

Northeast Coastal Indicators Workshop

Meeting Summary



**Durham, New Hampshire
January 6-8, 2004**

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Northeast Coastal Indicators Workshop

New England Center, Durham, NH

January 6-8, 2003

Workshop Summary Report

The Northeast Coastal Indicators Workshop (NCIW) was held on January 6-8, 2004 at the New England Center on the campus of the University of New Hampshire, Durham. The region considered during the workshop extended from the Bay of Fundy and Gulf of Maine in Canada to Long Island Sound (Connecticut and New York). Regional environmental professionals from federal, state, provincial, local, academic, and non-profit organizations participated in the workshop. A geographic breakdown of attendees from the workshop is represented in Figure 1. Figure 2 shows participant representation by business type. The invitation, agenda and participant list are included in Appendix A.

The workshop was primarily funded by the U.S. Environmental Protection Agency (EPA), with sponsorship support from National Oceanic and Atmospheric Administration (NOAA), Gulf of Maine Ocean Observing System (GoMOOS), Gulf of Maine Council on the Marine Environment, Maine State Planning Office's Coastal Program, Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET), Alliance for Coastal Technologies (ACT), and Battelle.

This workshop follows recommendations from the *Atlantic Northeast Coastal Monitoring Summit* which was convened in December 2002¹. One of the suggested next steps from that summit was to identify indicators to track the overall status of the region's coastal and marine environment and to measure responses to environmental management activities.

Workshop Preparation

In preparation for the workshop, straw conceptual models, key questions, and indicators² were drafted by the Steering Committee for participants to discuss and come to consensus on regionally important themes including: fisheries, coastal development, eutrophication, climate change, contaminants, and aquatic habitat. Key workshop products include:

- National Indicator Development Initiatives;
- Tapping the Indicators Knowledge Base: "Lessons Learned";
- Indicators Workshop Operational Definitions;

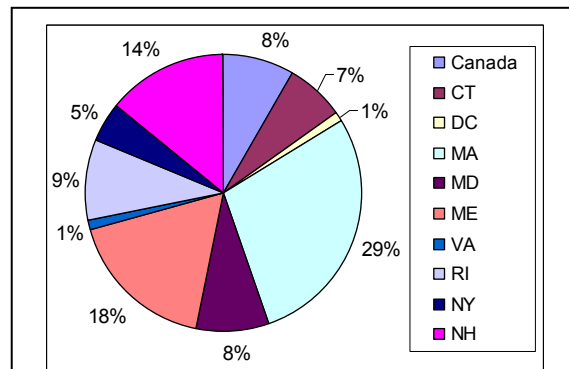


Figure 1 Workshop Participation by Geographic Spread

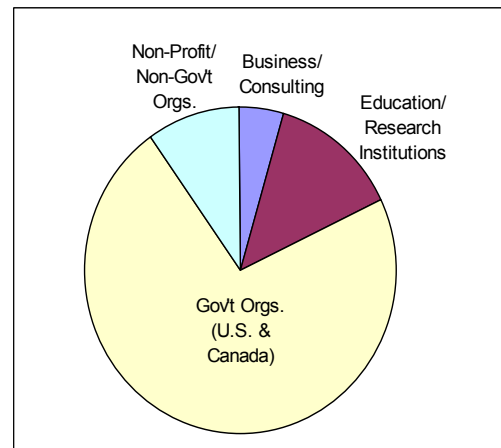


Figure 2 Workshop Participation by Business Type

¹ Proceedings from the *Atlantic Northeast Coastal Monitoring Summit* can be viewed on the Gulf of Maine Council on the Marine Environment's website: <http://www.gulfofmaine.org/nciw/ancms2002.asp>.

² Copies of all workshop briefing materials, participant and Steering Committee member lists, as well as all of the presentations given at the workshop (also included in Appendix B) can be viewed or downloaded from the workshop website, <http://www.gulfofmaine.org/nciw/>.

- Conceptual Model Papers; and
- Indicators bibliography.

The Steering Committee developed the following mission and goals for the region and the workshop.

Vision for the region – A sustainable northwest Atlantic ecosystem that ensures environmental integrity and that supports and is supported by economically viable, healthy human communities.

