

Gulf of Maine Science-to-Management

Establishing Research Priorities in the Gulf of Maine



Final Report

GOMC-RARGOM Theme Meeting
South Portland, Maine
September 20, 2004

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Meeting summary prepared by B. Tripp, M. Ernst, & D. Keeley
with assistance from the RARGOM-GOMC Planning Committee

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Background

Sound coastal decision-making depends on the sustained interaction between scientists and managers that produces the science needed by managers. Over time, the Regional Association for Research in the Gulf of Maine (RARGOM) and the Gulf of Maine Council on the Marine Environment (GOMC) have played an instrumental role in supporting communication among and between scientists and managers in the region. Building on an extensive base of scientist-to-scientist communication, RARGOM prepared a “Research Plan” in 1992 for the new Regional Marine Research Program that incorporated regional research needs. Much research has been completed since that date and it is timely and appropriate that a new discussion about regional research priorities be initiated.

The GOMC and RARGOM recognize that a priority-setting process is complex and needs to incorporate many mandates and perspectives. A new research effort is driven by both immediate resource management needs and by individual scientific curiosity. New research, both basic and applied, should focus along a geographic continuum from the open Gulf, to various coastal embayments, and up into the Gulf’s watershed. It needs to be conducted at scales appropriate to processes and environmental issues. Research priorities cannot be established in any single meeting or by any single subset of Gulf participants.

During 2004, both GOMC and RARGOM renewed efforts to sustain the dialogue between coastal scientists and resource managers about the kinds of policy-driven research needed to solve longstanding environmental and resource issues in the Gulf region. Policy-driven research is an essential component of any priority setting discussion and will drive the distribution of research funding by some agencies.

One step has been taken by the GOMC to initiate this process. A web-based survey hosted by the Council and the Coastal States Organization (CSO) was conducted to identify the research, information, and technology needs of resource managers from the Gulf of Maine states and provinces. The tabular results of the survey and a 12-page report providing an analysis and historical perspective of this feedback are both available for review on the Council’s web site (see <http://www.gulfofmaine.org> under publications).

The Council and RARGOM have cooperated to bring the results of the survey to a wider Gulf audience for discussion. On September 20, 2004, over 40 scientists and resource managers met for a one-day meeting in South Portland, Maine. Based on the CSO survey, the region’s top priority management concerns are habitat change and land use. The purpose of the forum was to identify critical research activities that could eventually lead to the improved management of coastal ecosystems affected by these issues. The Planning Committee intentionally constrained the South Portland meeting to a discussion of the two highest-ranked management issues, in part, due to a realization that a full discussion of research priorities could not take place in one day with a single small group.

Meeting Summary

A Planning Committee designed a one-day discussion to initiate a wider review of the CSO survey results and to begin to “scope out” specific research tasks that might be needed to address the highlighted management issues. The Committee developed a Project Template to guide the meeting work groups and to focus group discussion. The meeting sought to begin the process of soliciting researcher feedback on the survey results, knowing that an on-going effort by RARGOM would be needed.

One science-management issue is woven through every discussion of regional research needs and that is a disconnect between the researchers and the managers focused partly on geographic scales and partly on time. At the risk of oversimplification, managers need to address today’s environmental problems primarily in the watershed and at the waters edge while researchers try to understand processes that extend beyond these constraining space/time boundaries into the wider ocean. Essential linkages between these two coastal “regimes” are not yet adequately highlighted by anyone. Anyone who has participated in a science-management discussion has heard the echo of this disconnect.

This communication problem arose quickly in South Portland because the CSO survey results focused tightly on nearshore resource management issues while giving less weight to Gulf-wide, open-ocean processes. Improved understanding of such wider Gulf processes may be essential for a resolution of a specific near-shore problem but the connection is apt to be obscure and not likely to be identified in a manager survey. Hence the emphasis on effective dialog between the various groups that work in the coastal zone.

