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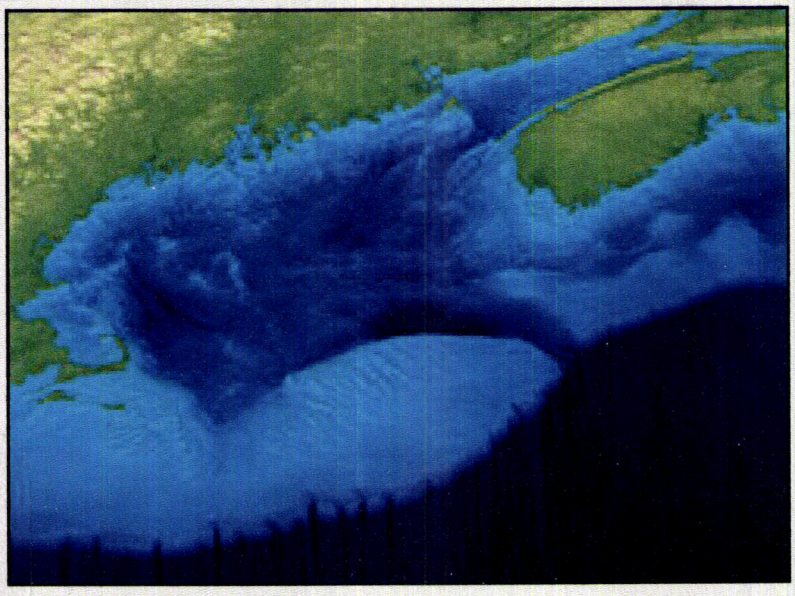
Bay of Fundy/Gulf of Maine Overview and Strategic Framework

DRAFT REPORT



Environment Canada - Atlantic Region

Working Group on the
Bay of Fundy/Gulf of Maine

June 2003

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Executive Summary

Environment Canada in the Atlantic Region is involved in developing strategies to guide itself in establishing program directions, setting priorities and advancing its overall agenda[1] in six main ecoregions; these are the Bay of Fundy/Gulf of Maine, Eastern Nova Scotia/Scotian Shelf, Southern Gulf of St. Lawrence, Western Newfoundland/Northern Gulf of St. Lawrence, Newfoundland/Grand Banks, and Labrador/Labrador Shelf. Having a strategy for each ecoregion[2] is recognized to be highly important in advancing the departmental agenda; however, the RDG and members of RMC chose to place initial priority on the Bay of Fundy/Gulf of Maine ecoregion.

The *Bay of Fundy/Gulf of Maine Overview and Strategic Framework was* undertaken by Environment Canada - Atlantic Region as an internal effort to focus on the department's interests, programs and priorities related to the Bay of Fundy/Gulf of Maine ecoregion. It aims to guide departmental efforts in the delivery of programs, to identify the main environmental and health concerns, and to raise the profile of this nationally and internationally important ecoregion. As well, it offers insight into what the department has collectively achieved in the Bay of Fundy/Gulf of Maine ecoregion. It identifies gaps and focuses on areas requiring additional program attention, resource allocation and capacity building, in order to address environmental issues in this ecoregion.

In contributing to a departmental inventory for the Bay of Fundy/Gulf of Maine ecoregion, the operational branches provided information on all of their activities that are specific or generic to this ecoregion, including its terrestrial, freshwater, coastal and marine environments. The following eight priority issue areas were determined from the inventory of these activities, combined with information gathered from the *5th BoFEP Bay of Fundy Science Workshop*, discussions with

[1] To deliver EC's mandate through the 4 main Business Line Priorities: Clean Air and Climate Change, Clean Water, and Nature.
[2] A relatively large area of land or water that harbours a characteristic set of species, communities, dynamics and environmental conditions.

members of the internal Bay of Fundy/Gulf of Maine Working Group and from other sources:

Priority issue areas

1. Municipal waste disposal and on-site sewage disposal
2. Environmental emergencies and oil spills
3. Contaminants and toxic chemicals
4. Wildlife and conservation
5. Climate change
6. Atmospheric transport and deposition
7. Meteorology and Climatology
8. Coastal Development

Each priority area contains pressing issues, which the department has full or partial responsibility in addressing (see D1 for the complete list of related priority issues.)

Clearly, the operational branches have been successful in conducting individual activities through their programs. However, in order for the department to advance its agenda and address gaps within the identified priority areas, horizontal action across the department is necessary. The *Bay of Fundy/Gulf of Maine Overview and Strategic Framework* provides a description of the program areas and issues currently being addressed by the department and its partners. This report also summarizes the activities, funding, information and program gaps, desired results and opportunities within the Bay of Fundy/Gulf of Maine ecoregion.

Many jurisdictions and organizations have interest and/or responsibility in the Bay of Fundy/Gulf of Maine ecoregion. This, along with the fact that the Gulf of Maine is shared between Canada and the United States, contributes to a complex governance issue. This framework document reviews the current governance mechanisms involved within the ecoregion. The report evaluates these governance mechanisms in the context of environmental issues, mandates and responsibilities, in order to gain an appreciation for the issues they contend with and to determine whether these mechanisms are appropriate to meet the policy/strategic, research, capacity and operational/technical needs of the ecoregion.

The most useful governance model for the department to support appears to be one that relies on the current organizations and the cluster of governance functions they provide. The players that stand out as leaders in a system of governance in this ecoregion are the Gulf of Maine Council on the Marine Environment, the Bay of Fundy Ecosystem Partnership and the Global Programme of Action Coalition for the Gulf of Maine. However, none of these have all the essential elements or network connections to "govern" the Bay of Fundy/Gulf of Maine ecoregion individually.

The department's capacity in this region needs strengthening in several areas including research and monitoring, communication with stakeholders and in certain aspects of management. Opportunities to address these needs might be found in forging new partnerships and strengthening others. A stronger link with HQ is needed to increase and sustain regional efforts and meet needs at the policy and program level. A reinforced HQ-Atlantic Region relationship would promote an increase in joint programs, which could result in an increase in resources allocated to the Atlantic Region. Long-term issues will need to be considered, such as succession, sustained departmental and staff commitment, engagement of senior managers and the focus of partners.

It will be important for the Bay of Fundy/Gulf of Maine Working Group to move the recommendations and considerations of this report forward, building upon the framework iterated here. The *Bay of Fundy/Gulf of Maine Overview and Strategic Framework* will also be useful in shaping an approach to forming strategies for addressing issues in the other Atlantic ecoregions.

Bay of Fundy/Gulf of Maine
Overview and Strategic Framework

A. Introduction and Background

Ecosystem initiatives across Canada over the past decade have provided resources and opportunities for Environment Canada and its partners to become fully engaged in addressing broad environmental issues and concerns, which affect whole ecosystems. Large scale ecosystem initiatives of this nature include the Georgia Basin Ecosystem Initiative, Northern Rivers Ecosystem Initiative, Northern Ecosystems Initiative, Great Lakes Action Plan and St. Lawrence Action Plan Vision 2000. In all these cases, work by the department and others has resulted in a better understanding of environmental issues and the strategic actions to resolve them using an ecosystem approach, involving a multitude of partners. A similar large scale ecosystem approach to the Bay of Fundy/Gulf of Maine ecoregion is one of the concepts explored in this paper.

The need to address key environmental concerns has driven these ecosystem initiatives and contributed substantially to the scientific, management and governance capacities of the Environment Canada regions involved, enabling them to bring adequate resources and expertise to bear on those concerns and resolve problems, remediate conditions and institute mechanisms to protect the ecosystem. Fundamental to the success of these initiatives has been the availability of suitable fiscal resources and, equally important, the benefits of a wider scope of the approach and its breadth over broad ecosystems, which could not be dealt with through normal operational capacities.

The department in the Atlantic Region has policy and program interests that focus on 6 main ecosystem ecoregions, which are defined by extensive watersheds and their associated large marine basins including: Bay of Fundy/Gulf of Maine, Eastern Nova Scotia/Scotian Shelf, Southern Gulf of St. Lawrence, Western Newfoundland/Northern Gulf of St. Lawrence,

Newfoundland/Grand Banks, and Labrador/Labrador Shelf. It is generally the interface between the land and marine systems where the larger human populations live and where environmental stresses peak. Coastal lands, bays and estuaries show evidence of environmental degradation ranging from loss of shellfish beds to the accumulation of toxic chemicals in fish and shellfish. This results in loss of biodiversity, reduced jobs, human health risks, impairment of recreational opportunities and the collapse of coastal communities and local economies.

B. Setting the Context

Environment Canada Atlantic Region is involved in developing strategies to guide itself in establishing program directions, setting priorities and advancing its overall agenda in the 6 major Atlantic Ecoregions. While the need for such a strategy is acknowledged as being important in advancing the department's agenda in all the ecoregions, regional management chose to place an initial priority on the Bay of Fundy/Gulf of Maine Ecosystem.

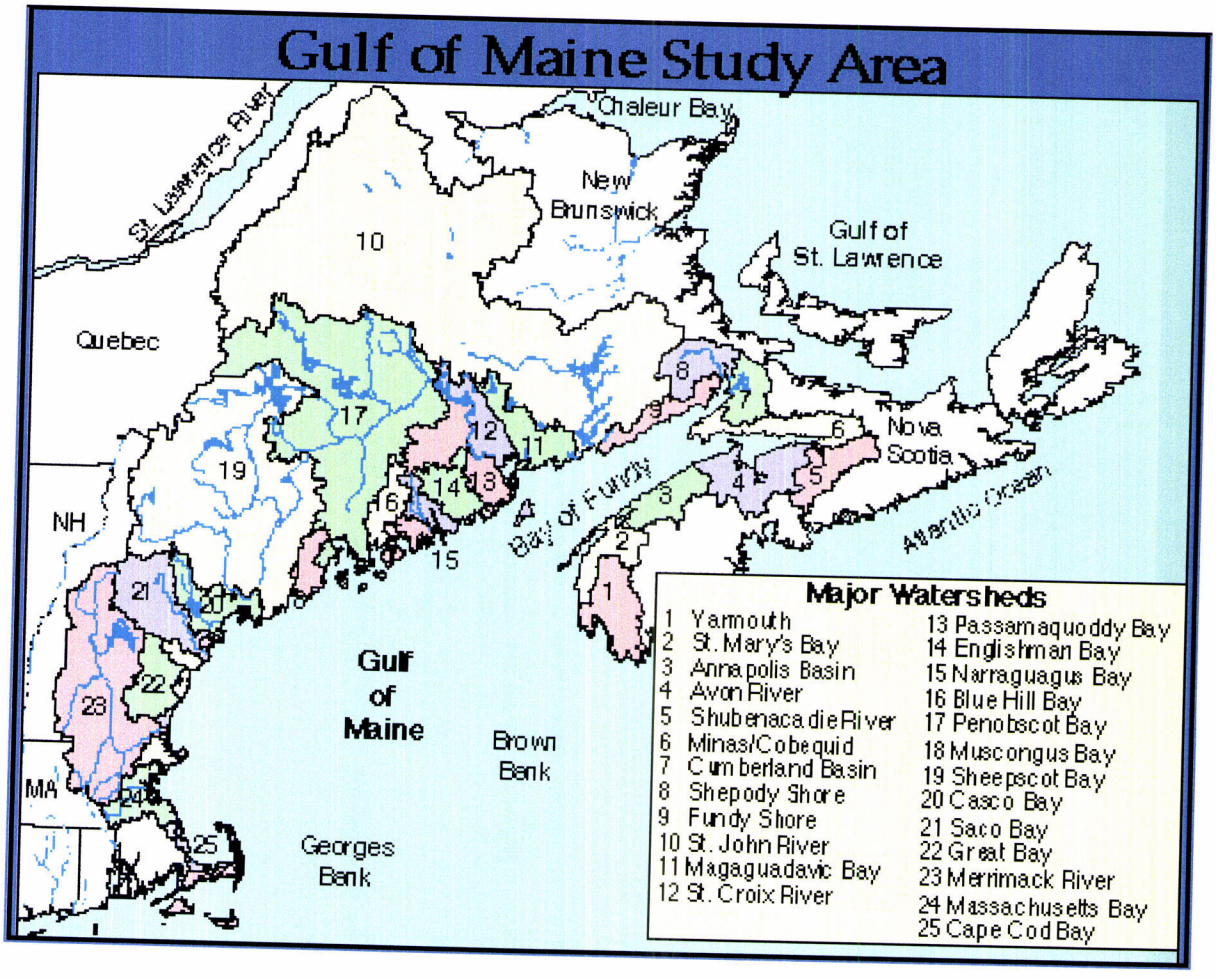
This exercise is an internal effort by EC Atlantic Region. Its objective is to focus the department's interests, programs and priorities in relation to the Bay of Fundy/Gulf of Maine ecoregion, including its terrestrial, freshwater, coastal and marine environments. The purpose is to develop a strategic framework to guide departmental efforts in delivering specific programs in this ecoregion. Further, it aims to raise the profile of this nationally and internationally important ecoregion and to lay out its environmental and health concerns.