Mission for regional indicators – To track the status and trends in ecosystem integrity throughout the northwest Atlantic region through collaborative partnerships. To provide information for management decisions at regional and local scales.

Indicators Workshop Goal – To achieve consensus on a list of key indicators focusing on six major categories: fisheries, eutrophication, contaminants, coastal development, aquatic habitat, and climate change, for which regional data will be compiled and tracked to indicate changing trends in ecosystem integrity through the northwest Atlantic region (*i.e.* northeast U.S./Maritime Canada).

Workshop Overview

The workshop began the afternoon of Tuesday, January 6th during which a number of background and informational presentations (copies of all of the PowerPoint presentations are in Appendix C) were given by members of the Steering Committee and invited speakers. On the second day, participants were divided into six breakout sessions, each discussing one of the key issues. During an afternoon session, the participants were convened for a keynote address by Congressman Tom Allen of Maine. On the final day, results from each of the breakout sessions were reported to workshop participants and a panel of invited Senior Environmental Managers from throughout the region. Workshop highlights, a description of key presentations, and a listing of the suggested next steps are detailed below.

Tuesday, January 6, 2004

Workshop Opening Remarks and Presentation

Mr. Barry Burgan of the EPA Ocean Coastal Protection Division opened the meeting with a discussion of the efforts leading up to the monitoring and indicators workshops and EPA's plans to duplicate these efforts in other regions. These efforts were begun based on the Coastal 2000 Research and Monitoring Strategy, which was developed in partnership with EPA's Office of Wetlands, Oceans and Watersheds, NOAA, U.S. Geological Survey (USGS), and the U.S. Department of Agriculture. The strategy recommends the development of issue-based regional coastal monitoring efforts supported by the National Coastal Survey. The monitoring efforts developed under this strategy are meant to concentrate on specific issue-based problems (*e.g.*, eutrophication, sediment contamination, habitat loss) with particular emphasis on regional applications.

Dr. Carlton Hunt followed Mr. Burgan's opening remarks with a discussion of the workshop charge. He focused on the reasons for regional coordination, which has received recent attention due to a number of collaborative reports that have recommended the creation of regional councils. Indicators to track the status of a region are a necessary part of any regional coordination effort. Thus, the workshop was designed to assist the development of regional coordination efforts throughout the northwest Atlantic. The desired outcomes of the workshop were:

- To develop indicators that apply to the six key issues; and
- To identify an implementation process (*e.g.*, core concepts, key partners, timelines, relative budget requirements) for the indicators.

Progress Since 2002 Regional Monitoring Summit

Mr. David Keeley gave an overview of the progress that has been made on the regional monitoring efforts since the December 2002 Summit. Progress attained includes a number of data aggregation efforts, increased funding for monitoring and indicator development, EPA regional commitment, and this workshop.

Role of the National Coastal Assessment

Dr. Hal Walker of the EPA presented findings regarding the National Coastal Assessment (NCA) program. He noted that the NCA has three major goals:

- 1) Assess ecological condition of the nation's estuarine resources based on comparable data of known quality,
- 2) Determine reference conditions for more detailed studies of ecological responses and stressors, and
- 3) Help build infrastructure in states and EPA regions for more effective reporting to meet the requirements of the Clean Water Act.

Dr. Walker stated that the overall goal of building state and regional infrastructure and understanding is very important, because the states have the legal responsibility to report on conditions in their coastal waters under the Clean Water Act. In the Northeast U.S., the implementation strategy and approach of NCA involves partnering with state resource agencies in collecting, processing and analyzing the northeast coastal data, and utilizing a consistently measured set of indicators to assess and help explain estuarine condition. Probability surveys were designed to estimate conditions in 100% of the states' estuarine waters. In some states it was possible to incorporate pre-existing sites into the probability survey design to increase sensitivity for detection of environmental trends. States in the northeast agreed to share their data, which facilitated rigorous quality assurance and provided an opportunity for states to learn about their estuarine conditions in relation to neighboring states.

Dr. Walker stated that the National Coastal Condition Report II, summarizing a regional analysis of the summer 2000 survey, will soon be released for public comment and policy review. States will report on the conditions in their estuarine waters, utilizing NCA data along with additional information gathered during more targeted monitoring. Work is also underway using NCA data and statistical models to predict the likelihood of impairment in estuaries not initially monitored. Finally, a web-based Northeast Coastal Condition Report will be released in 2005, summarizing the NCA 2000 and 2001 results and employing innovative methods of data visualization and analysis.