A second communication problem also arose in South Portland, that of a need for clear and specific problem definition. The identification of generic management issues like “Habitat Change” and “Land Use” help to guide us in a general direction but quickly lose their usefulness when specific actions (either management or research) begin to be discussed. To some extent, an analogy can be made with the old saw: “I don’t know art but I know what I like when I see it”. Managers already know that the generic survey topics identified by the survey would need to be defined much more rigorously before any specific management action could be implemented. When scientific information is also missing, then this clarification and definition is equally essential before any new research is undertaken. For example, when designing a research project to assess “Habitat Change”, a researcher might ask specific testable questions about changes in ecosystem structure or function or changes in species interactions in the system. Such specific research questions are not esoteric niceties but are essential steps toward an improved understanding of “Habitat Change” that will provide useful information to a manager.

The issue of research priorities related to habitat change in the Gulf is not a new topic of discussion and the need for on-going discussion between scientists and managers is highlighted by Appendix 3. This list of research priorities is taken from a previous (1994) RARGOM workshop, which developed recommendations for research from the scientists perspective. A new list, developed in 2005, would perhaps look somewhat different but it is evident that a list prepared in collaboration would be sorted quite differently than separate lists produced independently.

Although directed by the Planning Committee to focus tightly on the two management issues highlighted by the survey, meeting participants used a Project Template to begin the process of defining research tasks that would be needed to address the identified management issue. To a surprising extent, this template worked very well as a model to help meeting participants define and amplify research tasks and begin to estimate a level of effort necessary for each. A blank template and two completed templates, produced at the meeting are appended. These completed templates do not define Gulf research priorities but do demonstrate a scoping method which can be useful to the priority-setting process.

A final issue arose at the meeting and remains to be resolved. Although all lumped by the survey respondents into “research needs”, each survey-identified issue is actually a mix of research needs and information needs. Commonly, research results may be available that are unknown or inaccessible to managers and some “research needs” may only require further explanation of existing research results. When attempting to address manager-identified “research” needs a parallel effort in research “translation” should also be launched. Researchers cannot expect managers to reach back to original scientific publications for essential information any more than managers can expect researchers to develop management strategies. This translation effort also will require effective and on-going dialog.

Lessons Learned

- 1) Developing research priorities is difficult. With only manager interests and researcher interests included and only two specific issues under discussion, it proved difficult to identify well-defined and achievable research projects that are tightly focused on specific management concerns,. One confounding factor will be the separation of information needs, from research needs because some “research” needs identified by managers may prove to be lack of access to recent research results.
- 2) Getting the right people to the discussion is important. The discussion process was only started in South Portland and the Planning Committee acknowledged that the meeting would be but a single step in a complex process. While the Committee sought to achieve a good balance of scientists and managers, a subset of the invited participants who were able to attend presented a broad but not fully representative mix of views; some more tactical in their perspective and some better able to see the strategic (“big picture”) long-term context. Both views are needed, in addition to the greater degree of representation of the Gulf community.. We need to use the results of South Portland to facilitate a wider on-going discussion of research priorities in the Gulf.
- 3) A balanced discussion of regional research needs, especially research that is expected to address management issues, should engage social scientists more energetically. Few social scientists were represented in So. Portland, from either academic or management realms. Basic information on social science research done on priority management topics should be incorporated into future discussions and those researchers integrated into a priority-setting process. .Highlighted as one issue of importance in South Portland was the assessment of “value” of natural resources and natural processes.
- 4) The use of pre-designed templates helped to maintain group focus and enhance the groups’ progress. Having blank research templates prepared in advance allows the group to focus on

essential specific research project details and on ancillary efforts needed to support a project while guiding separate groups to produce information of similar detail. Participants were asked to address the research, information, and technology needs for habitat change or land use, using the template to help tease out and capture comparable levels of detail. As a meeting exercise, several “straw-man” research projects were scoped using the templates, and are appended to this report.

5) A one-day meeting can only initiate a discussion that should continue beyond this initial face-to-face contact. Meeting organizers need to provide the opportunity for such discussion, probably in other formats (e.g., on-line in) that will open the discussion to a larger and wider group. Such an opportunity will permit the filling in of details inevitably missing at a one-day discussion.

