November 21, 2005

To: Gulf of Maine Council
From: Ecosystem Indicator Partnership
Re: Briefing materials for 12-01-05 Council meeting

One year ago, at your winter meeting, you acted on recommendations from the Gulf of Maine Summit and requested that a detailed management and implementation strategy be prepared for a gulf-wide indicators and state of the environment reporting initiative.

Please find attached the draft Table of Contents and introductory text for the Gulf of Maine Ecosystem Indicators and State of the Environment Reporting Strategy. (Copies of the full report will be available at your meeting.) The Strategy is designed to create synergies with the region's investments in ecosystem-based management approaches (e.g., mapping, monitoring and observing, research, data management, education/outreach, etc.) and build on current indicator efforts.

At your meeting we will request the Council's long-term philosophical and financial commitment, as a member of the Partnership, to the production, dissemination and use of indicators and environmental reporting. We look forward to this discussion.

DRAFT
Do Not Cite

Gulf of Maine Ecosystem Indicators and State of the Environment Reporting Strategy

Prepared by:
Kathy Mills

Prepared for:
Gulf of Maine Ecosystem Indicator Partnership

DRAFT
November 18, 2005

Table of contents

Introduction

The Gulf of Maine lies between Cape Cod and the southern edge of Nova Scotia. It extends into the Bay of Fundy and is partially isolated from the Atlantic Ocean by Georges and Browns Banks. The seaward portions of the Gulf of Maine, including its deep basins and shallow banks, constitute one of the most productive ecosystems in the world. Landward to the north and west, the ecosystem encompasses major rivers, such as the St. John and Penobscot, and human communities distributed across rural farmlands and in urban centers. On land and in coastal waters, diverse habitats provide homes for an array of plants and animals.

The Gulf of Maine ecosystem[1]—including its physical, biological, and human components—is dynamic. Over the course of history, the Gulf of Maine has changed as a result of both natural processes and human interventions. Some changes are widely recognized, such as the decline in groundfish stocks. Other changes are less readily apparent, such as increased rural land development as more people emigrate from cities. Some ecosystem conditions directly affect human health and well-being; others impact human value and aesthetic preferences. When ecosystem conditions fail to lie within an acceptable range, humans have the capacity to improve conditions, whether by seeking to reduce water pollution, restore coastal habitats, establish land use guidelines, or by taking a variety of other actions.

Information regarding changes in the ecosystem and its resulting condition is critical for enabling humans to recognize changes and take appropriate actions. As part of detecting these changes and considering them in management processes, ecosystem indicators and state of the environment reports are commonly used to communicate information and support decision-making. Indicators are quantitative or qualitative measures that provide information about the status of or changes in natural, cultural, and economic aspects of an ecosystem. Indicators focus on key factors within the ecosystem to summarize complex information into a simplified form, and trends can be tracked over time to provide insights into environmental conditions, stressors, and societal responses. Indicators can draw attention to challenges or benefits created by ecosystem conditions, progress towards addressing these challenges or sustaining these benefits, and additional responses that may be necessary.

While many indicator and reporting efforts exist within and encompass the Gulf of Maine, a regional-scale indicators and reporting program is lacking. The Gulf of Maine Council on the Marine Environment (GOMC) focused regional attention on ecosystem indicators and reporting through a series of efforts that culminated in the Gulf of Maine Summit in October 2004 (Appendix A). The *Committing to Change* proclamation—signed at the Summit by the Premiers of Nova Scotia and New Brunswick and the Governors of Maine, New Hampshire, and

[1] Throughout this document, "ecosystem" refers to a geographically specified system of organisms, the environment, and the processes that control its dynamics. "Environment" is more narrowly defined as the biological, chemical, physical, and social conditions that surround organisms (NOAA 2005). While the environment is part of the broader ecosystem, focusing on the environment alone neglects the integral role that humans play in ecosystems. This strategy intends to develop a framework for tracking and reporting on multiple components of the ecosystem and the dynamic interactions between these components, including human activities and outcomes. Use of the word "environment" is retained when referring to "state of the environment" reports generally, as this phrase has become standard terminology.

Massachusetts—called on the GOMC to "provide timely and responsive information to decision-makers (including a comprehensive state of the environment reporting and indicators series)." The Ecosystem Indicators Partnership (ESIP) was tasked with fulfilling this mandate; towards this end, this document formulates a strategy to guide the regional indicators and reporting effort.

The strategy outlined herein lays out the guiding principles, fundamental approach, and organizational structure for a Gulf of Maine regional indicators and reporting initiative. It describes actions necessary to initiate a regional ecosystem indicators and reporting effort that builds upon existing programs. Recognizing that a complete program to track ecological integrity for the Gulf of Maine will require years to build, this strategy lays out a plan for gradually developing the regional effort so that the initial steps serve as building blocks for later portions of the project. In addition, it outlines the infrastructure and partnerships that will be necessary to support a regional indicators and reporting program.