Implementing a Regional Monitoring and Indicators Initiative

Mr. Keeley presented his assessment of the core components needed for implementing a regional coordinated monitoring and indicators initiative. The challenges of developing a regional program were acknowledged. This large endeavor involves many organizations coordinating their efforts to identify priority questions and issues. He emphasized that this is not an effort to reinvent programs, but rather to integrate complimentary programs in a phased approach. One key component is the application of a pilot project which can demonstrate applied indicators success in use within a regional perspective.

He also discussed the critical need to gain support from the management community as well as the public. To do so, the need for indicators must be established and easily understood, and the monitoring and observing community needs to present material in synthesized products. To "create a solid foundation for a sustained effort" the following goals were suggested:

Regional Monitoring

- By Spring 2004: Form committee; set terms of reference, goals, and work plan; secure seed funds and hire staff; and commence work on region-wide monitoring strategy.
- By Summer/Fall 2004: Disseminate concept papers and solicit comments.
- Winter 2004/05: Produce strategy and seek implementation funds.

Regional Indicators

- By Summer 2004: Workshop Indicator work groups continue ad-hoc efforts to crystallize core indicators in the six issue areas.
- Fall 2004: Present draft indicators resulting from this workshop at the Gulf of Maine Summit in New Brunswick for review and refinement.
- Winter 2004: Integrate indicators effort into the regional strategy.

Web Survey Results

An Indicators Web Survey was developed by the Steering Committee and posted to the workshop website in mid-November. As of December 24th, 215 respondents had completed the survey. The survey was used to obtain feedback on the relative importance of the key topics, goals, themes, and straw indicators identified by the Steering Committee for the region. The straw indicators were chosen from a number of documents on indicators and were edited to fit the northwest Atlantic region. Respondents made decisions on the importance of each indicator and were allowed to make additional suggestions. These data were used to ensure that the workshop organizers were on the right track and to make adjustments to the straw questions and indicators put before the breakout groups. Cross-tabulations were run on the respondent's job characterization, ocean scales studied (*e.g.* estuary, coastal zone, embayment, river, etc.), and the jurisdiction with which they were associated (*e.g.* state/province, NGO, etc.). While some understanding of the relevant regional questions and indicator themes were evident in the initial evaluation of responses, the survey data must be analyzed further to fully understand and cross correlate the results.

Indicators in the International Large Marine Ecosystem Program in Relation to the Northwest Atlantic

Dr. Kenneth Sherman of National Marine Fisheries Service presented an overview of large marine ecosystems (LMEs) from an international perspective, emphasizing the Global Environmental Facility's (GEF- located within United Nations Environmental Programme (UNEP), funded by the World Bank) initiative to move LMEs from degradation to restoration. LMEs are regions of the ocean (extending from coastal watersheds to the edge of the continental shelf) that are characterized by distinct bathymetry, hydrography, productivity, and trophically dependent populations. They are 200,000 square kilometers or larger in size. On a global scale, 64 LMEs account for 90% of the annual marine fisheries yield. They represent the portions of the ocean affected by overexploitation, ocean pollution, and coastal habitat loss/degradation. The LME approach to ecosystem-based assessment and management practices uses five modules and suites of ecosystem indicators: productivity, fish and fisheries, pollution and ecosystem health, socioeconomic conditions, and governance. The Northeast Shelf LME extends from Cape Henry, Virginia to the Gulf of Maine, with the major offshore human stressor within the ecosystem being excessive harvesting of demersal fish stocks. Pollution and habitat alteration are important sources of ecosystem degradation inshore.

The LME approach to fisheries management is focused on improving resource assessments with sustainable socioeconomic benefits while restoring depleted fish stocks and degraded habitat. Lessons learned from international LME projects applicable to the northwest Atlantic region include the importance of socioeconomic drivers in reducing coastal pollution, restoring damaged habitats, and recovering depleted fish stocks. The critical role of governance in developing political support for restoration was acknowledged, as was the emerging problem of eutrophication extending from the inshore

onto the continental shelves. Dr. Sherman also discussed a variety of indicators from each of the five LME modules that might be applicable to the northwest Atlantic coastal ecosystem in the context of our workshop.