Conclusions

All meeting participants agree that the setting of region-scale research priorities is a complex task that can only be accomplished through broad discussion involving all affected parties. In addition, both scientific curiosity and societal needs must be incorporated into this process. Neither this single meeting in south Portland, nor this small group can direct this process but one step builds on the previous ones.

This report describes a very early and very small step in the research priorities setting process. Societal needs have begun to be addressed through a survey of resource managers, who identified future research needs from the management perspective. This perspective is largely driven by today's management problems and has not yet incorporated an understanding of natural processes on a scale that crosses jurisdictional boundaries. Feedback from research scientists to the managers research priority list would be a useful “reality check” and opportunity for that feedback was initiated in south Portland. This feedback loop will be developed and expanded through future RARGOM activities.

Who might pay for future research, once we all agree on a list of priorities? Except for the now-terminated Regional Marine Research program, research funding with a regional perspective has been weak. Several research funding programs are already in place in the region, each focused on a portion of the Gulf or a subset of the issues of concern. Might these pre-existing programs work more cooperatively, with a region-scale view in the future? The Oceans Commission has strongly recommended that coastal research support at the federal level be dramatically increased, but the implementation of this recommendation may be in a distant future. A wider discussion of closer regional collaboration between existing programs while we simultaneously position ourselves for a brighter funding future is appropriate. This report opens a door to that discussion.

Appendices

- 1 – Survey of “research priorities” as identified by coastal managers. Survey report provides an analysis and historical perspective of results for the Gulf of Maine, available on the Council’s web site at URL: <http://www.gulfofmaine.org>
- 2 – Project Template, prepared by the Planning Committee to help focus participant discussion; a blank form and “strawman” examples resulting from the South Portland discussions are appended.
- 3 – Research priorities list related to habitat change as produced by previous (1994) RARGOM workshop.
- 4 – Strawman research projects developed at the meeting.

Research Statement Template

NOTE TO WORK GROUPS: Please use this template to help guide and record a brief synthesis of your discussion. Use a separate template for each research project described.

Project title: Provide a brief title that describes the focus of the research.

Policy relevance: Describe the policy or type of management decision this research will address?

Scientific context: List the top 2-3 scientific objectives of the proposed research and the hypotheses being tested. How will the results further our understanding of a natural system?

Approach: Briefly outline the methods, approaches, and techniques to be employed.

Space & time scales: Describe the spatial scale that is required.

single embayment multiple embayments basin-wide other

Describe the time scales of processes under investigation.

daily-weekly monthly-annual annual-multi-year decadal or greater

Time frame: Provide an estimated length of time for the research to be performed.

<1 year 1 year 1-3 years 3-5 years other

Project cost: Provide an estimate of the annual funding needed to complete the project and any additional requirements (e.g., ships, sensor platforms, interdisciplinary support)

<\$50K \$50-100K \$100-250K >\$250K

Description of final product: Describe the scientific results you expect to achieve.

Collaborators: What types of partners, if any, would be critical to have involved during the planning or implementation phases and what would be their role(s)?

Complementary studies: What scientific or policy studies would complement this work?

Relationship to related work: How does what is being proposed link to other ongoing, relevant work in this subject area?

Agency Interests: What agencies or organizations would have an interest in having this research performed or in contributing as a funding partner?

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.

Appendix 3

FROM: RARGOM, 1994. Gulf of Maine Habitat: proceedings of a workshop.
RARGOM Report No. 94-2. Stevenson, D., and E. Braasch, Eds. 146 pp.

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

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Section 1. Habitat Change Research Statements Template #1

Project title:

Provide a brief title that describes the focus of the research.

Link habitat change to local and regional circulation and watershed discharge models.

Policy relevance:

Describe the policy or type of management decision this research will address? How would we use this in decision making process?

Nutrient loading from land use change and subsequent impacts on habitats, i.e., how does habitat change respond to discharge; e.g., ME statute “structure and function of biological community.” (Maine Statutes Water Classification Program - MSRA Title 38 Article 4A, 465B)

Scientific context:

List the top 2-3 scientific objectives of the proposed research and the hypotheses being tested. How will the results further our understanding of a natural system?