The Bay of Fundy/Gulf of Maine Ecoregion

The Bay of Fundy/Gulf of Maine is a body of water that is uniquely dynamic and productive due to the natural tidal pumping effect caused by the extreme tidal fluctuations within the Bay of Fundy. Nutrients are vigorously circulated within the Bay allowing high primary production to drive a food chain, which attracts many marine species, including a large number of whales. It is the major summer feeding ground of the rare and endangered Right Whale. At the same time, the ecoregion is a highly populated and rapidly developing center of growth for industries, communities, cities and resource exploitation. Those oceanographic features that drive the productivity of the Bay also serve to circulate land-based sources of pollution placing a stress on the whole marine and coastal ecosystem. Resource pressures, such as forestry, industrial water use, recreational growth and agriculture, in the watersheds of some rivers that empty into the bay exacerbate the marine stresses.

The diagram below illustrates the major watersheds, which feed into the Bay of Fundy/Gulf of Maine. In Nova Scotia and New Brunswick, these include: Magaguadavic Digdeguash/Maces Bay, St. Croix River, Passamaquoddy Bay, Saint John River, Fundy Shore, Shepody Shore, Cumberland Basin, Minas/Cobequid Shore, Shubenacadie River, Avon River, Yarmouth, St. Mary's Bay and the Annapolis Basin. Nova Scotia and New Brunswick encompass 34% of the total land area within the Gulf of Maine watershed and, therefore, hold a large stake in conserving, protecting and remediating the major environmental issues stressing the Bay of Fundy/Gulf of Maine ecoregion (see Table 1 below).

Figure 1



http://www.gulfofmaine.org/watershed/watershed.html

Table 1 **Provincial/State Land Area within the BoF/GoM Watershed**

Province/State	**Land area within the Gulf of Maine watershed (km)
Maine	86,027
New Brunswick	40,792
Nova Scotia	19,555
New Hampshire	16,835
Massachusetts	8,806
Quebec	6,993

http://www.gulfofmaine.org/watershed/watershed.html Total land area of the Gulf of Maine watershed = 179,008km

Strong focus on the Bay of Fundy and Gulf of Maine was initiated in the mid to late 1980's, as the effects of accumulated anthropocentric activity on this international body of water became more visible and began to impair community livelihoods. The concept and practice of ecosystem health and ecosystem modeling are also relatively new within the last couple of decades. These models provide broad evaluations of an ecosystem as a whole, recognizing that individual components must be sound in order for the entire ecosystem to benefit and be sustainable. Within the past few decades, many informative reports, journals, articles and workshops were developed and used as a basis for on-going research, field work and education. Action plans, particularly those developed by the Gulf of Maine Council on the Marine Environment since 1989, have motivated many of the interested groups and agencies to adapt similar plans to influence their short and long-term planning.

The extent of work undertaken within the Bay of Fundy/Gulf of Maine ecoreigon includes research and assessments on the physical, biological and chemical environment of the ecoregion, marine resource conditions, ecosystem issues and human-induced changes. Research and assessments have played a vital role in shaping the type of work and expertise that many agencies and interest groups provide to the region, such as conservation, protection and enforcement.

Hundreds of local, national and international interest groups and agencies play a role within the Bay of Fundy/Gulf of Maine ecoregion. Jurisdictional responsibilities also fall under federal, state, provincial, county and municipal

departments. The issue of governance is, not surprisingly, quite complex. Responsibilities for the policy/strategic, research, capacity and operational/technical needs of the Bay of Fundy/Gulf of Maine ecoregion are shared among these organizations, including governments (provincial, state and federal), ENGOs, communities, and international and joint agencies (see Appendix 1). While the support from individual agencies and interest groups is crucial in sustaining the Bay of Fundy/Gulf of Maine ecoregion, a balanced governance mechanism to link efforts amongst these various organizations is needed to address the broad issues within the ecoregion. Although many government agencies and some interest groups are considered to have somewhat narrowly-defined mandates and roles, mechanisms such as the Gulf of Maine Council on the Marine Environment provide a forum for collaborative, horizontal management opportunities for these stakeholders.

C. An Inventory of Current Issues, Activities and Opportunities

Inventory Methodology

Environment Canada required a method for organizing detailed information on its current activities, existing partnerships, new/emerging issues in the Bay of Fundy/Gulf of Maine ecoregion and how it delivers its programs. Organizing an inventory database was decided to be the best approach to successfully capture what the department is collectively achieving in this ecoregion. To accomplish this, inventory information was obtained from all operational branches and incorporated into an Access database.

An internal Bay of Fundy/Gulf of Maine working group was developed, which included members from each of the operational branches. In order to incorporate the most accurate information possible into the inventory, the Working Group agreed that each of the operational branches would provide information on all departmental activities, both specific and generic, undertaken in the ecoregion in the past 3 years (1999/00 - 2001/02). An inventory template was developed and provided to working group members. The following information was requested:

- Branch/Division/Section
- Program
- Activity
- Brief activity description & current issue
- Activity goals/objectives
- New & emerging issues
- Partners
- Approximate annual EC resources in the BoF/GoM ($ & PY)
- Approximate annual partner resources in the BoF/GoM ($ & PY)
- Ongoing activities
- Contact person

By anticipating typical inquiries which would be requested from the database, the above information was grouped and incorporated into tables in order for specific and desired information to be easily retrieved. At the internal workshop held by the Working Group in April 2002, multiple queries were performed on the database to display its organizational value. The combinations of information

requested from the database are dependent on the amount of information inputted into the system. For our purpose, the retrieval of specific branch, program and resource information was highlighted; however, many additional outputs and combinations of information can be generated from such a database. For example, one could query the database for all the branch activities and activity goals that fall into a particular program area, with all the relative partners and funding. Another example could request all the departmental activities above, below or equal to a specific funding amount or range. The queries performed on the database information were useful in the identification and assessment of gaps, emerging issues, capacity needs and opportunities.

Activities identified within this inventory were specific to work currently carried out by the department in addressing environmental issues affecting the Bay of Fundy/Gulf of Maine ecoregion, such as water quality sampling, providing chemical advice, shoreline cleanup and assessment technique (SCAT) training, shorebird surveys, input into the Fundy Biosphere Reserve Project proposal, analyses of climate change related impacts on seal level rise impacts on coastal areas and concentration measurements of atmospheric pollutants in ambient air. Such activities relate to specific issues affecting the region including bacterial and chemical contamination, land-based spills, ocean dumping, shorebird habitat threats, birds oiled at sea, meteorological impacts, atmospheric transport and deposition of pollutants, benthic metal and aggregate extraction and sea level rise. Ultimately, the specific issues are connected to 8 high-order priority issue areas. An analysis of the issue areas and associated issues follows (see section D1).

According to the inventory, the department provides approximately $2.2 million annually in funding toward the main issue areas and related community initiatives, while partners provide about $2.56 million in annual funding support. The inventory and analyses (see appendices) provide insight not only to the depth of departmental involvement within the Bay of Fundy/Gulf of Maine

ecoregion, in terms of partnerships and resource allocation, but also into the severity and effects of the environmental issues, departmental gaps in solving/resolving the issues, possible outcomes to address the gaps, and opportunities to improve and collaborate with others for better program delivery abroad.

Table 2 and Table 2.1 provide regional and branch summaries of the BoF/GoM inventory results, including the program areas relative to activities and the amount of department and partner funding for the various issue areas. Each priority area contains pressing issues, which the department has full or partial responsibility in addressing (see D1 for the complete list of related priority issues.)

Table 2 **Regional Summary**

INVENTORY RESULTS*					
ISSUE AREA (IA)	**# of Activities in related IA**	**DEPARTMENTAL FUNDING**		**PARTNER FUNDING**	
		(PY/yr)	**(K/yr)**	**(PY/yr)**	**(K/yr)**
MWWE & onsite sewage	6	0.7	96	1.0	230
Environmental emergencies & oil spills	9	0.2	44	0.4	8
Contaminants & toxic chemicals	14	9.22	120	0.3	279.5
Wildlife and conservation	32	10.85	665	2.9	251.8
Climate change	7	None identified	140	None identified	45
Atmospheric transport & deposition	3	1.5	130	None identified	100
Meteorology & climatology	5	None identified	40	None identified	None identified
Coastal development	6	0.3	130	None identified	36
Community Initiatives	29	0.6	852.2	None identified	1610
Total	**111**	**22.37**	**2217.2**	**4.6**	**2560.3**

* Activity and resource information used to develop the inventory was taken strictly from the inventory templates submitted by Working Group members' et al.

To put the regional summary above into perspective on what Environment Canada – Atlantic Region generates on an annual basis, the department dedicated approximately 5.3% of the total 425 PYs and 4.8% of the total $46 million operating budget[3] in the Atlantic Region, to conduct activities in support of addressing issues within the Bay of Fundy/Gulf of Maine.