Charge to Breakout Sessions

At the end of the first day, Dr. Hunt reviewed the charges for the breakout sessions to be held the following day. Each breakout session was instructed to focus on the following goals:

- Discuss overall applicability of the developed conceptual model/white papers,
- Identify the top five most important issues/questions,
- Identify up to three priority indicators for each question,
- Identify primary/secondary users, information conveyed, spatial and temporal scales, and whether additional data collection are needed, and
- Identify required actions over the next 12-18 months, including key partners needed, adequacy of existing data, ways to engage end-users, and implementation approaches.

Wednesday, January 7, 2004

Breakout Sessions

On Wednesday the participants assembled into six breakout groups. See Figure 3 for a breakdown of each breakout session participation by geographic spread. Breakout session discussions were divided into three sessions of approximately two hours each, including a clarification of the issues, a discussion of particular indicators, and formulation of ideas for implementation. Each group was responsible for completing these discussions and preparing a report of their progress that could be conveyed to a Senior Management Panel the following morning.

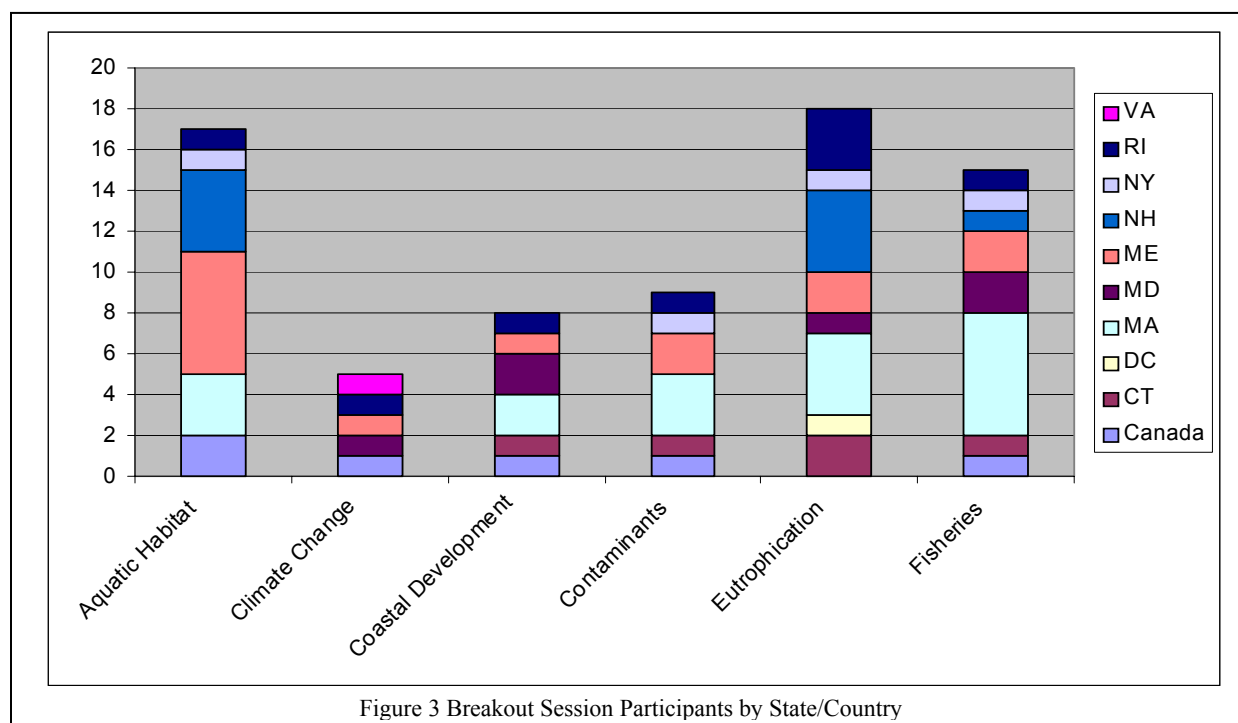


Figure 3 Breakout Session Participants by State/Country

Congressman Tom Allen

Congressman Tom Allen of Maine provided participants his thoughts on the House Oceans Caucus and the pending Ocean Commission’s report recommendations. Congressman Allen stated that he feels it is

Congress's job to figure out how to deal with the long range problems resulting from increasing human impact on the oceans. He also recognized the enormous challenges involved.

