Roger B. Theroux*, Northeast Fisheries Science Center

The Woods Hole Laboratory of the NOAA/NMFS Northeast Fisheries Science Center has, through the years, accumulated an extensive data base of qualitative and quantitative (wet weight and number per square meter) data on the composition, distribution and abundance (including a variety of environmental measurements) of the macrobenthic invertebrate fauna of the U.S. east coast continental shelf, slope and upper rise ranging from the mouth of the Bay of Fundy to Key West, Florida.

This data base is currently being updated with results of numerous taxonomic studies, and assembled into a form which is expected to be made available to the scientific community within a year. At this time the intent is to make the data available on a variety of media (e.g. networks, CD-ROM, diskette, etc.) and to reside in a variety of localities (i.e. NEFSC master database, NOAA database, NODC, USGS, USNM/SI, etc.).

The data base consists of nearly 200,000 individual records from somewhat over 11,700 sampling sites. The samples were obtained by a wide variety of means including hand collecting in the intertidal zone to the use of research vessels (17 different ones) on 208 separate cruises using 49 different types of sampling gear (ranging from dipnets to trawls, dredges, grab type devices etc.) at sea out to 4,000 meters depth. The split between qualitative and quantitative samples is 9,580 vs. 2,210. Slightly over 8,000 benthic sampling stations are represented from the Gulf of Maine region alone, including the Bay of Fundy, Georges Bank and as far west and south as Nantucket Shoals; more than 3,000 of these samples are from the principal basins of the GOM. The time frame involved extends from 1881 to 1975; however, the majority of records are from 1953 to 1975. Supporting data for each sampling site or station include date, location, depth, sediment type, gear type, vessel, bottom temperature, taxonomic code and name, weight, number, etc.

The vast majority of the quantitative grab samples in this biological data base have an exact match (on a station basis) with a detailed geological data base (including physical and chemical characteristics) maintained by the U.S. Geological Survey which was generated by the U.S. Continental Margin Program during the 1960's and early 1970's. Information relating to this and other databases maintained by USGS may be obtained from Marilyn ten Brink at the USGS in Woods Hole.

The entire data base is backed up with a comprehensive Specimen Reference Collection which, since June of 1993, is housed at the U.S. National Museum of Natural History at the Smithsonian Institution in Washington, DC. The phylogenetic representation in this collection (and in the data base) ranges from Protozoa (Foraminifera) to Chordata (Urochordata); including some lesser protosomes: (Pogonophora,

Sipunculida, Echiurida, Priapulida); and Chaetognatha. Also included are collections of animal and plant remains and a variety of marine fossil materials, chiefly mollusk shells. Systematic diversity includes over 11,000 taxonomic names maintained in a data base taxonomic code file associated with the master data base and the Specimen Reference Collection. Information relating to accessibility and use of the Specimen Reference Collection at the Smithsonian may be obtained from the Invertebrate Collection Manager Dr. Michael Sweeney at USNM.

Interest in and studies relating to the benthic invertebrate fauna of the marine environment off the coasts of the United States formally began in a systematically organized manner with the establishment, by Spencer F. Baird, of the U.S. Fish Commission in 1871. Woods Hole, Massachusetts was chosen as the site of the first permanent laboratory in the U.S. solely devoted to the scientific study of all aspects of the marine environment. Collections and data gathered on the benthic fauna from those early days, for the most part, were distributed to many other institutions and museums through the intervening years. However, some material (specimens and data) were preserved at the Woods Hole Laboratory and have been incorporated into the data base and Specimen Reference Collection under discussion herein. The vast majority of the data and specimens, however, are the result of activities conducted at the Woods Hole Laboratory, beginning in the mid 1950's, as part of studies relating to the feeding habits of commercially important demersal fishes. The perceived lack of ecologically oriented data on the composition, distribution, abundance, and ecological and environmental relationships of the benthic fauna making up the diet of these fishes led to the establishment of studies designed to provide the necessary information on those topics. When the USGS Continental Margin Program was initiated in the early 1960's in cooperation with the Woods Hole Oceanographic Institution, the Woods Hole Fisheries Lab's Benthic Dynamics Investigation, then conducting similar studies, was invited to join the effort to provide biological expertise. The data bases created as a result of these joint efforts remain to this day without peer in the scientific world.

The benthic data base and the invertebrate collection continue to be used by ecologists, systematists, and taxonomists, to great advantage in preparing environmental impact statements, characterizing the benthic fauna of selected sites for a host of specific purposes (e.g. mining, dumping, drilling, marine sanctuaries, etc.). Through the years many (well over 40 at last count) specialists in a variety of disciplines have made use of these data and specimens for a multitude of purposes. In addition to numerous unpublished reports in the gray literature, these holdings have resulted, to date, in more than 100 formal, peer reviewed, scientific papers and reports on a variety of subjects, as well as yielding eleven new species to science.