Table 2.1 Branch Summaries

ECB ~ Inventory Results*					
ISSUE AREA (IA)	**# of Activities in related IA**	**EC funding**		**Partner funding**	
		(PY/yr)	**(K/yr)**	**(PY/yr)**	**(K/yr)**
Contaminants & toxic chemicals	3	4.5	65	None identified	None identified
Community Initiatives	1	0.2	15	None identified	None identified
Wildlife and conservation	31	10.85	663	2.7	218
Coastal development	2	0.3	55	None identified	None identified
Total	**37**	**15.85**	**798**	**2.7**	**218**

EPB ~ Inventory Results*					
ISSUE AREA (IA)	**# of Activities in related IA**	**EC funding**		**Partner funding**	
		(PY/yr)	**(K/yr)**	**(PY/yr)**	**(K/yr)**
Contaminants & toxic chemicals	11	4.72	55	0.3	279.5
Community Initiatives	3	None identified	67	None identified	10
MWD & onsite sewage	4	0.5	47	1.0	195
Environmental emergencies & oil spills	8	0.2	4	0.4	8
Wildlife and conservation	1	None identified	2	0.2	33.8
Coastal development	1	None identified	12	None identified	None identified
Total	**28**	**5.42**	**187**	**1.9**	**526.3**

[3] Environment Canada – Atlantic Region's total operational budget was taken from 2002/03 HR statistics.

* Activity and resource information used to develop the inventory was taken strictly from the inventory templates submitted by Working Group members' et al.

Table 2.1 Branch Summaries (cont'd)

MSC ~ Inventory Results*					
ISSUE AREA (IA)	**# of Activities in related IA**	**EC funding**		**Partner funding**	
		(PY/yr)	**(K/yr)**	**(PY/yr)**	**(K/yr)**
Climate change	7	None identified	140	None identified	45
Atmospheric transport & deposition	3	1.5	130	None identified	100
Environmental emergencies & oil spills	1	None identified	40	None identified	None identified
Coastal development	3	None identified	63	None identified	36
Meteorology & Climatology	5	None identified	40	None identified	None identified
Total	**19**	**1.5**	**413**	**-**	**181**

CAB ~ Inventory Results*					
ISSUE AREA (IA)	**# of Activities in related IA**	**EC funding**		**Partner funding**	
		(PY/yr)	**(K/yr)**	**(PY/yr)**	**(K/yr)**
Community Initiatives	25	0.4	770.2	None identified	1600
MWD & onsite sewage	2	0.2	49	None identified	35
Total	**27**	**0.6**	**819.2**	**-**	**1635**

* Activity and resource information used to develop the inventory was taken strictly from the inventory templates submitted by Working Group members' et al.

D1. An Analysis of Issues

Issues in the Bay of Fundy/Gulf of Maine ecoregion have been the subject of numerous recent meetings, workshops, conferences and scientific studies. Many issues have been described. The Working Group decided, for the purpose of this overview, to build on issues previously identified in a departmental report of workshop proceedings entitled, *Bay of Fundy Issues: a Scientific Overview; Workshop Proceedings,* which took place in Wolfville, NS from January *29 to* February 1,1996. The suitability of these issues is supported by lectures, presentations and research demonstrated at the Bay of Fundy Ecosystem Partnership's *5th Bay of Fundy Science Workshop (2002),* along with inventory results and consensus from workshop attendees. Key issues of priority to the department are identified within the Bay of Fundy/Gulf of Maine ecoregion as follows:

Biodiversity

- Decline in migratory bird populations
- Declining/changing species diversity
- Genetically engineered species
- Invasive species
- Species at risk

Contaminants

- Bacterial & pathogen contamination
- Closed shellfish growing areas
- Marine transportation spills & impacts
- Birds oiled at sea
- Non-point sources of contamination
- Chemical use in aquaculture
- Point sources of contamination
- Harmful algae blooms
- Impact of atmospheric pollution transport & deposition
- Water quality degradation
- Nutrient inputs
- Land-based spills & impacts: Industrial sources

Habitat

- Benthic metal & aggregate extraction
- Shorebird habitat disturbance
- Ecological change
- Protection of fossil beds
- Ecotourism/human activity
- Unsustainable coastal resource harvesting
- Ocean dumping
- Obstruction of rivers & estuaries
- Benthic habitat disturbance
- Wetland & shoreline habitat disturbance/destruction

Meteorology

- Meteorological impacts
- Worse tropical storms
- Short-term environmental trends

Climate Change

- Long-term climate/environmental trends
- Sea level rise: erosion & coastal flooding

A total of 111 individual activity entries were provided by the operational branches and incorporated into the database to develop the inventory. Of these, 29 focused on community initiatives and the remaining inventories identified activities linked to the list of 32 issues. These were assembled under issue areas as follows:

1. Municipal Waste Disposal and On-Site Sewage
2. Environmental Emergencies and Oil Spills
3. Contaminants and Toxic Chemicals
4. Wildlife and Conservation
5. Climate Change
6. Atmospheric Transport and Deposition
7. Meteorology and Climatology
8. Coastal Development

The matrix shown in Appendix 2 illustrates another way in which database information was analyzed. Certain aspects of each issue are shown in combination with the level of departmental concern. This helps to evaluate and prioritize the various environmental issues and focus departmental attention on those areas where knowledge and understanding, local involvement, capacity or management are reduced or lacking.

D1. An Analysis of Issues (cont'd) - *(See Appendices 2 & 3)*

Municipal Waste Water Disposal and On-Site Sewage

The Issue: Adverse affects to human health, environmental quality and socio-economic development are significant problems surrounding municipal waste water disposal and on-site sewage. Human health hazards from this problem have been caused mainly from the introduction of bacteria, viruses and other pathogens into drinking water supplies, shellfish beds and areas used for recreation. Shellfish contamination has closed hundreds of shellfish growing areas across the region, which generates significant economic hardship to surrounding communities. Approximately 10% of the shellfish growing areas in the region are located in the Bay of Fundy/Gulf of Maine. The department pursues a strong program of source identification, water quality assessment and prevention as well as the remediation of contaminated areas. The problems currently being pursued by the department and relevant partners include:

⇒ Nutrient inputs

⇒ Harmful algal blooms

⇒ Bacterial and pathogen contamination

⇒ Closed shellfish growing areas.

Activities include:

- Source identification
- Water quality assessment and classification
- Pollution prevention and prevention planning
- Remediation of contaminated shellfish areas.
- Socio-economic assessments
- Waste water assessment
- Shoreline sanitary surveys

Gaps:

* Research on nutrients and phytotoxins
* Monitoring for CEPA toxics and nutrient inputs
* Resources

Although the understanding of the various issues under municipal waste disposal and on-site sewage is improving, it has been identified with high concern that the department needs to increase research and monitoring efforts toward the issue of nutrient inputs into the Bay of Fundy/Gulf of Maine. Issues of nutrient inputs, harmful algae blooms and bacterial and pathogen contamination also lack

appropriate resources and capacity to provide for insufficient science and management aspects, including enforcement and control.

Desired Results & Opportunities:

A main departmental goal in addressing issues surrounding municipal waste water disposal and on-site sewage is to improve surface water quality through the enhancement of rural and municipal waste water systems and the use of new technology. Strengthening science and research partnerships, along with improving industry support, are important to making progress in this area. Another area the department hopes to address, which touches on both human health and safety and socio-economic issues, is the application of pollution prevention in the restoration and remediation of contaminated shellfish areas. In order to achieve this, the shellfishery requires integrated shellfish recovery efforts within management plans, along with the development of guidelines and funding for training. A solid connection with community and other ENGO networks is important. Within the shellfishery overall, there are additional opportunities for the department to increase collaborative efforts with Aboriginal groups.

Partners: DFO, ACOA, CFIA, NBDELG, NSDMRA, NSDEL, ACAP Saint John, CARP, NB Health and Wellness, NBDAFA and relative municipalities, cities and universities.

Total activities in the BoF/GoM ecoregion = 6
Departmental funding = 96K
Partner funding = 230K

Environmental Emergencies and Oil Spills

The Issue: Marine and land-based spills threaten the health of the ecosystem as a whole and often have long term effects, which are difficult or impossible to control or remediate. Chronic oil releases are usually non-point source and are even more difficult to track or control. The department, along with various partners, is working together with industry, the provinces and various community groups to develop suitable contingency and watershed management planning to combat these oil releases and other environmental emergencies. Problems currently being addressed include:

⇒ Marine transportation spills and impacts

⇒ Land-based spills and impacts (industrial sources)

Activities include:

- Shoreline Cleanup and Assessment Technique (SCAT) training to industry, communities and others
- Spill modeling
- Sensitivity mapping
- Updating preparedness for inland spills affecting the Canada/US transboundary area

Gaps:

* Research on oil impacts on offshore wildlife populations
* Monitoring spills and ecological effects
* Research on the recovery rates and processes in oiled ecosystems

The department has enhanced the science surrounding environmental oil spill issues; however, providing increased effort to the monitoring of marine transportation spills and impacts remains an average concern. It is apparent that the department has worked successfully with the appropriate communities, industry and government stakeholders to prevent and/or cope with issues surrounding environmental oil spills. The department requires resources and capacity for additional monitoring of marine transportation spills and impacts, along with oil spill control and enforcement.

Desired Results & Opportunities:

Improving spill preparedness and response through community and First Nations support, along with upgraded technology, remains a priority for the department. Increasing community interests through the facilitation of workshops has and will

continue to be an on-going task. Through improved coordinated mapping programs with the United States, the department will have better capability for tracking oil spills. Orimulsion® is a fossil fuel planned for use by Énergie NB Power for the Coleson Cove Generating Station Refurbishment Project in November 2004. The use of Orimulsion® here and potentially at other sites in the future, may have dramatic implications for the Bay of Fundy/Gulf of Maine ecoregion, in terms of risk from emergencies and oil spills. To reduce the threat of Orimulsion® spills, the department must ensure its proper transport, storage and handing. The department, therefore, has an opportunity to assist in the development of new emergency response/contigency plans for the use of Orimulsion®.

Partners:

CCG, USCG, USEPA, Alert Inc., NBDOELG, ETAD, TC, DFO, CWS, NOAA, provinces of New Brunswick and Nova Scotia and many communities, academia and several ENGOs.

Total activities in the BoF/GoM ecoregion = 9
Departmental funding = 44K
Partner funding = 8K

Contaminants and Toxic Chemicals

The Issue: Contaminants and toxic chemicals from industrial effluents and emissions and the use of chemicals and pesticides in agriculture, forestry and aquaculture are effecting the health and diversity of marine and aquatic organisms. Heavy metals and organic pollutants have been found in sufficient levels to threaten the survival of individual animals and in some cases pose a health risk to humans through food intake. Efforts are underway to deal with the following sources and issues concerning contaminants and toxic chemicals in the ecoregion. Problems currently being addressed include:

⇒ Non-point sources contamination

⇒ Chemical use in aquaculture

⇒ Point sources of contamination

⇒ Ocean dumping

Activities include:

- The review of studies and monitoring provided by industry
- Canada/US mussel watch
- The identification and study of land-based pollution sources.
- Advice on chemical use and effects
- Development of risk management strategies
- Compliance promotion and review.