In 2000, the House Oceans Caucus was created as a voluntary, bipartisan, and informal group. The committee is not in the chain-of-command of the government and therefore has more freedom. There are 54 members sharing the same interest in protecting the oceans. The House Oceans Caucus goals are to:

- Increase Congress's interest and awareness on ocean policy.
- Advocate increases in appropriations for oceans programs.
- Legislate in the House and promote national and international needs.

The preliminary draft of the Oceans Commission Report will be available in early March 2004. The report focuses on a wide array of policy issues such as ecosystem based management, integrated observing systems, and monitoring. Congressman Allen indicated the Ocean Commission Report will likely say that there is a need to integrate the watershed and ocean observing systems, and that a case can be made for long-term and financial support through Congress.

Congressman Allen further stated that information generated from monitoring activities needs to be accessible to managers and needs to be translated into a form that decision-makers can utilize and understand. In the next two years, there will be a new focus on oceans and the importance of quality of life and the health of the planet.

Thursday, January 8, 2004

Reporting Progress from Breakout Sessions

David Keeley reconvened the workshop by describing the format for the day and introducing the Senior Management Panel (Appendix C). Summary results of the breakout sessions were presented by members of each breakout session to the workshop and to the eight-member panel of Senior Managers representing government (federal, state/provincial) and non-governmental organizations (NGOs). The Senior Management Panel included:

- Secretary Ellen Roy Herzfelder – Executive Office of Environmental Affairs, Massachusetts
- Mr. Byron James – Deputy Minister of Agriculture, Fisheries, and Aquaculture, New Brunswick
- Dr. Priscilla Brooks – Conservation Law Foundation
- Dr. Rick Spinrad – NOAA/National Ocean Service
- Ms. Betsey Wingfield – Connecticut Department of Environmental Protection
- Dr. John Boreman – NOAA/National Marine Fisheries Service
- Ms. Faith Scattolon – Department of Fisheries & Oceans, Canada
- Ms. Katrina Kipp – Environmental Protection Agency, New England Region

The breakout group findings were summarized in a slide presentation (Appendix C). Each group was asked to present their top 3-5 questions and the indicators they agreed upon for each. The key questions identified by the participants and the associated indicators developed are provided below for each of the six topics considered. A more comprehensive discussion of each of the breakout session results is included in Appendix C following the presentations.

Fisheries

What is the health of the fisheries with regard to ecosystem integrity, including targeted and non-targeted species, habitat, and fisheries activities?

1. What are the trends in and the status of exploited fisheries stocks?
Indicator(s):
 - Proportion of stocks at or above targeted abundance or biomass
 - Age/Size structure of species from surveys and/or landings
 - Spatial distribution of fisheries species
 Spatial and Temporal Scales: Range of species or stocks; Annual to every 3-5 years

2. What are the effects of fishing on non-targeted species and their associated communities?
Indicator(s):
 - Characteristics of bycatch and discards
 - Population levels for selected species
 - Species Diversity
 Spatial and Temporal Scales: Regional based on populations or stock, biogeographic boundaries;
Seasonal

3. What are the effects of fishing and non-fishing activities on marine habitat and fisheries productivity?
Indicator(s):
 - Area closed to fishing, both pelagic and/or benthic
 - Benthic diversity
 - Spatial distribution of bottom fishing
 Spatial and Temporal Scales: Region wide (based on biogeographic boundaries); 1 to 5 years
depending on habitat to annually to continuous

4. What are the trends in the socioeconomic characteristics of fishing?
Indicator(s):
 - Days at sea
 - Fleet composition
 - Commercial and recreational fishing economic value
 - Angler satisfaction
 - Overcapitalized fleets
 - Natural capital value
 - Market value for consumers

Contaminants

1. How are contaminants in the region changing?
Indicator(s):
 - Area of sediments that have contaminant levels above sediment quality guidelines
 - Level of contaminants in representative non-migratory organisms
 - Area of shellfish bed closure by state by year
 - Days of beach closure due to bacterial contamination by state by year
 Spatial and Temporal Scales: Specific water body scales; Event to annual to decadal