- identify types of estuaries that represent different circulation and ecosystem regimes
- identify key forcing mechanisms for those models
- link habitat change to circulation and discharge processes

Approach:

Briefly outline the methods, approaches, and techniques to be employed.

- coastal and offshore circulation models need to be linked with one another and with watershed discharge models and further linked to how habitats are responding
- additional spatial data needs to be acquired
- models may exist, matter of scale and whether linkages are known to allow model results to be exported
- need a meeting of the minds among modelers (consultant and academic) to work on larger scale

Space & time scales:

Describe the spatial scale that is required.

_____ single embayment x multiple embayments x basin-wide _____ other

- start with systems that represent different combination of circulation patterns

Section 1. Habitat Change Research Statements Template #1

Describe the time scales of processes under investigation.

daily/weekly monthly/annual annual/multi-year decadal or greater

- event sampling; above refers to processes; responses happen on longer time frame

Time frame:

Provide an estimated length of time for the research to be performed.

< 1 year 1 year 1-3 years 3-5years other

- 5 yrs minimum

Project cost:

Provide an estimate of the annual funding needed to complete the project and any additional requirements (e.g., ships, sensor platforms, interdisciplinary support).

< \$50K \$50-100K \$100-250K > \$250K

- depends on scale

Description of final product:

Describe the scientific results you expect to achieve.

Predictive model demonstrating how habitat changes in response to changes in discharges in various hydrodynamic settings (linked to human alteration of landscape and atmospheric changes).

Collaborators:

What types of partners, if any, would be critical to have involved during the planning or implementation phases and what would be their role(s)?

- municipalities (MA, voluntarily)
- watershed groups
- physical oceanographic modelers
- coastal ecologists
- state and local decision-makers
- monitoring data holders
- state, federal and local resource managers

Section 1. Habitat Change Research Statements Template #1

Complementary studies:

What scientific or policy studies would complement this work (e.g., social/economic, mapping/resource data layer, monitoring, modeling, synthesis)?

- location of habitats (habitat inventories - quality and quantity)
- ecological significance of impact
- sources of loading
- indicators, e.g., benthic index, community/trophic structure
- response studies - relating organism/cellular/community to stressor (thresholds)
- studies that verify models
- natural variability
- GOM Council habitat monitoring subcommittee - framework for coastal habitat monitoring

Relationship to related work:

How does what is being proposed link to other ongoing, relevant work in this subject area?

- TMDL

Agency Interests:

What agencies or organizations would have an interest in having this research performed or in contributing as a funding partner?

- EPA 305b, 303d - coastal assessments
- NOAA
- USGS
- USFWS
- State and local governments
- EPA STAR GRANT program
- USDA
- Congress
- GOMCME
- GoMOOS
- fishermen - info providers/verification

Section 1. Habitat Change Research Statements Template #2

Project title:

Provide a brief title that describes the focus of the research.

Assess baseline and change in the ecological, economic and cultural value of specified habitats (individual or in combination) subjected to human activity.

Policy relevance:

Describe the policy or type of management decision this research will address? How would we use this in decision making process?

- What is impact of each management decision and the cumulative impact over time, e.g., impact of boat launching on eel grass beds?
- Results would support cost-benefit analysis and alternatives analysis, e.g., ME Natural Resources Protection Act/NEPA/needs and standards for mitigation

Scientific context:

List the top 2-3 scientific objectives of the proposed research and the hypotheses being tested. How will the results further our understanding of a natural system?

- How does habitat change translate into changes in structure and function of biological community?
- How do these changes translate into societal goods, services and values?
- Quantify/identify the biological use of these habitats?
- What is the physical use of habitat (e.g., shoreline protection from stormwater, floodwater storage)

Approach:

Briefly outline the methods, approaches, and techniques to be employed.