Gaps:

* Research on the fate and effects of toxic chemicals
* Monitoring and identification of sources and ecological effects
* Resources to meet CEPA expectations and operational needs

The department requires increased effort toward the issue of non-point sources within the Bay of Fundy/Gulf of Maine ecoregion, as aspects of the science, stakeholder involvement and management are inadequate. Overall, the level of understanding for the remaining issues under contaminants and toxic chemicals is improving. There is average concern over the need for increased research and monitoring for issues such as chemical use in aquaculture and ocean dumping. It appears that community and government support has improved, but there is opportunity for better involvement on behalf of industry stakeholders, which may contribute to needed monitoring for point sources of contamination. In order to address the various science and management needs, the department requires additional resources and increased control and enforcement effort.

Desired Results and Opportunities:

Overall, the department would like to see a cooperative approach to understanding and managing impacts from contaminants and toxic chemicals at an ecosystem level. Information and knowledge sharing is key to meeting this goal. Ensuring industries are in full compliance with regulatory requirements is another departmental concern that can be supported through information/knowledge sharing but also through closer working relations with provincial offices. Salmon farming is continuously increasing within the ecoregion and the department is striving to reduce cumulative effects on marine water and sediment quality, through improved technology for effluent treatment along with cooperation from industry. The department also wants to ensure that salmon farm operators have a better understanding of EC's roles and responsibilities related to marine salmon farming information through sessions and facilitated workshops. The department also has opportunity to design and implement a regional study of cumulative effects that could tie into a regional contaminants monitoring network. This study and monitoring network would help to identify, and therefore minimize, contaminants associated with marine salmon farming and investigate the levels of heavy metals and other toxic contaminants entering the marine environment of the Bay of Fundy/Gulf of Maine.

Partners:

NSDOE, NBDAFA, NBELG, DFO, USEPA, NOAA, Maine Department of Environmental Protection, Mass. Coastal Zone Management, NS Department of Fisheries, Universities, provincial environmental departments and Pulp and Paper mills.

Total activities in the BoF/GoM ecoregion = 14
Departmental funding = 120K
Partner funding = 279.5K

Wildlife and Conservation

The Issue: Habitat loss, exposure to toxic chemicals, over-harvesting or exploitation, the invasion of non-indigenous species, disease and genetic manipulation are all threatening the health and well being of wildlife species and some entire wildlife communities. Coastal development, forestry expansion, over-fishing and aquaculture are sources of stress, which require careful, science-based management. The symptoms of stress, and some of the known causes of these problems are being studied and addressed by the department and other partners. Problems currently being addressed include:

⇒ Invasive species

⇒ Benthic habitat disturbance

⇒ Birds oiled at sea

⇒ Genetically engineered species

⇒ Water quality degradation

⇒ Shorebird habitat disturbance

⇒ Declining/changing species diversity

⇒ Unsustainable coastal resource harvesting (rockweed harvesting, aquaculture

⇒ Species at risk

⇒ Decline in migratory bird populations

Activities include:

- Water quality sampling, analysis, interpretation, publication and modeling.
- Migratory bird surveys, monitoring, banding and trends analysis.
- Coordination of Maritime Breeding Bird Surveys.
- Conservation measures to secure critical upper Bay of Fundy shorebird habitat.
- Research on mud-flat ecology, tidal barriers and toxic substances.
- Wetland habitat research.
- Studies on the impacts of aquaculture activity on coastal waterfowl and vice versa.
- Biosphere Reserve Project input.
- Development of cooperative enforcement agreements.
- Coordination of EHJV.

Gaps:

* Understanding of ecosystem interactions, saltmarsh interactions and functions of Atlantic Canada seabirds.
* Wildlife research into broader range of key species.
* Monitoring endangered species.
* Resources.

Within the area of wildlife and conservation, benthic habitat disturbance and invasive species remain issues of high concern in terms of insufficient science, low stakeholder involvement, inadequate management and weak resources. Similar inadequacies are apparent within the issues of genetically engineered species and declining/changing species diversity. Unsustainable coastal resource harvesting, declines in migratory bird populations and shorebird habitat disturbance lack appropriate science, including research and monitoring efforts. While the department's level of understanding for problems, like water quality degradation, species at risk and birds oiled at sea, has improved, it is clear that more must be done in the area of monitoring for all wildlife and conservation issues.

Overall, the department has been fairly successful in engaging and working with community stakeholders to reduce wildlife and conservation issues within the Bay of Fundy/Gulf of Maine. Increased stakeholder support amongst industry and government is of high concern especially for invasive species, benthic habitat disturbance, genetically engineered species and declining/changing species diversity. Similar support is also needed for issues like unsustainable resource harvesting, water quality degradation, declining migratory bird populations and species at risk.

Approximately 80% of wildlife and conservation issues are inappropriately funded and, of these, 75% are lacking appropriate enforcement and control efforts. Improved resources and capacity would, therefore, help to meet the science and management needs of these various issues.

Desired Results and Opportunities:

In efforts to restore important wetland habitat, the department has an opportunity to demonstrate the benefits of constructed wetlands and incorporate community interests. Restoration work could return abandoned diked land areas to original salt marshes. In efforts to protect, restore and conserve important and ecologically sensitive land and wetland habitat, the department has the chance

to create a monitoring network and reporting system on environmental indicators and to support the potential designation of the upper Bay of Fundy as a Biosphere Reserve. The department also has the opportunity to develop recovery plans for species under the Species at Risk Act (SARA), which would assist in the protection and recovery of various species at risk. The department has, and will continue to promote and coordinate, stewardship programs which have successfully engaged First Nations, landowners, resource users, nature trusts, provinces, the natural resource sector, community-based wildlife societies, educational institutions, and conservation organizations at every scale. This effort provides voluntary services from monitoring and conserving wildlife species and their habitat, to protecting and improving the quality of soil, water, air and other natural resources.

***Partners*:**

Parks Canada, DFO, Canadian Forestry Service, NSDOE, NBDOELG, NBDOT, NBDSS, Atlantic Flyway Council, ACWERN, NSDNR, NBDNRE, Provinces of NS and NB, NCC, CCG, USFWS, NSAEC, EHJV, SDJV, NWRC, USEPA, NERC, NWRI, Agriculture and Agri-Food Canada, Ducks Unlimited Canada, Acadia ACER, Irving, Huntsman Center, EHJV, Tantramar Wetlands Center, NB Wildlife Federation, NB Wildlife Trust, CARP, UNB, Holland College, MSVU, NGOs, NB Conservation Council, Aquanet, Ducks Unlimited

Total activities in the BoF/GoM ecoregion = 32
Departmental funding = 665K
Partner funding = 251.8K

Climate Change

The Issue: Climate Change has the potential for affecting marine and coastal habitat, ocean circulation, the hydrology of the region, food and timber production, the incidence of weather extremes and human health and safety. It is attributable to the over-generation of greenhouse gases by the combustion of fossil fuels and other human activities. The department has placed a high priority on understanding the effects of climate change and responding to its impacts and the need for prevention.

Climate change problems currently being addressed include:

⇒ Worse tropical storms
⇒ Sea level rise
  - increased erosion and coastal flooding
  - increased tropical storm intensity (marine safety, infrastructure damage, etc.)
⇒ Ecological changes and shifts

Activities include:

- Understanding climate change and responding to its effects and impacts.
- Studies on sea level rise and increased coastal erosion and risk to infrastructure.
- Research on tropical storm intensity and frequency.
- Development of temperature trend database, climate change scenarios and the regional climate change web site for the Atlantic region.
- Assessing climate change related forest die-back.
- Providing public information on climate change.

Gaps:

* Research impacts of climate change and remediation options and alternatives.
* Long-term climate change monitoring.
* Resources for improved science and outreach.
* Involvement and support from all levels of stakeholders.

Ecological change is a serious environmental result of climate change but one that is poorly understood, researched and monitored. Consequently, it has not received strong support from community, industry or government bodies. It seems evident that this area requires additional focus and funding to upgrade the science of ecological changes resulting from climate change. An improved information base will lend support to increased stakeholder involvement, enforcement and control in the future. While research for sea level rise is improving, more work must be done on the effects of worsening tropical storms. Such storms will be detrimental to the ecoregion in terms of flooding, erosion, damage to infrastructure and related effects on coastal habitat. Although

stakeholder involvement appears to be of average concern, the department needs to improve relations with all levels of stakeholders.

Desired Results and Opportunities:

In order to reduce the adverse impact of coastal flooding due to high water and storm surge, the department is improving mapping for storm surge and continues to provide high water warnings. By increasing departmental capacity, high water warnings can be delivered in a timely way. In supporting climate change efforts, the department hopes to educate and promote underground thermal energy storage as a method to store available, surplus energy. Such energy storage/conservation would result in long-term environmental benefits, including more efficient use of electricity and reduced energy costs, conservation of fossil fuels for heating and electricity use and a considerable reduction in annual CO_2 emissions. Historical temperature records are important for the department to retrieve in order to formulate accurate climate change models for future predictions. The department also has interest in developing a database of various climate variables to assist researchers on a site-specific scale and contribute to studies on climate sensitive species in Eastern Canada.

Partners: CFS, AIRG, Climate Research Branch, Province of NB, City of Saint John, ACAP Saint John, UNB.

Total activities in the BoF/GoM ecoregion = 7
Departmental funding = 140K
Partner funding = 45K

Atmospheric Transport and Deposition

The Issue: Reducing the amount of atmospheric pollution is critical in preventing detrimental effects to coastal waters, aquatic ecosystems and wildlife and human health. Main areas of concern stem from acid rain, POPs, and atmospheric mercury and nitrogen, which are the result of human activities. Acid rain causes detrimental effects to aquatic ecosystems and originates through the burning of fossil fuels. POPs, like PCBs, dioxins, furans and DDT, undergo long-range transport and remain in the environment, bioaccumulate through the food chain and have been known to cause serious adverse effects to human health, such cancers and reproductive disorders. Atmospheric mercury has the potential to contaminate aquatic ecosystems and be harmful to human health, especially when fish and wildlife from these ecosystems are consumed. Within this ecoregion, one of the main human-induced sources of atmospheric mercury is coal-combustion in the northeastern US and central Canada, reaching the ecoregion via long-range atmospheric transport. The release of nitrogen into the atmosphere, through human activities such as using fertilizers, cultivation of crops and the combustion of fossil fuels, has increased the supply of nitrogen and resulted in eutrophication of estuaries and coastal waters which, in tern, can cause massive die-offs of estuarine and marine plants and animals, loss of biodiversity and other habitats important for healthy coastal ecosystems.

The following issue is currently being addressed:

⇒ Impact of atmospheric pollution transport and deposition

Activities include:

- Studying source and movements of pollutants and their risk to biodiversity.
- Working through international channels for better controls.
- Use of a Human Health Damage Model to provide a broad view of the impact of poor air quality and guide mitigating measures.
- Addressing environmental issues such as deposition, ground level ozone, air toxins and particulate matter.
- Measuring selected atmospheric pollutants in ambient air.