2. How is the input of contaminants changing over time and space?
Indicator(s):
 - Annual chemical load to water bodies by state
 - Number of bacterial source investigations and sources eliminated by year by state
 Spatial and Temporal Scales: Water bodies region-wide; Annual to source specific

3. Are management actions changing the extent and severity of human health effects?
Indicator(s):
 - Incidences of human disease caused by consumption of fish and shellfish and recreational contact

- Level of contaminants in representative fish/shellfish and at-risk humans
 - Annual number of beach and shellfish closures (reopenings)
- Spatial and Temporal Scales: Water bodies region-wide; Annual to source specific

4. How well are contaminant management actions protecting ecosystem integrity?

Indicator(s):

- Sediment quality measure by triad approach
- Incidence of disease
- Reproductive success
- Quality of habitats as affected by contaminants

Spatial and Temporal Scales: Water bodies region-wide; Annual to decadal scales

Eutrophication

1. What are the extent, severity, and trends of eutrophication impacts?

Indicator(s):

- Dissolved oxygen
- Chlorophyll a
- Submerged aquatic vegetation
- Water clarity

Spatial and Temporal Scales: Estuary-wide; Seasonal to annual

2. What are the sources of nutrients, can they be controlled, how are they changing?

Indicator(s):

- Measured and modeled loads
- Land use/cover (load proxy)
- Population (load proxy)

Spatial and Temporal Scales: Regional; Seasonal to annual to decadal

3. What is the state of management measures and how can they be optimized?

Indicator(s):

- Dissolved oxygen
- Chlorophyll a
- Submerged aquatic vegetation
- Water clarity
- Measured and modeled loads
- Land use/cover (load proxy)
- Population (load proxy)

Aquatic Habitat

1. How is the extent, distribution, or use of coastal habitats (watersheds+ estuaries+ near and offshore) changing over time?

Indicator(s):

- Extent per habitat type over time
 - Large scale mapping, small scale ground surveys
- Distribution per habitat type
- Inventory of human use
 - Area, percent of public vs. private
 - Area, percent designated for permanent habitat protection

2. How is the ecological condition of coastal habitats changing over time?

Indicator(s):

- Community Structure
 - Measure of change of relative abundance of species within habitat
- Trophic Structure
- Species of Concern

3. What are the causes of coastal habitat change over time?

Indicator(s) of most important potential causes of habitat loss and degradation (physical and hydrologic alteration, nutrient loading, resource extraction, contaminants, climate change, sediment input)

- Extent and percent habitat area altered by tidal restrictions
- Boat registrations
- Seagrass Nutrient Pollution Index
- Indicators relating to other causes assumed covered by other groups

Coastal Development

1. What is the type, pattern, and rate of land use change?

Indicator(s):

- Percent change in land cover to more intensive uses
- Demographic changes (population, etc.)
- Types of land uses and change

2. How are these changes impacting the integrity of coastal ecosystems?

Indicator(s):

- Integrity of coastal ecosystems for:
 - Threatened and endangered coastal species
 - Migratory species
 - Invasive species

3. How is the region responding to changes in coastal ecosystems?

Indicator(s):

- Type, location and pace of land conservation
- Type, location and pace of habitat restoration
- Land management (planning, regulatory, etc)

Climate Change

1. What are the causes?

Indicator(s): None identified

2. What are the impacts of climate changes to: weather, atmospheric & ocean circulation, ecosystems, and society?

Indicator(s):

- Precipitation trends
 - Storm frequency and intensity
 - Water temperature surface bottom
 - Relative sea level rise
- Spatial and Temporal Scales: Regional; Annual to decadal

3. What are the impacts of climate change on biotic ecosystems?

Indicator(s):

- Warm vs. cold water finfish species diversity
- Planktonic diversity
- Wetlands extent, distribution and composition
- Marine diseases indices (i.e., MSX, dermo, shell disease)

Spatial and Temporal Scales: Regional; Annual

Critical Linkages between all issues:

- Management and regulator community involvement to frame need and buy in
- Monitoring and observing community to provide data and create synthetic products
- Scientific community to guide expanded monitoring and identify research needs
- People/Programs with lessons to share

Senior Management Panel Response

After completion of the presentation of the breakout findings the members of the Senior Management Panel responded with observations and comments. The workshop participants then engaged in an open discussion with the panelists on the indicators and comments. This was followed by suggestions from the Senior Management Panel members on how these indicators might be incorporated into related efforts in the region, their relevance to management, timeliness of the recommendations, and, when possible, initial implementation strategies.