- map habitats – GOM Mapping Initiative
- synthesize life history, food web dynamics information
- monitor habitat use
- market/nonmarket valuation

Space & time scales:

Describe the spatial scale that is required.

single embayment multiple embayments basin-wide other

Section 1. Habitat Change Research Statements Template #2

- single or linked embayments or habitats
- stratified approach to representative systems
- include watershed/nearshore/offshore and linkages

Describe the time scales of processes under investigation.

_____ daily/weekly x monthly/annual x annual/multi-year x decadal or greater

Time frame:

Provide an estimated length of time for the research to be performed.

_____ < 1 year _____ 1 year _____ 1-3 years x 3-5years _____ other

- series of projects, each would be 3-5 yrs

Project cost:

Provide an estimate of the annual funding needed to complete the project and any additional requirements (e.g., ships, sensor platforms, interdisciplinary support)

_____ < \$50K _____ \$50-100K x \$100-250K _____ > \$250K

- multiple = \$250K+

Description of final product:

Describe the scientific results you expect to achieve.

- habitat value/significance
- how changes effect the value of habitat
- understanding trade-offs
- decision support tool for habitat managers
- integrated baseline maps of critical (user identified) GOM habitats
- useful for oil spill response and NRDA assessments

Collaborators:

What types of partners, if any, would be critical to have involved during the planning or implementation phases and what would be their role(s)?

- private industry (recipient of information)
- remote sensing and GIS folks
- coastal ecologist and resource economist
- recreational boaters

Section 1. Habitat Change Research Statements Template #2

- tourists
- NGO community
- fishermen (could assist with data collection)
- Federal agencies - USCG, NOAA (e.g. NERRS), USGS, EPA (NEP), USDA, USFWS
- State agencies and municipalities

Complementary studies:

What scientific or policy studies would complement this work (e.g., social/economic, mapping/resource data layer, monitoring, modeling, synthesis)?

- data recovery/mining.
- state habitat inventories.
- national ocean economics project
- state/federal fisheries data
- seafloor mapping projects (GOMMI!)
- monitoring studies on land and sea.
- high resolution time series data.

Relationship to related work:

How does what is being proposed link to other ongoing, relevant work in this subject area?

- habitat restoration and protection efforts
- mitigation
- local habitat studies
- MPA initiatives...
- aquaculture, e.g., siting
- submerged lands leasing
- permitting
- dredging
- related research on habitat functionality

Agency Interests:

What agencies or organizations would have an interest in having this research performed or in contributing as a funding partner?

- All collaborators previously listed
- NGOs
- Foundations
- Conservation organizations

Section 1. Habitat Change Research Statements Template #3

Project title:

Provide a brief title that describes the focus of the research.

Identify appropriate thresholds of various (physical, biological, chemical, hydrological) stressors on habitats. (Examples of stressors include docks and piers on shellfish beds; watershed/atmospheric inputs – mercury; dredging; invasives.)

Policy relevance:

Describe the policy or type of management decision this research will address? How would we use this in decision making process?

- activity/project permitting
- land use planning
- water resource planning
- ocean zoning
- shellfish/fisheries resource allocation/utilization
- remediation/restoration
- *program/funding prioritization (applies to all projects)

Scientific context:

List the top 2-3 scientific objectives of the proposed research and the hypotheses being tested. How will the results further our understanding of a natural system?

- establishing cause and effect relationships
- determining assimilative capacity – organism/community resilience
- establishing thresholds for ecosystem changes
- sensitivity assessments
- synergistic effects

Approach:

Briefly outline the methods, approaches, and techniques to be employed.

- dose response studies
- multi-variate analysis of physical, chemical, biological, socioeconomic components of system
- literature review for thresholds
- long-term data/mapping to understand natural variability
- spatial analysis to identify large scale habitat patterns

Section 1. Habitat Change Research Statements Template #3

Space & time scales:

Describe the spatial scale that is required.

single embayment multiple embayments basin-wide other

Describe the time scales of processes under investigation.

daily/weekly monthly/annual annual/multi-year decadal or greater

- would depend on who's asking and the level of funding available
- can do more rapid studies on a shorter time scale

Time frame:

Provide an estimated length of time for the research to be performed.