Gaps:

* Monitoring
* Community stakeholder involvement
* Understanding pathways and ecological effects
* Long-term monitoring of deposition.
* Resources

In terms of science, the level of understanding and research for the impact of atmospheric pollution transport and deposition needs improving but is of average

concern to the department. Monitoring needs remain high. Although community support amongst stakeholders in low, industry and government stakeholders have increased their support towards this issue. In order to upgrade the level of science and management inadequacies, the department needs to improve resources and capacity surrounding atmospheric pollution transport and deposition impacts.

Desired Results and Opportunities:

Harmful affects to human health as a result of atmospheric pollution is a large departmental concern. In efforts to provide better science around this issue and improve air quality, the department is working diligently with other governmental departments to further develop the Canada Wide Standards (CWS) on the precursors of particulate matter and ozone, sulphur dioxide, nitrogen oxides, gaseous ammonia and volatile organic compounds. These contaminants, along with other pollutants, including mercury, benzene, dioxins and furans, are produced through the burning of fossil fuels and other industrial processes. The department also has an opportunity to assist in the development of provincial policies to respond to CWS. New standards for exhaust emissions and the chemical content of vehicle fuels are being implemented. A reduction of sulphur in gasoline has been mandated with further reduction starting in January 2005. The department also plans to reduce sulphur in diesel fuel by June 2006, which will result in a 95 per cent reduction in the regulated level of sulphur. The *Canada-Wide Acid Rain Strategy - Post 2000* pursues SO_2 emission-reduction targets of 50 per cent in New Brunswick and Nova Scotia by 2010.

The department continues to be part of the on-going, long-term, regional data acquisition program and partakes in regional monitoring networks, which are all components of a national network, in order to increase the use of computer models to predict contaminant concentrations and sources. These models will help to identify and combat those atmospheric concentrations that have harmful implications to human and ecosystem health and inevitably improve air quality forecasts currently provided by the department. Some of these networks link to international networks and the department needs to work with US partners to

affect regulations and controls at regional scales. Providing a suitable Human Health Damage model for Atlantic Canada will allow the department to review some of the socio-economic implications of atmospheric pollution within the Atlantic Region.

Partners: Health Canada, NRCan, DFO, universities and various NGOs.

Total activities in the BoF/GoM ecoregion = 3
Departmental funding = 130K
Partner funding = 100K

Meteorology and Climatology

The Issue: Human safety, infrastructure and coastal developments are at risk when faced with drastic changes in environmental conditions. High impact storms can be devastating to human safety and cause damage to infrastructure and coastal developments. Many who depend on natural resource harvesting can be subjected to economic hardship as a result of storm surge, ice storms, drought or other severe weather phenomena. The following Meteorology and Climatology issues remain a priority and include:

⇒ Short-term environmental trends

⇒ Long-term climate/environmental trends

⇒ Meteorological impacts

Activities include:

- Predicting weather and storm events, storm surges, changes or trends in climate and other meteorological - ocean linked phenomenon.
- Contributing to safety of marine interests, protection of shoreline infrastructure and long-term planning of coastal developments.
- Focusing on safety in agriculture, forestry and other sectors where weather is critical.
- Collecting data and managing ocean based meteorological and surface ocean data and a wide variety of other meteorological parameters.

Gaps:

* Understanding, research and monitoring for long-term meteorology.
* Stakeholder involvement at various levels

With the exception of long-term climate/environmental trends, the science for issues under meteorology and climatology has improved. The department has successfully engaged community and government stakeholders in supporting concerns over long-term climate/environmental trends and short-term environmental trends; however, meteorological impacts would benefit from additional community and governmental support. Meteorological impacts have obtained successful industrial involvement, while long-term climate/ environmental trends and short-term environmental trends need increased industrial support. The department has also been successful in providing appropriate funds toward issues of short-term environmental trends and meteorological impacts. There is still a need for additional resources and

capacity to improve the science and control of long-term climate/ environmental trends.

Desired Results and Opportunities:

The department will continue to be part of on-going, long-term, regional data acquisition programs and has the opportunity to strengthen Canada/United States cooperation on data collection and research. By building the department's predicting capacity, human safety and infrastructure may be protected from weather impacts. The department has an opportunity to provide better public education and outreach on weather impacts, along with socio-economic analyses of severe weather events.

Partners: DFO, CCG, Dalhousie University

Total activities in the BoF/GoM ecoregion = 5
Departmental funding = 40
Partner funding = none identified

Coastal Development

Issue: A major stress on the Bay of Fundy/Gulf of Maine ecoregion is the impact of uncontrolled and expanding coastal development including forest harvesting, agriculture, coastal in-filling, highway construction, housing developments and growing tourism. Environmental effects include impacts on shoreline and inshore marine habitat wetlands, coastal wilderness areas and access to sensitive habitat as well as threats to biodiversity and species at risk. Coastal development and other increased human activities enhance the risks from land based pollution with ecological and human health implications. Current activities address the following problems:

⇒ Wetland and shoreline habitat disturbance/destruction

⇒ Protection of fossil beds

⇒ Benthic metal and aggregate extraction

⇒ Ecotourism/human activity

⇒ Obstruction of rivers and estuaries

Activities include:

- Assessing environmental impacts of coastal development
- Managing municipal and industrial wastes
- Conducting ecological effects monitoring
- Addressing wildlife and wetland conservation
- Enforcing legislation aimed at coastal environmental protection.
- Monitoring ecological effects of coastal development.

Gaps:

* Research
* Monitoring
* Community and government stakeholder support
* Research into ecological effects of human activities
* Monitoring of trends and impacts

Shoreline habitat disturbance/destruction remains an issue of high concern to the department, as it lacks appropriate science, stakeholder involvement and management. The same inadequacies exist for the protection of fossil beds. Understanding both the impacts of ecotourism and the obstruction of rivers and estuaries has improved, but other issues are in need of better understanding. Stakeholder involvement for some of the issues is insufficient. The issue of river and estuary obstruction stands out with satisfactory research. Benthic metal and aggregate extraction and river and estuary obstruction are the only issues

identified with successfully engaged industry stakeholders. Overall, the department requires improved monitoring, better engagement of government support, additional resources and capacity and better enforcement and control for coastal development issues.

Desired Results and Opportunities:

Many of the coastal development issues within the Bay of Fundy/Gulf of Maine are a result of human activities or interference. In order to maintain the health of the international St. Croix River watershed and marine zone, the department has an opportunity to improve land-use planning on an ecosystem basis. The Gulf of Maine Council on the Marine Environment's *Action Plan: 2001-2006* is an excellent guide for all stakeholders involved within the ecoregion because it sets out sustainable goals and realistic short and long-term measurables to achieve them. These also help to advance the department's Vision for the ecoregion. The department, therefore, has an opportunity to assist in the development and implementation of this Action Plan. In terms of the operational needs for addressing environmental impacts of coastal development, providing ongoing training to a skilled workforce in environmental emergency response is crucial. By improving the science of coastal development issues, the department will have a greater chance to provide accurate advice on coastal and marine ecological changes and spatial descriptions of tidal flats for other government departments, researchers and volunteers. The stewardship program, provided through the department, supports coastal efforts to reduce environmental stress through extensive hands-on work by volunteers at various levels. Another method of reducing the human "footprint" within the ecoregion is simply providing increased public education and outreach.

Partners: NRCan, CCG, Alert Inc., NSERC, ACWERN, DFO, NBDOE, Dalhousie University, UNB-SJ and Acadia ACER.

Total activities in the BoF/GoM ecoregion = 6
Departmental funding = 130K
Partner funding = 36K

Community Initiatives

Community initiatives help to support all of the program areas mentioned and, more specifically, address such issues as water pollution, depleted natural resources, pesticides, land use planning and vehicle emissions. Projects include those that achieve results in clean air and water, nature and climate change. Some activities that have been undertaken to address these issues include various forms of monitoring, remediation and enhancement of streams and rivers, beach sweeps, various scientific and socio-economic studies, educational programs and capacity building. These initiatives and programs are successful since they are well supported by elements of the community, such as non-profit organizations, environmental interest groups, aboriginal groups and First Nations councils, service clubs, associations and youth and seniors' organizations. Community stakeholders contribute most of the resources through volunteer labor, in-kind contributions and financial support, but significant resources are also levered from funding institutions or foundations.

The department contributes project funding to many of these community initiatives through programs, such as the Atlantic Coastal Action Program (ACAP), the Community Animation Program (CAP), the EcoAction Community Funding Program and the Nova Scotia Sustainable Community Initiative (SCI). The following provides a brief description of these programs and the issues they address:

- *ACAP* involves 14 sites across the Atlantic region; however, 4 sites influence and encourage local communities to address their own environmental and developmental challenges in the Bay of Fundy/Gulf of Maine ecoregion. These include, Clean Annapolis River Project (CARP) of Nova Scotia and St.

Croix Estuary Project Inc., Eastern Charlotte Waterways Inc. and ACAP Saint John of New Brunswick. A range of issues have been identified in the comprehensive environmental management plans, which the sites developed early in the program. Common issues among most plans include: natural habitat protection, domestic sewage, toxics and atmospheric emissions. Some activities that have been undertaken to address these issues are:

Natural habitat

- identifying sensitive areas
- protecting sensitive areas through protected designation
- education of stakeholders
- restoring damaged habitat
- constructing wetlands

Domestic Sewage

- construction of sewage treatment plants
- educating residents on source control and water efficiency
- changes to water pricing policies to encourage water conservation
- testing of alternative treatment technologies

Toxics

- information to handlers of toxic chemicals
- developing strategies
- setting up hazardous waste collection systems
- offering P2 programs
- monitoring and studying effects of toxins
- greater enforcement of existing regulations
- remediating contaminated sites

Atmospheric Emissions

- establishment and enforcement of standards and regulations
- monitoring and air quality
- research
- public education and awareness

ACAP's Science Linkages Initiative, which provides limited funding to joint ACAP-EC projects on a competitive basis, has fostered partnerships between ACAP communities and EC scientists since 1997. Administered by the department, the initiative allows Environment Canada and ACAP organizations to work on common science priorities within local ecosystems,

while maximizing the department's ability to carry out its programs and initiatives.

- *CAP (Community Animation Program)* is a joint initiative of Environment Canada and Health Canada that provides training, facilitation, and information for community groups to make the links between human health and the environment. Past CAP initiatives have been categorized by the linked health and environmental issue that they address, for example: air/climate change, contaminants, food/soil, sustainable development, and water.

- The *EcoAction* is an Environment Canada program that provides financial support to community groups for projects that have measurable, positive impacts on the environment. Non-profit groups and organizations are eligible to apply to the Funding Program and all projects require matching funds or in-kind support from other sponsors. Priority for funding is given to projects that will achieve results in the following areas: clean air and climate change, clean water, and nature. The program encourages projects that protect, rehabilitate or enhance the natural environment, and build the capacity of communities to sustain these activities into the future.

- *SCI (Sustainable Communities Initiative)* is a unique partnership comprised of more than 40 federal, provincial, municipal and First Nations organizations dedicated to working with communities towards improved social, economic, environmental and cultural well being. It is a framework that allows governments to work collaboratively, communities to define what sustainability means to them, and the two to work together towards achieving that vision. SCI's overall role is to coordinate government programs and services in support of consensus decision-making at the community level. Its aim is to support community sustainability by strengthening horizontal coordination across government, building community-government partnerships and by building and strengthening community capacity. SCI is

currently operational in two initial partner areas: the Bras d'Or Lake watershed and the Annapolis River watershed, including the adjacent Fundy shore. The issue primarily addressed by SCI is the broad concern over sustainable development.