Program guidance, fundamental approach, and structure

Vision statement

Decision-makers in the Gulf of Maine and Bay of Fundy region possess the necessary information to manage the ecosystem to preserve ecological integrity and to sustain economically and socially healthy human communities.

Regional ecosystem indicators, developed in a manner that is guided by science and supported by routine monitoring, will detect patterns of change in the ecosystem. By presenting and interpreting these indicators in biennial state of the environment reports, information will be communicated in a manner that decision-makers can use to shape their priorities and guide their choices. The regional-scale insights provided through indicators and state of the environment reports will complement other information used by decision-makers and will integrate across multiple jurisdictional boundaries that exist within the Gulf ecosystem. By creating links between science, management, and ecosystem goals at a regional level, this information will help decision-makers understand the larger implications of their choices.

Core principles

The core principles established for the regional indicators and reporting initiative will ensure the production of a high quality product that is relevant for its users and that is developed through a transparent, science-based process that engages a wide group of partners.

- **Partnerships.** This effort will build on existing monitoring, indicator, and reporting programs within and encompassing the Gulf of Maine. Strong, robust partnerships with these programs and other organizations will be vital for a region-wide indicators and reporting effort to succeed.
- **Science-based.** Indicators will be selected based on the best scientific understanding of how the ecosystem functions and factors that influence its functioning.
- **Audience-relevant.** Indicators will be responsive to audience needs, and information will be presented in formats that are clearly understood by the target audience.

- **Necessary and sufficient**. This effort will track as few indicators as necessary to determine whether ecosystem goals and objectives associated with specific management issues are being achieved.
- **Transparent.** The selection, development, and interpretation of the indicators will be conducted and documented in a manner that ensures transparency such that each indicator can be evaluated by users and replicated by other programs or in future iterations of this initiative.

Fundamental approach

The Gulf of Maine regional indicators and reporting initiative will be guided by the following objectives:

- Provide baseline information, using historical data where available, about ecosystem conditions against which future changes can be compared
- Develop ecosystem indicators for assessing the state of the Gulf of Maine and Bay of Fundy that have a scientific grounding and that are relevant to management issues of concern in the region
- Provide consistent, scientifically-sound, credible information that can be used to strengthen environmental policy and management
- Utilize a collaborative, interactive process that involves a variety of partners and data sources
- Ensure that information reaches decision-makers within the Gulf of Maine and Bay of Fundy region in a manner that is useful to them

Although decision-makers receive information from multiple sources, the Gulf of Maine indicators and reporting initiative will uniquely convey linkages between science, management, and ecosystem goals at a regional scale and elucidate connections between ecosystem conditions and human needs. This initiative will begin with modest short-term goals and gradually extend the scope of its effort to expand 1) the depth and breadth of management-relevant issues that are covered, 2) the spatial scale of focus, and 3) the audience that is reached through products of this initiative. It will rely heavily on partnerships with existing government agencies, environmental organizations, community groups, business and trade groups, academic institutions, and other programs operating within the region and at national scales.

Program structure

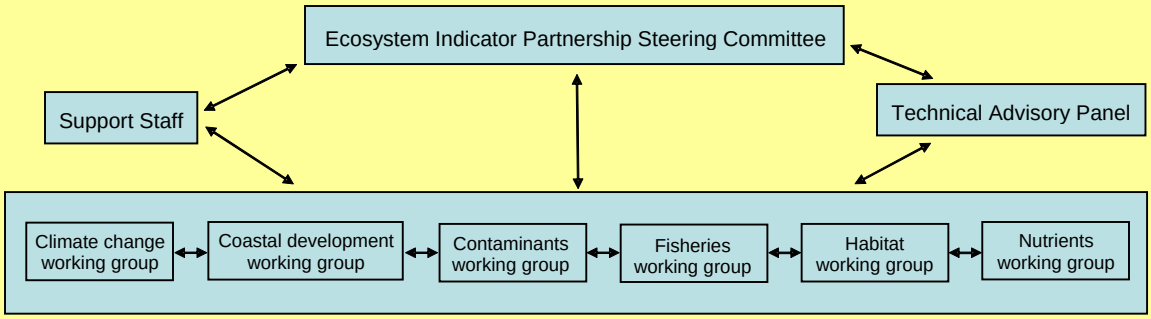
The core structure of the regional indicators and reporting initiative will consist of an ESIP steering committee, work groups associated with each of the topical indicator issues, a technical advisory panel, and a small staff. In addition, the GOMC will play a high-level role in guiding the direction of the program and supporting its activities (Figure 1).