In general, the panelists endorsed the indicator development approach, the indicators, movement towards regional reporting of environmental conditions, and the utility of the indicators put before them. Several panelists noted the present push towards ecosystem based management, both technical and statutory, and developing policies to support these thrusts. Some noted the necessity of having a central driving force on which to focus the regional indicator effort and that this force was not clearly established. Also expressed during the discussions was an essential need to know what was wanted or needed from the system (region) with respect to environmental quality and natural resources. Other panelists noted the necessity to convey with exactness what the indicators show and the practical questions addressed. The workshop conveners were encouraged to summarize and convey the findings from the workshop to provide focus for future agency planning and funding requests. Panelists indicated that the regional dialogue is critical and encouraged participants and conveners to continue to define management relevant, comprehensive indicators applicable at both broad and local scales. Others added the necessity that the indicators address relevant natural resource questions and convey convincing arguments and information germane to these questions. Encouragement towards developing indicators that were sensitive enough to provide early warning and support planning on emerging issues was also communicated.

One sense of direction from the panelist's responses was that the steps taken at the workshop can help build consistency in ocean programs and make the public aware of needs and progress. The panelists indicated that the breakout results were cogent and "actionable", although several noted the need for folding in socioeconomic frameworks and inclusion of socioeconomic indicators. Major issues noted during the discussions were access to data generated under an indicator program, rapid interpretation of data and production of information that serves management needs, ability to show improvement in knowledge, support for building effective models, and conveyance and management of uncertainty in the indicators. The latter included conveying an understanding of the sources of uncertainty and how they are managed in the information conveyed by the indicators. Others raised the need to build and incorporate predictive or forecasting tools into the indicator development process and the importance of conveying the criteria used to develop the indicators. Factors such as ease of measurement, statistical error (confidence), and relevance were raised in this context. Other concerns raised in the discussions included the necessity for knowing the "tipping points" (understood as unacceptable conditions or thresholds) in the indicator metrics.

Many panelists conveyed that they are encouraged by the process defined by the Northwest Atlantic Coastal Indicators Workshop and indicated they would support future efforts to find resources to continue the effort. The panelists suggested the next step for the process might include substantiating the concepts, questions and indicators put forward by the breakout groups and determining who has responsibility to make the next steps happen (*e.g.*, housing and governance of a regional program, funding, staffing, demonstration of efficacy of the concept).

A summary of the main points made by the senior management panel, organized by major themes flowing from the panelists' response and the subsequent question and answer period, follow.

Ecosystem Management

- Importance of connecting the environment to development and “smart-growth.”
- Encouragement to develop and use well-articulated case studies that document the entire story (presenting the problems identified, what successfully solved the problems, how these could be implemented on a larger scale) to provide information and better inform decision makers.
- Essential need for officials to have a clear understanding of the issues or problems that must be solved in order to gain support.
- Provide intersections of knowledge and visions at federal to regional to state levels to develop fiscal support.
- Frustration regarding how best to use data sets to solve problems and connecting this to forcing functions that drive the system was voiced.
- Essential that there be clear understanding of the problems being addressed and use practical questions to gain management support.
- The need for the development of decision aids as information products and to support management was noted.
- Questions arose regarding the extent to which private sector should be involved in information products and data management. The roles and responsibility of various other groups was also raised.
- Ecosystem-based management is being mandated through legislation. The objectives for such management are conservation of species and habitats.