Total activities in the BoF/GoM ecoregion = 29
Departmental funding = 852.2K
Partner funding = 1610K

D2. EC's Vision, Objectives and Outcomes

A Vision:

Environment Canada envisions a future for the Bay of Fundy/Gulf of Maine ecoregion where environmental sustainability and ecosystem health are harmonized with human activities in a way that supports communities that are environmentally, economically and socially sustainable.

Goals and Objectives:

The goal of the department is to maintain and enhance the quality of the Bay of Fundy/Gulf of Maine ecoregion and foster the sustained viability of its terrestrial, aquatic and marine ecosystems and the sustainable use of its resources for future generations. It sees itself achieving this goal through the development and application of progressive environmental management plans and activities and through the effective use of suitable environmental laws, regulations and practices. Environment Canada will continue to develop partnerships and cooperative arrangements with Canadian and U.S. agencies, organizations, communities, industries and other interests in the ecoregion and strive to improve science and understanding, public awareness, policies, legislative tools and other means of protecting, conserving and enhancing the quality of the environment in the ecoregion.

Outcomes:

Some of the areas in which the department hopes to achieve particular advances, or place markers that can be met or moved over the next three to five years, include: municipal waste disposal, contaminants and toxic chemicals, wildlife conservation, climate change, air quality, meteorological prediction and coastal development. Within these general areas, some of the specific outcomes identified in the preparation of this strategic overview include the following:

1. **The extent and function of existing saltmarsh are maintained for the protection of aquatic and terrestrial biodiversity, thereby helping to ensure that threatened or endangered species populations under federal jurisdictions meet the objectives of recovery strategies and action plans within 15 years (From CWS Strategic Plan). (Lead: ECB)**

Actions:

- Continue inter-governmental cooperation to work towards common habitat and endangered species protection goals. (ECB)
- Involve the broad-based conservation community in Canada and the United States. (ECB, EPB, CAB)
- Develop, in concert with other responsibility centers, recovery strategies and action plans for appropriate endangered species populations. (ECB)

Barriers:

- Main barriers in achieving these objectives would be the government land-use policy and over-whelming development pressures.

Critical partners:

- Federal, provincial and municipal governments and NGOs.

Governing Mechanisms:

- The GoM Council, GPAC and BoFEP would be helpful in delivering these outcomes.

2. **A regional monitoring network is established for recording/ reporting on environmental indicators with a pilot effort focused on the Bay of Fundy/Gulf of Maine ecoregion. (Lead: ECB/EPB/MSC)**

Actions:

- Find a clear place/mandate for coordination and networking with science managers and the science and environmental communities. (CAB, ECB)
- Communicate to senior managers, policy makers and communities on the many values of networked monitoring. (ECB, MSC)
- Find a champion or champion agency, as leader. (CAB)

Barriers:

- The lack of detailed knowledge of programs among various possible participants in a regional coastal monitoring network.

Critical partners:

- Environment Canada, Department of Fisheries and Oceans, Natural Resources Canada, Agriculture and Agri-Food Canada, ACAP sites, and other community organizations, state agencies and US EPA.

Governing Mechanisms:

- GoM Council, BoFEP

3. **The protection of habitat in the upper north-west portion of the BoF is enhanced through various partner programs ranging from acquisition to internationally recognized conservation designations.**
   (Lead: ECB/CAB)

Actions:

- Continue long-term acquisition and habitat enhancement activities under the Eastern Habitat Joint Venture partnership or the Ecological Gifts Program. (ECB)
- Create National Wildlife Areas on islands of particular importance. (ECB)
- Continue to support initiatives to enhance existing international designations – Ramsar and Western Hemisphere Shorebird Reserve Network – such as Biosphere designations. (ECB, CAB)
- Continue to work with local residents who are interested in ensuring the long-term conservation of the BoF.

Critical partners:

- Provinces of NS and NB
- Other federal departments (DFO, NRC, AAFC, Parks Can.)
- Community organizations (i.e. ACAP, etc.)
- Private land owners, land trusts

Governing Mechanism:

- The Eastern Joint Venture mechanism is the most appropriate avenue to these goals.

4. **A functional liaison is established with provincial, municipal and state planning authorities to work toward building an environmentally sustainable development plan for coastal areas of the Bay of Fundy/Gulf of Maine ecoregion. (Lead: CAB)**

Actions:

- Establish one-to-one relationships with provincial, municipal and state planning authorities to understand their needs and related regional-scale issues. (CAB, EPB)
- Bridge the gap between traditional land-use planners at the municipal and provincial scales, and those involved in coastal/marine planning and management, possibly through MOUs or by equally engaging land-use partners within regional-scale bodies. (EPB)
- Pursue a collaborative approach for coastal planning in NB, for improved integrated coastal planning (underway.) (CAB)

Critical Partners:

- EC, DFO, NB Environment & Local Government, and NB Agriculture, Fisheries & Aquaculture

Barriers

- Insufficient resources in NB provincial agencies and DFO
- There is dispute on which process to build on (DFO's integrated management agenda or NB's coastal areas protection policy) in the pursuit of a collaborative approach for coastal planning in NB.

Governing mechanisms

- Increase engagement/involvement between Canada and US land-use planners in BoFEP and GoM Council.

5. **A Human Health Damage model of poor air quality impacts in the Atlantic Region is established, with initial application in the Bay of Fundy/Gulf of Maine ecoregion. (Lead: MSC/CAB)**

Actions:

- Partner with the New England Governors and Eastern Canadian Premiers to coordinate and incorporate ambient air quality datasets from the Atlantic states, held within the BoF/GoM ecoregion, and ensure datasets are updated. (EPB)
- Engage a modeler to use a pre-developed model that has been tested within Atlantic Canada, such as a modified Air Quality Valuation Model (AQVM), to incorporate transboundary air issues. (MSC)
- Establish a steering committee that would identify air quality change scenarios to evaluate within the model. (EPB, MSC)

Critical partners:

- Health Canada, the provincial governments and the appropriate federal and state agencies in the US.

Barriers:

- Poor modeling expertise and resources.

Governing Mechanisms:

- The New England Governors and Eastern Canadian Premiers, GoM Council and BoFEP.

6. An integrated coastal resource management initiative involving shellfish remediation and the engagement of communities, including a strong aboriginal involvement. (Lead: EPB)

Actions:

- Strengthen partnerships with local groups and the NS and NB governments. (CAB)
- Promote the installation/maintenance of proper onsite MWW systems. (EPB)
- Support the clam resource committee, established in south-western NB. (EPB)
- Fulfil goals established through the cooperative shellfish water quality monitoring program. (EPB)
- Engage regional-scale bodies such as BoFEP, GoM Council and GPAC (All)

Barriers:

- Funding at program and community levels
- Complexity of departments at all levels.
- Low commitment and participation of the shellfish industry

Critical partners:

- Federal and provincial governments, communities, municipalities, shellfish industry and NGOs.

Governing mechanisms:

- The GoM Council and BoFEP (high potential but not fully engaged)

7. **A center of expertise is established ("virtual" institute) in the region for the study, tracking and understanding of climate change related environmental changes and for delivering public information and education on climate change and options for public involvement. (Lead: MSC)**

Actions:

- Establish a virtual climate change "institute" as a collaborative venture between universities, research institutes and Federal Depts. (MSC)
- Identify those areas of research critical to the Atlantic Region. (All)
- Develop a research agenda that captures those critical areas. (ECB, MSC)
- Identify communication mechanisms that are most effective in this region. (CAB)
- Utilize current collaboration methods, such as networking and communities of practice to develop relationships. (MSC)

Critical Partners:

- Universities (AESN), provincial governments, Aboriginal research institutes, CCIARN (Climate Change Impacts & Adaptation Program)

Barriers

- Insufficient resources across all partners to establish and maintain such an "institute".
- Collaboration on this scale demands a level of leadership previously unseen in the region.
- Although the "institute" could be designed to work within an ecosystem structure, there are also areas of concern that span the entire region. For example, delivery of climate change information will probably be consistent across the region.

Governing mechanisms

- Well-defined collaborative mechanism required.
- Partners would be tied together by interest and mutual benefit.
- Such an "institute" could be expanded beyond the region.

8. **A science-based framework is applied in the regulation and control of toxic chemicals associated with the aquaculture industry and is supported by improved understanding of the associated ecosystem health and sustainability issues. (Lead: EPB)**

Actions:

- Pursue a collaborative approach with the provinces, academia, OGDs and industry for the development of a scientifically sound understanding of the environmental effects of aquaculture chemicals. (EPB)
- Develop, with the provinces of NS and NB and the industry, a scientifically-based framework for the regulation and control of toxic chemical use in the aquaculture industry. (EPB)
- Share scientific findings and management options concerning chemicals used in aquaculture with stakeholders and local residents from an educational perspective. (EPB, ECB, CAB)

Barriers:

- Commitment and participation of all relevant stakeholders is poor.

Critical partners:

- Federal and provincial government departments with responsibility for fisheries, environment and aquaculture.
- NB Salmon Growers Association
- Aquaculture Association of Nova Scotia

Governing Mechanisms:

- Well defined collaborative mechanism required (GoM Council, BoFEP, and GPAC)

9. **A cooperative arrangement is established with OGDs, the provinces, industry, communities and other stakeholders engaged in studying and understanding the implications of toxic chemical use on the sustainability of ecosystems and the health of communities. (Lead: EPB/ECB)**

Actions:

- Find a clear place/mandate for communication, networking and coordinating research on the fate and effects of toxic chemical use in the aquaculture industry. (EPB)
- Develop and/or strengthen existing partnerships with stakeholders involved in toxic chemical research. (ECB, EPB)
- Engage industry, communities, the provinces and other stakeholders in an effective outreach and education program. (CAB, EPB, ECB)

Barriers:

- Poor commitment and participation of industry stakeholders.
- Lack of adequate funding for research activities.

Critical partners:

- Federal and provincial government departments
- NGOs
- The aquaculture industry
- Universities

Governing Mechanisms:

- GoM Council, GPAC and BoFEP.

D3. Governance

The question of governance among all the various jurisdictions and organizations with responsibility, interest and an active focus in the Bay of Fundy/Gulf of Maine is a complex one. Given that the Gulf of Maine is largely shared between Canada and the United States, there is an added layer of complexity to the issue of governance. This, and our attempt to include the watersheds in the ecoregion, two of which are international, brings into the mix a wide variety of authorities and interests ranging from federal, state and provincial agencies in Canada and the U.S. to local watershed organizations and community groups. It is estimated that there are over three hundred interest groups within the Bay of Fundy/Gulf of Maine ecoregion on top of the seven jurisdictions at the state and provincial levels. An example of some of these government and non-government organizations is illustrated in Appendix 1.