Roles and responsibilities of the Gulf of Maine Council

Through the *Committing to Change* proclamation, the GOMC has been charged with developing a comprehensive state of the environment reporting and indicators series. The GOMC will play a high-level role in the indicator and reporting effort by guiding the general direction and scope of the initiative. Its responsibilities will primarily entail:

- Providing input to the strategy and activities of the indicators and reporting effort to ensure consistency with GOMC priorities and protocols
- Reviewing and responding to annual progress reports developed by the initiative
- Providing financial resources to support the indicators and reporting initiative.

Figure 1. Organizational chart for the Gulf of Maine regional indicators and reporting initiative



Structure, roles, and responsibilities of ESIP Steering Committee

A steering committee will head the ESIP and serve as the coordinating body for the Gulf of Maine regional indicators and reporting effort.

Leadership. ESIP is co-chaired by two leads from the United States (from the Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA)) and two leads from Canadian government agencies (from Fisheries and Oceans Canada (DFO) and Environment Canada (EC)).

Membership. Co-leads of the issue-specific indicator work groups will also participate as members of the ESIP steering committee.

Advisors. A group of advisors will provide periodic guidance to the ESIP steering committee regarding the direction and strategy of the indicators and reporting program. The advisory panel will be composed individuals with expertise in the development and implementation of indicators or with extensive involvement in monitoring programs. These individuals may participate in steering committee meetings to the extent they are willing, but they will be specifically engaged at certain points to provide input to action plans, review draft documents, and participate in the development of products and workshops.

The primary responsibilities for the ESIP steering committee include:

- Serving as the oversight and coordinating committee for the Gulf of Maine indicators and reporting effort

- Establishing action plans and timelines for project
- Creating indicator work groups and assisting group co-leads to recruit and retain members
- Maintaining communication with work groups to ensure a consistent understanding about the project and its goals and tasks
- Engaging ESIP advisors as needed to shape the direction of the indicators and reporting effort
- Preparing and submitting annual progress reports regarding the indicators and reporting initiative to the GOMC and considering the GOMC's response in planning future activities.

Structure, roles, and responsibilities of the indicator work groups

A work group is responsible for each of the key issues for which ecosystem indicators will be developed.

Leadership. Two co-leads, one from the U.S. and one from Canada, will head each of the work groups. These individuals should be employees of key partner agencies or organizations, possess a thorough scientific understanding of the issue they will manage, and have experience communicating scientific information to decision-makers. Their primary responsibilities include:

- Managing the direction and activities of the work group
- Serving as liaisons between the work group and ESIP
- Maintaining contact with work group members and calling upon them as necessary to delegate responsibilities
- Developing and maintaining compositional balance of the work group to ensure that necessary topical expertise and geographical distribution exists among group members
- Coordinating activities with other work group leads as needed
- Identifying lead members to oversee development of each indicator and providing assistance as needed.

Membership. Each work group will be composed of additional members distributed throughout the Gulf of Maine region with diverse expertise regarding the issue-specific topic of the group. At least one social scientist should be represented on each work group. The work group members will be affiliated with partner agencies and organizations. They will play key roles in:

- Selecting indicators to be developed
- Providing guidance to staff and overseeing the development of indicators, including identifying relevant partners and evaluating data sources associated with each indicator
- Guiding the content of sections of the state of the environment report associated with each indicator
- Providing input regarding distribution opportunities and communication channels to disseminate the state of the environment report

Structure, roles, and responsibilities of the technical advisory panel

A technical advisory panel will be established to provide consultancy services for the indicator work groups and ESIP steering committee and to serve as an independent reviewer of protocols for developing, interpreting, and presenting indicators. This panel will be comprised of members

with expertise that is relevant to all of the work groups but that is unlikely to be available within each work group. Panel members should possess expertise in spatial statistics, geographic information systems, communication, outreach, and policy analysis. Additional areas of expertise that would likely prove beneficial may include risk communication and visualization tools. Responsibilities of the technical advisory panel include:

- Providing input regarding the proposed data sources for each indicator and protocols for compiling and analyzing these data
- Offering guidance for remedying temporal and/or spatial gaps in data availability that preclude development of certain indicators
- Evaluating interpretations and presentations of indicators and offer suggestions to increase understandability and impact
- Providing advice regarding plans to disseminate report products to decision-makers
- Identifying opportunities to use report products as leverage tools to increase the underlying capacity to develop indicators in the region

Staff support for indicators and reporting effort

Much of the work associated with developing regional ecosystem indicators and state of the environment reporting will be conducted by a small core staff. Permanent staffing needs include:

- A coordinator to manage all components of the indicator and reporting initiative;
- Two to three staff members to work closely with the work groups to develop the indicators and produce the state of the environment report

Temporary staffing needs include:

- A data management specialist to create a web-based home for the indicators program and to develop metadata and quality assurance protocols
- A communication and outreach specialist to develop detailed plans for conveying and disseminating information
- A contractor to conduct a follow-up evaluation of the usefulness of the report to decision-makers and to document future priorities and needs of the target audience
- Workshop coordinators
- Report editor