< 1 year 1 year 1-3 years 3-5years other

- depends on scale of project

Project cost:

Provide an estimate of the annual funding needed to complete the project and any additional requirements (e.g., ships, sensor platforms, interdisciplinary support).

< \$50K \$50-100K \$100-250K > \$250K

- can be addressed at any or all spatial or temporal scales

Description of final product:

Describe the scientific results you expect to achieve.

- threshold for allowable impacts
- stressor response models
- decision support models
- data for economic assessments

Collaborators:

What types of partners, if any, would be critical to have involved during the planning or implementation phases and what would be their role(s)?

- EPA (e.g., 305b, 303d, coastal assessments, STAR grant program)
- NOAA, USGS, USFWS, USDA
- State and local governments
- Congress
- GOM Council

Section 1. Habitat Change Research Statements Template #3

- GoMOOS
- Fishermen - info providers/verification

Complementary studies:

What scientific or policy studies would complement this work (e.g., social/economic, mapping/resource data layer, monitoring, modeling, synthesis)?

- templates #1 and #2
- Essential Fish Habitat studies
- socioeconomic data
- growth requirements in unstressed environments
- lab and field experiments of organismal/community response
- define reference conditions and growth requirements
- natural variability

Relationship to related work:

How does what is being proposed link to other ongoing, relevant work in this subject area?

- Chesapeake Bay studies (IAN)
- Great Lakes
- Casco Bay – benthic index, nekton relationship with fringing habitat/land use
- EPA ORD
- USGS and NPS – studies on dose response
- USGS National Water Quality Assessment Program
- *Canadian efforts (applies to all – fill in specifics)

Agency Interests:

What agencies or organizations would have an interest in having this research performed or in contributing as a funding partner?

- Department of Homeland Security
- EPA (e.g., 305b, 303d, coastal assessments, STAR grant program)
- NOAA, USGS, USFWS, USDA
- State and local governments
- Congress
- GOM Council
- GoMOOS
- Fishermen - info providers/verification
- Maine Oil Spill Advisory Committee

Section 2. Land Use

Research Statements Template #1

Project title:

Provide a brief title that describes the focus of the research.

Development of a suite of indicators (may require development of new indicators) for land use change and ecosystem response that can be used for real world change.

Policy relevance:

Describe the policy or type of management decision this research will address? How would we use this in decision making process?

Land managers and policy-makers need indicator tools that identify and track environmental changes.

Scientific context:

List the top 2-3 scientific objectives of the proposed research and the hypotheses being tested. How will the results further our understanding of a natural system?

- How will the results further our understanding of a natural system?
- What pattern(s) of development (cluster, traditional neighborhood design, brownfields, greyfields, etc.) will minimize impacts?
- What is the linkage between land use change and what are the reflected impacts in the natural systems?
- Instead of using dichotomous indicators, how do we develop and use indicators that describe a continuum of responses. What associated development patterns of are most likely to harm ecosystem resources (lawns, width of street pavement, curbs, detention basins VERSUS low impact development (LID)

It is currently difficult to use information from multiple jurisdictions to work on these issues regionally.

Approach:

Briefly outline the methods, approaches, and techniques to be employed.

- document the relationship between land use and site design change and ecosystem response
- identify 3-4 most critical/useful/descriptive indicators
- engage multidisciplinary team including users of the final product
- National Center for Ecological Synthesis type model based on the GOM regional issues and context
- integration of large and small scale economic datasets with natural resource data sets in GIS using spatial correlation techniques
- synthesize existing work to avoid duplication
- tie land use and site design (LID) impacts to natural system response

Section 2. Land Use

Research Statements Template #1

Space & time scales:

Describe the spatial scale that is required.

single embayment multiple embayments basin-wide other

- could cover the following spectrum from the continental shelf to the nearshore environment, coastal zone, then into the uplands and headwater areas – how about just the relationship between headwaters and coastal zone – that is often misunderstood.
- indicators may be different in different places
- determine appropriate segments to study and develop indicators
- compare multiple embayments based on various land use activities and site design requirements in each embayment

Describe the time scales of processes under investigation.

daily/weekly monthly/annual annual/multi-year decadal or greater

- socio-economic change occurs over long periods of time

Time frame:

Provide an estimated length of time for the research to be performed.