# Resources

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## Circulation Modeling Workshop Held

*Daniel R. Lynch, Dartmouth College*

RARGOM convened a scientific workshop on Circulation Modeling in the Gulf of Maine on 15-16 November 1993 at Dartmouth College. This was the second in the current series of regional workshops. The first day was devoted to plenary discussions of work-in-progress in the Gulf by the various modeling teams. Papers presented were as follows:

Overview: Observational Evidence of Gulf of Maine Circulation

Neal Pettigrew, University of Maine

Process-Oriented Modeling in the Georges Bank Region

Glen Gawarkiewitz, Woods Hole Oceanographic Institution

Modeling Buoyancy-Driven Flows in the Gulf of Maine

David Brooks, Texas A&M University

Model Progression in the Gulf of Maine

David Greenberg, Bedford Institute of Oceanography

Prognostic Circulation Model for the Gulf of Maine, Scotian Shelf, and Georges Bank

Daniel Lynch, Dartmouth College

Modeling the Seasonal Circulation in Massachusetts Bay

Richard Signell, US Geological Survey

Interfacing Near-Field and Far-Field Models of Coastal Water Quality

Eric Adams, Massachusetts Institute of Technology

Hydrodynamic Modeling of Cobscook Bay & Toothacher Bay

Vijay Panchang, University of Maine

Transport Processes Affecting Red Tide in the Western Gulf of Maine

Jia Wang, Woods Hole Oceanographic Institution

David Townsend, University of Maine/RMRP led a roundtable discussion and closure of the first day. On day two, the presenters met informally to share experiences and draft a closure statement.

It was generally agreed that all modeling efforts are converging on the same underlying physics: the classical nonlinear description of a 3-D hydrostatic, baroclinic, Boussinesq fluid, with prognostic treatment of the temperature and salt fields, resolved on realistic topography in tidal time. The details of turbulence closure, and the ability to correctly simulate horizontal and vertical mixing and the formation/maintenance of the pycnocline, is an important area for future research. The need for variable resolution in the Gulf is

apparent: horizontally in order to resolve fronts and coastal features, and to provide natural linkage of estuarine circulation with the larger-scale Gulf circulation; and vertically in order to resolve surface and bottom boundary layers both hydrodynamically and in terms of buoyancy fluxes. The computation of the baroclinic pressure gradient in bottom-following coordinates (the "sigma" problem) remains a high priority for research, along with basic studies of internal waves and all manner of baroclinic processes.

The various modeling results achieved to date are full of promise, and it is appropriate to contemplate the formation of a Gulf of Maine Modeling Center. Such a center would amplify individual modeling projects, make model results more accessible to the broader scientific community, and facilitate the evolution of more complex models which go beyond circulation per se. Specific technical activities of a center would include

- provide a point of access to archived model flow fields
- facilitate the transfer of models themselves from research institutions to operational agencies
- provide easy access to model input data: topography, climatology, winds, river flow, etc.
- maintain and develop visualization tools at various levels of sophistication
- define and service standards for large data files and their interface to diverse programs and packages
- development of interfaces to advanced 3-D visualization packages
- develop interfaces among models, in particular among circulation models and water quality and ecosystem models
- provide community access to pooled equipment (disk farm; advanced video hardware; etc.) as needed

Establishment of such a modeling center would be a major step toward scientific utilization of circulation models and their evolution toward more complex models of the Gulf ecosystem.

A Gulf of Maine Modeling Bibliography assembled by the speakers is enclosed in this newsletter. Workshop proceedings will be available from RARGOM headquarters by April 1. Financial support for workshop participants was provided by a grant from the Regional Marine Research Board.

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**Gulf of Maine Data & Information Workshop  
Proceedings Available,  
Request for Proposals to be issued this spring**

*David Townsend, Regional Marine Research Program*

The Regional Marine Research Program will be issuing a request for proposals sometime this spring for the development and initial operation of a Data & Information system for the Gulf of Maine RMRP. This RFP is partly the product of the recommendations made at the Data & Information workshop at the University of New Hampshire last November, which was co-sponsored by the Association, the RMR Board, and the Council on the Marine Environment. The workshop proceedings will be distributed this month.

The key recommendations resulting from the workshop are:

1. A regional Gulf of Maine Information Management System should be developed.
2. A distributed system utilizing INTERNET, as opposed to a centralized system, should be implemented.
3. The Gulf of Maine Information Management System should not re-invent any wheels. A vehicle should be put in place to generate and distribute a directory of the component systems and assure compatibility with important specific systems.
4. A Gulf of Maine IMS Oversight Group should be formed and charged with ensuring that the needs of various groups are incorporated in the planning process.
5. A Technical Start-up Committee should be established.
6. Charge the Technical Start-up Committee with proposing short and long-term goals for the Gulf of Maine Information Management System and the Oversight Group with developing a vision statement.

If you have not already requested a copy of the proceedings, or, if you wish to receive the RFP, contact the Regional Marine Research Program office, 5715 Coburn Hall, University of Maine, Orono, ME 04469. telephone (207) 581-1435.