In Canada, at the federal level, there are at least four departments with an active involvement in the ecoregion; EC, DFO, Transport Canada and External Affairs. In the U.S. there are EPA, NOAA, USGS, U.S. Army Corps of Engineers, U.S. Fish and Wildlife and U.S. Coast Guard. Noteworthy of organizations at the international level are the Gulf of Maine Council for the Marine Environment, the Organization of New England Governors and Eastern Premiers, the Global Program of Action Coalition for the Gulf of Maine (GPAC), the St. Croix International Waterway Commission and the Canada - U.S. Committee supporting the Canada – U.S. Bilateral Agreement on Shellfish. Sustaining a healthy ecosystem requires cooperation among scientists, resource managers, business interests, resource users and residents of coastal communities. The concept of governance deals with how all these organizations interrelate, who does what and how decisions are made at the broadest ecoregional level. (See *Governance Priorities and Options* below)

Players in the Issue of Governance

In order to advance the department's agenda in addressing the priority environmental issues within the Bay of Fundy/Gulf of Maine ecoregion, it is necessary to review the current governance mechanisms, the issues they focus on and to determine whether these are appropriate to meet the policy/strategic, research, capacity and operational/technical needs of the ecoregion. By viewing Appendix 2, it is clear that there are areas which may not be adequately governed by the current governance mechanisms and are lacking support, some of which are the responsibility of the Environment Canada alone, which puts the Department in an awkward position potentially outside of good governance. This section examines some of the organizations particularly suited to provide good governance and discusses issues and mechanisms which exist for effectively positioning and moving the markers.

Currently there are many organizations focused on the Bay of Fundy/Gulf of Maine ecoregion that meet the region's policy and strategic needs for governance. Three key players include the Gulf of Maine Council on the Marine Environment, the Global Programme of Action Coalition for the Gulf of Maine (GPAC) and the Bay of Fundy Ecosystem Partnership (BoFEP). It is evident that academia and organizations, such as the Regional Association for Research on the Gulf of Maine, Canadian Climate Impacts and Adaptation Research Network and the Coastal Network of the Gulf of Maine, provide regional support for research and monitoring. Other organizations, such as ACAP, support community involvement. Still others support conservation, protection, enforcement, education and other essential activities. While Canada provides a good share of support to organizations such as these, a large proportion stems from our U.S. counterparts. This is an important consideration for any governance role which such organizations might play where a Canada – US balance is important.

For example, capacity in the area of public education and outreach requires improvement on the part of Environment Canada. This particular activity is

important in order to provide communities with the ability and purpose to take on a greater role regarding the region's coastal issues and resources. The Bay of Fundy Marine Resource Center links information to local communities; however, their resources are limited and they therefore lack the ability to network throughout the entire ecoregion. ACAP sites have similar constraints, but their community roots compensate for resource shortfalls. Much of the operational/technical or "hands-on" work is, ultimately, left in the hands of local academia, government departments and/or community groups, many of which are inappropriately funded or inadequately governed such that they are unable to complete their desired projects/tasks.

Following are descriptions of most of the organizations mentioned in this report and an evaluation of their potential governance capacity and possible role in the governance of the combined efforts in Canada and the US to address environmental issues in the ecoregion:

Gulf of Maine Council on the Marine Environment, established in 1989, is a multi-jurisdictional collaboration among the Governors of Maine, Massachusetts and New Hampshire, the Premiers of New Brunswick and Nova Scotia and 6 federal agencies with mandates in the marine environment (Environment Canada, DFO, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, the U.S. EPA and NOAA.) Its mission is to maintain and enhance environmental quality in the Gulf of Maine and to allow for sustainable resource use by existing and future generations. The Council fosters co-operative actions within the Gulf of Maine watershed to preserve common heritage and encourage sustainable resource use. The Council's supporting actions are aimed at protecting and restoring coastal and shellfish habitats, reducing toxic contaminants in the food chain, reducing debris, and protecting fishery resource habitats. Members of the Council agree to guide state, provincial, and federal policy and budgeting decisions affecting the Gulf's coastal and marine environments.

The priority of the Gulf of Maine Council is to meet the measurable objective of is action plan which is to: protect and restore coastal and marine habitats, restore shellfish habitats, protect human health and ecosystem integrity from toxic contaminants in marine habitats, reduce marine debris and protect, restore fishery habitats and resources and encourage sustainable maritime activities. The 13 year longevity of this organization, its senior level representation from the participating organizations and its ongoing funding from government sources secures its position as a very significant governing body.

Bay of Fundy Ecosystem Partnership (BoFEP), initiated in 1995, is comprised of a wide range of groups and individuals interested in fostering the well-being of the Bay of Fundy ecosystem, including a cross-section of federal, provincial, community, NGO, academic, First Nations, industry and resource user groups. It is essentially a "Virtual Institute" that is instrumental in facilitating and enhancing communication and cooperation among all citizens and organizations interested in understanding the ecology of the Bay of Fundy, conserving habitats and using its resources in a sustainable way. It has a focus on science but also on supporting the social well-being and economic sustainability of its coastal communities. BoFEP believes that resource development and other coastal zone activities should be based on ecologically sound integrated coastal planning and management and promotes and facilitates long-range planning and integrated management in the coastal zone.

BoFEP coordinates specific research projects, conservation activities and other initiatives which are undertaken by multi-disciplinary working groups constituted as needed (presently 12) from among the membership. Its priorities include developing a geographically dispersed, adaptable, responsive and inclusive network linking all partners and serving as a readily accessible network for scientific, community and other knowledge pertaining to the state of the Bay of Fundy ecosystem.

While strong links between BoFEP and the Gulf of Maine Council on the Marine Environment have been established; BoFEP only represents the Canadian network component of this Canada-U.S. ecosystem and therefore has limited capacity to provide governance within the whole ecoregion. So far it has had consistent federal funding and has a strong role to play in coordinating science and coastal management activities in the Bay of Fundy.

The Global Programme of Action Coalition for the Gulf of Maine (GPAC) was established in 1997 with the help of the Commission for Environmental Co-operation (CEC). It is a bi-national organization consisting of a broad group or coalition of individuals and some 40 agencies and organizations, from Canada and the United States, with interest in the Gulf of Maine and the United Nations sponsored International Agreement and the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA). Each of the signatories to the GPA is required to establish their own program to deal with coastal marine pollution as specified by the agreement. Canada established its National Program of Action (NPA) to meet its obligations under the GPA agreement.

This coalition includes representatives of the federal governments of Canada and the United States, governments of New Brunswick, Nova Scotia, Maine, New Hampshire and Massachusetts, Native American tribes, First Nations of Canada, industry, community action groups, environmental advocacy groups and research and academic institutions. Through a series of workshops, meetings and discussion groups over the past 6 years, GPAC has developed a list of priority issues and concerns in the Gulf of Maine and various actions to address them. GPAC has worked closely with the Gulf of Maine Council on the Marine Environment and its aims, objectives and actions have been largely adopted by the Council.

The GPAC mission was to establish a collaborative, short-term organization dedicated to the implementation of the United Nations Global Programme of

Acton in this region. GPAC has focused on five priorities including: coastal development, physical alterations, resource use, sewage and eutrophication and toxics. They have been successful in focusing the resources of the CEC (which provided an initial three years of funding) and in gaining attention from a wide spectrum of interests in the ecoregion to address specific problems in these priority areas. The initial intention of a finite existence for this organization and the lack of a sustaining funding base diminish its long-term role as a strong governance body. Nevertheless, its consolidation of a wide group of diverse interests over the past five years calls for important consideration of its governance role and future potential.

Regional Association for Research on the Gulf of Maine (RARGOM), founded in 1991, is primarily comprised of scientific researchers in the United States and their institutions, with other members stemming from the federal and state governments and organizations and individuals interested in this ecoregion. RARGOM advocates and facilitates a coherent program of regional research, promotes scientific quality and provides a communication vehicle among scientists and the public primarily in the U.S. Its priorities are to coordinate marine research and monitoring in the Gulf of Maine, facilitate research funding, plan, organize and implement long range, interdisciplinary research programs, communicate scientific findings and research needs and provide scientific and technical advice and planning for federal, regional, state and local agencies and organizations.

RARGOM is primarily focused on scientific research in the Gulf of Maine and plays a governance role in guiding and coordinating U.S. researchers. It has strong linkages with the Gulf of Maine Council on the Marine Environment and will continue to be a key governance player in facilitating scientific work in the Gulf.

Atlantic Coastal Action Program (ACAP) was initiated by the department in 1991 to engage local communities in addressing their local environmental and

developmental challenges. ACAP is a non-profit, community-based program that depends on local involvement and support to restore damaged coastal environments. The department helps to fund some individual projects and aspects of the program and maintains a supporting structure or network for the ACAP sites. A larger part of the resources are secured by the ACAP Coordinators and community stakeholders through volunteer work, in-kind contributions, fundraising and various partnerships. The Program has established 14 sites across Atlantic Canada, each of which is operated as a non-profit organization with a Board of Directors and a Coordinator. Four sites are located on the Bay of Fundy/Gulf of Maine ecoregion, including ACAP Saint John, Clean Annapolis River Project, St. Croix Estuary Project and Eastern Charlotte Waterways Inc.

ACAP envisions Atlantic Canada as a prosperous, diversified region of healthy, vibrant, sustainable, coastal communities that will retain their lives and livelihoods for generations to come. It helps communities to define common objectives for environmentally appropriate use of their resources and to develop plans and strategies that will help achieve them. Some of the priorities which ACAP has identified for the Bay of Fundy/Gulf of Maine include: wildlife and wetland protection and conservation, inter-tidal assessments, shoreline surveillance, climate change, coastal debris, water conservation and education and outreach. Activities range from beach and stream clean-ups and educational initiatives to research in marine and aquatic systems.

While the focus of ACAP is on the individual communities involved, they have strong linkages with BoFEP, GPAC and the Gulf of Maine Council on the Marine Environment. They also have strong ties to Environment Canada and broad networks with other resource management groups, local resource users, industry and other NGOs. Their governance role is community-led and they have the capability to address local issues through community efforts with linkages to research and management agencies and organizations.

Other Organizations of Interest

Coastal Network of the Gulf of Maine (CNet), established more than 8 years ago, is the only Gulf-wide coalition of community-based organizations focused on monitoring. It consists of approximately 250 community organizations, which have come together to apply monitoring efforts in support of improving environmental conditions in the Gulf of Maine. Their focus is on air quality, inter-tidal habitat, marine debris, salt marsh quality, phytoplankton and shellfish resources. They are involved in protocol development, training, local capacity building and communication within the network and among communities.

Bay of Fundy Marine Resource Center (MRC), located in Cornwallis Park, Annapolis County, is a not-for-profit, community-based institution that was established in 1997 through collaborative efforts between the Western Valley Development Authority (WVDA) and the Fundy Fixed Gear Council (FFGC). Its purpose is to give the Digby and Annapolis region the capacity to take on a greater role in the integrated management of its coastal resources. The MRC works closely with fishermen's organizations, processors, aquaculture operators, marine ecotourism operators, First Nations, environmental groups, researchers and government representatives to offer its services, facilities and technical support to all aspects of the Bay of Fundy marine economy and ecosystem. Its focus is on community-based resource management, aquaculture, regional marine tourism promotion and marketing and other technical, economic and social aspects of local marine resources.