< 1 year 1 year 1-3 years 3-5years other

- scoping period – one year
- research – three years

Project cost:

Provide an estimate of the annual funding needed to complete the project and any additional requirements (e.g., ships, sensor platforms, interdisciplinary support).

< \$50K \$50-100K \$100-250K > \$250K

Description of final product:

Describe the scientific results you expect to achieve.

- suite of indicators best suited to each of the segments of the Gulf which increase the managers ability to make decisions about the types of land use and site design principles that will be incorporated into their bylaws, ordinances, and/or regulations.
- cause and effect analysis which describes the continuum of eventualities which allows managers to make more informed decisions

Section 2. Land Use

Research Statements Template #1

Collaborators:

What types of partners, if any, would be critical to have involved during the planning or implementation phases and what would be their role(s)?

- RARGOM - coordination
- American Planning Association
- Smart Growth Network
- National Center of Ecological Synthesis
- EPA
- Low Impact Development Center

Complementary studies:

What scientific or policy studies would complement this work (e.g., social/economic, mapping/resource data layer, monitoring, modeling, synthesis)?

- what the public responds to re: indicators, social marketing
- the ways that we collect and manage the data that would be used to develop these indicators
- build on the GOM Council's regional indicator initiative

Relationship to related work:

How does what is being proposed link to other ongoing, relevant work in this subject area?

- NEP
- CZM
- NERRs all being told to develop indicators
- NPS is developing indicators
- USGS
- CEQ also

Agency Interests:

What agencies or organizations would have an interest in having this research performed or in contributing as a funding partner?

- National Center of Ecological Synthesis
- EPA
- NOAA
- CEQ
- DOI
- National Academy
- DOT

Section 2. Land Use

Research Statements Template #2

Project title:

Provide a brief title that describes the focus of the research.

Assessing the environmental effect of concentrated vs. dispersed development.

Policy relevance:

Describe the policy or type of management decision this research will address? How would we use this in decision making process?

- provide scientific advice on where new growth should be directed and what designs of development/growth should be promoted to minimize adverse impacts
- will directing it to already impacted watersheds have less negative impact than dispersing development over broader landscape (i.e. watersheds with less impervious coverage)
- are there alternative treatment systems
- identify the full range of the impacts of land use development, including social, and economic and the environmental consequences of various land development models (cluster vs sprawl, etc.) and corresponding site design (LID) patterns of development

Scientific context:

List the top 2-3 scientific objectives of the proposed research and the hypotheses being tested. How will the results further our understanding of a natural system?

- prepare a portable/replicable watershed sensitivity analysis
- is the tipping point of 8-10% of impervious surface accurate?
- how does the rate of change in impervious cover correspond to the rate of change of degradation?
- Can degraded watershed be restored if land use patterns are changed?

Approach:

Briefly outline the methods, approaches, and techniques to be employed.

- create and test a model
- use paired watersheds – actual data (this would be the best because users would identify with a real world example.)
- coastal regions of Gulf of Maine
- could also be a comparative ecosystem analysis

Section 2. Land Use

Research Statements Template #2

Space & time scales:

Describe the spatial scale that is required.

single embayment multiple embayments basin-wide other
• multiple watersheds

Describe the time scales of processes under investigation.

daily/weekly monthly/annual annual/multi-year decadal or greater

Time frame:

Provide an estimated length of time for the research to be performed.

< 1 year 1 year 1-3 years 3-5years other

Project cost:

Provide an estimate of the annual funding needed to complete the project and any additional requirements (e.g., ships, sensor platforms, interdisciplinary support).

< \$50K \$50-100K \$100-250K > \$250K

Description of final product:

Describe the scientific results you expect to achieve.