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**Habitat Restoration is Research Priority of  
National Estuarine Research Reserves Request  
for Proposals**

*Michele Dionne, Wells National Estuarine Research Reserve*

The Sanctuaries and Reserves Division of NOAA is requesting preliminary proposals for research at sites in the National Estuarine Research Reserve System (NERRS) for FY 1995 and 1996. The overall objective of the NOAA funded NERRS research program is to study causes and effects of natural and anthropogenic changes in estuarine ecosystems. Research supported by this program should produce information of appreciable value for coastal zone resource management. There are twenty-two NERRS sites nationwide, located in representative areas within each coastal biogeographic province. In the Gulf of Maine there are two NERRS sites, one in Wells, Maine and the other in Great Bay, New Hampshire. The research priority for FY 1995 and FY 1996 is habitat restoration. Research proposals should address some aspect of methodology, experimental design, evaluation, or modeling applicable to estuarine habitat restoration. The tentative pre-proposal deadline for FY 1995 is July 15, 1994. For further information regarding the RFP and/or site specific opportunities for restoration research at Gulf of Maine NERRS, contact, Dr. Michele Dionne at the Wells NERR: RR2, Box 806, Wells, Maine 04090. telephone (207) 646-1555.

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**Reports received**

The following reports have been received at the Association office and are available for distribution by contacting the author.

“Report of the U.S. GLOBEC Georges Bank Program PI Workshop” D. Gifford, Rapporteur, University of Rhode Island. Workshop held at the Woods Hole Oceanographic Institution, Woods Hole, MA, January 11-12, 1994

“Science and Sustainability”, reprinted from Ecological Applications, Vol. 3, No. 4, November 1993. Reprints of this 45-page Forum are available for \$7.00 each. Order reprints from the Business Manager, Ecological Society of America, Arizona State University, Box 873211, Tempe, AZ 85287-3211.

“State of the Ocean Summary 1993” Temperature and Salinity data collected by the Canadian Dept. of Fisheries and Oceans, Weekly Scientific Briefing, Vol. 13, No. 6, February 11, 1994. contact Ken Drinkwater or Brian Petrie (902) 426-3809.

Vincent, C.L., T.C. Royer, and K.H. Brink, “Long Time Series Measurements in the Coastal Ocean: A Workshop”, Coastal Ocean Processes (CoOP) Report Number 3, WHOI-93-49, November 1993

“Wright, L.D., et al., “Coastal Oceanography: Future Trends and Vessel Requirements”, a Status Report by the UNOLS Coastal Oceanography Subcommittee and the participants in a UNOLS Coastal Oceanography Workshop, February 1994.

# Calendar

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This list includes workshops, meetings, working groups and deadlines for proposals. If you know of upcoming events that might be of interest to the Gulf of Maine research community, please contact us.

## March

- 22 RARGOM, RMR Board, and CME Annual Gulf of Maine planning meeting  
New England Aquarium, Boston, MA  
contact: Genie Braasch, (603) 646-3480
- 24-25 9th Annual Boston Harbor/Massachusetts Bay Symposium, "Integrating Coastal Management", JFK Library, Boston, MA  
contact: J.R. Kaufman Associates, (617) 862-4883
- 28-30 Annual Meeting, Geological Society of America, NE Section  
contact: Dr. James Soraf, Geology Dept., SUNY Binghamton, NY

## April

- 1 deadline from planning letters, NOAA Coastal Ocean Program, "Cumulative Effects of Multiple Stressors on Coastal Ecosystems"  
contact: Marjorie Ernst (301) 713-3338
- 6 Stellwagen Bank National Marine Sanctuary Research Planning Workshop  
Sheraton Inn Plymouth, Plymouth, MA  
contact: Jack Wiggin, Urban Harbors Institute, (617) 287-5570
- 6-9 Institute on the Social, Economic, Political and Scientific Issues affecting the Gulf of Maine Environmental Studies Program, Bowdoin College,  
contact: Becky Koulouris, (207) 725-3628

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## Gulf of Maine NEWS

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- 12-13 Habitat Workshop  
Maine Dept. of Marine Resources, West Boothbay Harbor, ME  
contact: David Stevenson, (207) 633-9530
- 29, 10:00 a.m. **RARGOM meeting**  
Wolfe's Neck Conference House, Freeport, ME  
contact: Genie Braasch, Dartmouth College, (603) 646-3480
- May**
- 1 deadline for proposals to ONR Program in the Biological Sciences  
contact: Ms. Sevgi Bullock, (703) 696-4760
- 19-20 A Workshop on Environmental & Economic Evaluation of Coastal Resources  
Wolfe's Neck Conference House, Freeport, ME  
contact: Charlie Colgan, (207) 780-4430
- June**
- 1 deadline for proposals to EPA Office of Exploratory Research  
contact: Clyde Bishop, (202) 260-5727
- 24, 10:00 a.m. **RARGOM meeting**  
Wells National Estuarine Research Reserve, Wells, ME  
contact: Genie Braasch, Dartmouth College, (603) 646-3480
- July**
- 15 pre-proposal deadline for NERRS FY 1995 "Habitat Restoration"  
contact: Michele Dionne (207) 646-1555