Issues and Indicators

- Identification and use of cross-cutting issues among the six topic areas and high level indicators that transcend throughout the regions were encouraged.
- Ability to provide cause-effect linkages is viewed as important.
- Development of practical indicators established on good data and interest is called for.
- Looking towards the future and emerging problems is important; however, managers need indicators that are relevant and measurable now.
- Encouragement on indicators that focus overall marine environment rather than just commercial or recreational fisheries was given.
- Indicators that concentrate on abundance, distribution, and diversity of all marine organisms rather than fisheries was encouraged.
- Societal impacts (*e.g.*, dependence on fossil fuels) were identified as important for all six topic areas.
- Importance of having the ability to adapt management approaches and monitoring was voiced.
- Indicators need to be relevant to multiple activities and management and monitoring objectives.
- Some indicators suggested by the panel include: maintaining natural communities, species populations of natural value, physical properties, and levels of contaminants in marine environments.

Data Access

- Questions regarding who controls access to data and maintains the data were raised; Questions related to how rapidly data are made available at large were noted; building information management capacity was seen as an essential step in the process.
- Engage end users both primary and secondary to ensure validity of approach.
- The link between indicators, modeling, and forecasting was raised as an important element to consider in the region.

Other comments:

- Provide case studies where indicators were clearly effective and supported management goals.
- Formulate an action plan; this can further the coordination of the regional initiative.
- The six topic areas need focus and consolidation and a set of indicators to broadly represent the area.
- The need for staff dedicated to the regional effort was indicated.
- Communicate indicators to the public and what they mean in terms of quality, progress toward management goals, etc.
- Link the indicators to regulatory and legislative mandates.
- Develop milestones to measure progress.
- Pilot projects are important and should move ahead; develop a strategy and a road map to develop and implement pilot programs.
- NGOs and the private sector are resources that can be used and have effective voices in the public area.
- Review the Ocean Commission Report to identify areas of need and next steps.
- Communicate with state and federal managers and have them represented in the effort.
- Focus on outreach and gain buy-in from those who use Gulf of Maine resources.
- Convey that this exercise is an inclusive process and not a threat.
- Make use of the government to drive the work, communicate with elected officials.
- Keep the interest of manager's objectives in mind when choosing indicators.
- Ensure the goals for the indicators are defined to build credibility.
- Investment in data management; it is essential for success; utilize established database where possible.
- Don't tackle the entire set at one time; start with a small set of key indicators for a set of significant management questions.

Next Steps

The session closed with a brief summary of the next steps suggested during the discussion among the participants, Senior Management Panel, and Steering Committee. These include:

- 1) Complete the workshop summary,
- 2) Establish the level of confidence in conceptual models, questions, and indicators developed,
- 3) Develop an action plan:
 - a. Identify resources that will support continuation of the process
 - b. Develop proposals for funding
 - c. Identify legislative authority linkages
 - d. Develop communication plan
 - e. Conduct pilot projects (field testing concepts)
 - f. Develop case studies
- 4) Conduct and outreach program,
- 5) Gain political support, and
- 6) Obtain commitments of resources.

A timeline for these activities as discussed during the workshop follows:

Spring/Summer 2004:

- Form regional monitoring and indicators committee
 - Set terms of reference and goals
 - Prepare a work plan
 - Secure seed funds to hire staff
- Continue to develop the region-wide monitoring and indicator strategy with the attributes:
 - Priority management issues and questions driven
 - Earnest agency coordination
 - Phased implementation
 - Resource sensitive
 - Demonstration oriented
- Perform Outreach

Fall 2004:

- Disseminate regional monitoring and indicators concept and solicit comments from managers
- Conduct the Gulf of Maine Summit in October - distribute action plan
- Initiate demonstration pilot projects
 - Define goals, audiences, uses
 - Content
 - Region-wide (1 theme) or sub-regional (multiple themes and indicators)
 - Apply indicators
 - Education, communication, outreach methods and materials
- Link to regulatory and legislative authorities

Workshop Closing

Mr. Barry Burgan closed the meeting, stating that the workshop had achieved and even exceeded some of the goals that the Steering Committee had hoped to accomplish. As stated on page 2, the goal of the workshop was “to achieve consensus on a list of key indicators...for which regional data will be compiled and tracked to indicate changing trends in ecosystem integrity through the Northwest Atlantic region”. The success of the working groups can be seen in their agreement on the proposed indicators put forth in this document and the resulting discussion with the Senior Management Panel members. However, as indicated in the list of next steps there is additional work to do and workshop participants are asked to continue assisting in the process. If anyone is interested in getting involved in further efforts, they should contact David Keeley of the Maine State Planning Department at David.Keeley@state.me.us.