- model that runs different land use patterns and documents watershed and water quality impacts
- documents spatial pattern of development that optimizes water quality and quantity (LID)
- data that assists local and regional planning agencies with preparing regulatory tools and policies that best preserve watershed functions and values

Collaborators:

What types of partners, if any, would be critical to have involved during the planning or implementation phases and what would be their role(s)?

- Center for Watershed Protection
- University of New Hampshire
- EPA
- NOAA
- land use practitioners?

Section 2. Land Use

Research Statements Template #2

- Regional Planning Agencies in MA.
- UConn (NEMO)

Complementary studies:

What scientific or policy studies would complement this work (e.g., social/economic, mapping/resource data layer, monitoring, modeling, synthesis)?

- drivers of current patterns that relate to this issue
- barriers to change
- Pew – Dana Beech
- sprawl report
- Markets for Traditional Developments, Maine SPO

Relationship to related work:

How does what is being proposed link to other ongoing, relevant work in this subject area?

- TMDL
- pending state stormwater rules
- Center for Watershed Protection
- State of New Hampshire Estuaries report

Agency Interests:

What agencies or organizations would have an interest in having this research performed or in contributing as a funding partner?

- National Homebuilders Association
- Maine Real Estate Developers Association
- Urban Land Institute
- EPA
- NOAA

Section 2. Land Use

Research Statements Template #3

Project title:

Provide a brief title that describes the focus of the research.

Creating a land use analytical tool for the GOM watershed that compliments GoMOOS measurements.

Policy relevance:

Describe the policy or type of management decision this research will address? How would we use this in decision making process?

- understand the changes in watershed land use/land cover
- determine the effects of these changes on the GOM marine ecosystem

Scientific context:

List the top 2-3 scientific objectives of the proposed research and the hypotheses being tested. How will the results further our understanding of a natural system?

- create regional land use change models and protocols that accurately predict corresponding changes in the marine ecosystem
- produce massing loadings models useful to land and water managers

Approach:

Briefly outline the methods, approaches, and techniques to be employed.

- secure consistent images for the GOM that are interpreted according to same protocol
- map land use change and automate it
- develop new web-based assessment and communication tools
- produce a time series of land use and habitat patterns in the GOM
- integrate traditional environmental monitoring with long term observations

Space & time scales:

Describe the spatial scale that is required.

___ single embayment ___ multiple embayments x basin-wide x other

Describe the time scales of processes under investigation.

___ daily/weekly ___ monthly/annual ___ annual/multi-year x decadal or greater

Section 2. Land Use

Research Statements Template #3

Time frame:

Provide an estimated length of time for the research to be performed.

< 1 year 1 year 1-3 years 3-5years other

Project cost:

Provide an estimate of the annual funding needed to complete the project and any additional requirements (e.g., ships, sensor platforms, interdisciplinary support).

< \$50K \$50-100K \$100-250K > \$250K

Description of final product:

Describe the scientific results you expect to achieve.

- change models that are ground-truthed
- GIS assessment protocols applicable to this climate

Collaborators:

What types of partners, if any, would be critical to have involved during the planning or implementation phases and what would be their role(s)?

- EPA (e.g., 305b, 303d, coastal assessments, STAR grant program)
- NOAA
- USGS
- NASA
- USDA
- Environment Canada
- state/provincial environmental agencies

Complementary studies:

What scientific or policy studies would complement this work (e.g., social/economic, mapping/resource data layer, monitoring, modeling, synthesis)?

- coastal change analysis program (NOAA)
- USGS
- new land use cover for Maine in July 2005 – land cover will be 5 meter
- Land-Based Sources of Pollution data
- Adaptation of Texas A&M SWAT model (mid-90s NOAA-GOM Council effort, insufficient funds)

Section 2. Land Use

Research Statements Template #3

Relationship to related work:

How does what is being proposed link to other ongoing, relevant work in this subject area?

- nutrient modeling in Massachusetts estuaries
- TMDL requirements by EPA for state water quality agencies
- establishment of electronic node for nutrients (proposed)

Agency Interests:

What agencies or organizations would have an interest in having this research performed or in contributing as a funding partner?

See “collaborators” above