As mentioned above, there are many other organizations throughout the ecoregion, but their importance in an overall governance role is not sufficient to warrant a description of them here.

Governance Priorities and Options

The roles that these various agencies, organizations and interests play in the Bay of Fundy/Gulf of Maine ecoregion vary from research to regulatory, development to management, planning to education, conservation to resource

utilization. Each has its own mandate and responsibility, but there is a degree of interface, cooperation and coordination both nationally on each side of the boarder and internationally between the two countries. Although the number of individual organizations and agencies is numerous, for the purposes of this report we will concentrate on those few that play a pivotal role in governing what goes on within the ecoregion and how it is carried out and by whom. The critical part of this analysis is how EC interfaces with other major players at the governance table and what role it can best play in achieving its goals and enhancing the state of the environment within the ecoregion.

As noted above, governance describes the overall relationships among the complex variety of interests within the ecoregion and the mechanisms which dictate, guide or control them. An appropriate mechanism of governance should arise from an oversight of the ecoregion and should generally be the means by which higher order decisions are made and activities, policies and broad initiatives are undertaken. Above all, any modern governance model should be principle centered, i.e. it should uphold the basic principals of participation (from the community level up) and democracy (where there is a general level of agreement or consensus). It should also govern how the various jurisdictions are guided in carrying out their functions and responsibilities. In a good governance model it should be clear where leadership lies and from where authority flows. Clearly, all jurisdictions and interests have their own mandate and authority (as does Environment Canada), but in the complexity of authorities and interests in the Bay of Fundy/Gulf of Maine ecoregion, a good governance model is essential to provide smooth, efficient and optimal cooperation among the authorities and interests to address broad environmental issues. Table 3 provides a list of organizations and their main functions within the Bay of Fundy/Gulf of Maine ecoregion.

Table 3 **Organizational Functions**

	ORGANIZATIONS						
FUNCTIONS in the BoF/GoM Ecoregion	**RARGOM**	**GOMC**	**BoFEP**	**ACAP**	**EC**	**DFO**	**GPAC**
Monitoring	●	•		●	●	●	
Regulation					●	●	
Enforcement				•	●	●	
Research	●	●	●	●	●	●	•
Conservation		•	•	●	●	●	●
Resource Management	•	●	•	•	●	●	
Protection				●	●	●	●
Communication/ Education	•	●	●	●	●	●	●
Planning		●	●	●	●	●	●

There are a number of activities aimed at addressing environmental issues and which need to be well governed including monitoring, regulation, enforcement, research, conservation, resource management, protection and planning, communications and education. They address such issues as land-use and development, marine protected areas, pollution, resource use, capacity building, awareness and understanding and other concerns related to human activities, sustainable communities and the sustainable use of the environment within the ecoregion. It is vitally important for everyone to understand their role in this context and the roles of others. It is similarly important for all to recognize where appropriate guidance and leadership is coming from and to try to fit into an overall scheme or model of governance.

One approach discussed at Fundy Forum was a nested approach (in relation to Marine Protected Areas) whereby a network of small areas is managed together using a community based approach; but, small pockets of protection unlinked is not enough. There also needs to be a balance between commercial or economic interests and the environmental interests and requirements. A linking mechanism is essential and is an important element of governance.

In any governance model it is critical to identify and cultivate local constituencies. The involvement of third parties or NGOs, community groups or interest groups will be critical to the success of the system, another element of good governance. For example, in any conservation initiative there is a need to consult and involve the owners and users of the area involved and the initiative needs to be well defined. Also, design professionals and planners in coastal areas, for example, are critical components or "voices" in the matrix of governance.

A governance system must be able to react appropriately to changes in indicators denoting ecosystem degradation or a threat to sustainability and to mobilize resources and expertise appropriately. Following is a list of those elements, which are essential for a good governance system.

Elements of a good governance system:

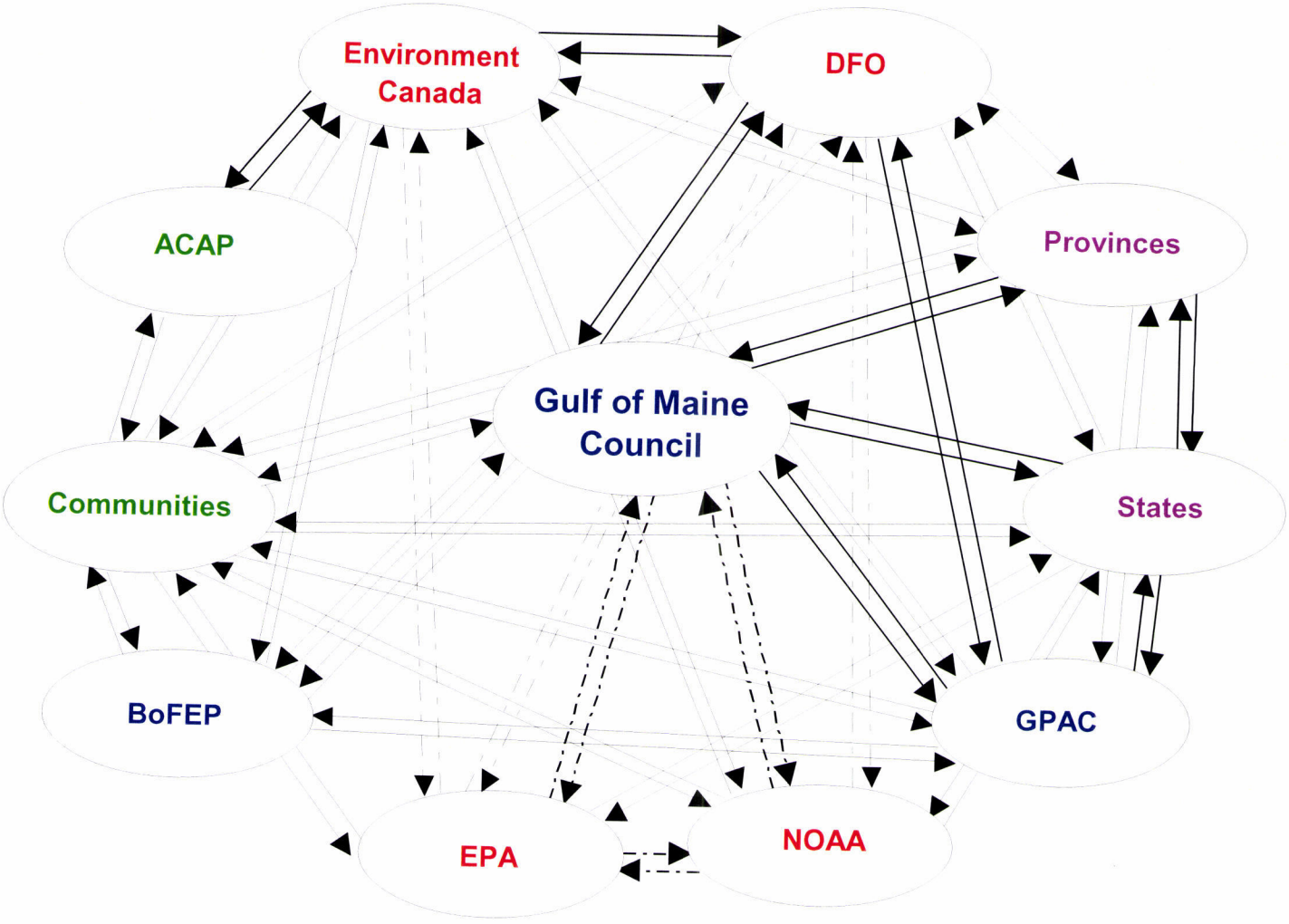
- Adaptive - able to respond to changing priorities, trends and emergencies.
- Provide linkages among all the players.
- Represent authority and decision making power.
- Principle based and democratic.
- Representative of all stakeholders and respectful to their needs and positions.
- Access to resources and able to mobilize expertise.
- Credible and respectable

- Acceptable to all or most of the stakeholders.

Most of these elements can be found in each of the 4 main governance players described above, but in some cases it is easier to see where they have particular strengths in some or all of the elements. The players that tend to meet the requirements of leaders in the system of governance would be the Gulf of Maine Council on the Marine Environment, BoFEP and GPAC in that order. At the same time, it should be pointed out that none of these alone could "govern" the Bay of Fundy/Gulf of Maine ecoregion. Other essential players exist, including the provinces, the states, Environment Canada, DFO, ACAP and the communities, which all have various roles essential to the overall governance system but do not to have some of the key critical elements noted above.

Figure 1 shows a governance network and structure, which basically describes the currently working governance structure for the Bay of Fundy/Gulf of Maine ecoregion. The Gulf of Maine Council on the Marine Environment plays a pivotal role and constitutes the hub of the governance model. GPAC and BoFEP, which are essentially offshoots of the Council in function, are included in the central cluster and contribute to the central hub. Within the system, there are 3 main clusters: a Canadian assembly including DFO, EC and ACAP, an assembly of U.S. agencies including NOAA, USF&W, and EPA and an assembly of provincial and state jurisdictional elements. In this model, the role of the Gulf of Maine Council on the Marine Environment becomes clear as a leader in governance. The connections indicated among the players may seem obvious but they are an important element of the system. It is these linkages which describe the governance roles of the Council and the other players.

Figure 2 Organizational Links



Simply, the roles for each of the players shown could be described as:

Gulf of Maine Council on the Marine Environment - acts as a central governing and coordinating focus for all levels of government and a functional and active link to other bi-national organizations, NGOs and community groups.

BoFEP - consolidates and coordinates a wide range of academic, community, industry and government interest and expertise to study and address environmental issues in the Bay of Fundy.

GPAC - constitutes a coalition of government, NGO and community groups with a focus on addressing specific concerns related to land-based sources of marine pollution outlined by the United Nations Global Programme of Action for the Protection of the Marine Environment from Land-based Activities.

Environment Canada - conducts studies, monitors trends, manages federal environmental legislative mandate, negotiates protection, conservation and regulatory matters with other government agencies and facilitates community involvement within Canada.

ACAP - engages a network of community groups around the Bay of Fundy in addressing their particular environmental issues and links EC with communities.

DFO - administers fisheries and oceans legislation, manages fisheries activities in Canadian waters, conducts research in fisheries resources and management, marine ecology and ocean technology and works collaboratively with other Canadian and U.S. interests in resource and habitat conservation and sustainable use.

The Provinces - administer jurisdiction over terrestrial and aquatic resources, coastal resources, land use and coastal development working independently but also cooperatively with each other and the eastern states on limited finances.

The States - have control over coastal development and independent jurisdiction over aquatic and terrestrial resources, administer often strong state laws, deliver conservation and monitoring programs for the U.S. federal agencies and collaborate where needed with the provinces, local communities and organizations.

EPA and NOAA - conduct coastal and marine studies and conservation programs through federal laws and funding initiatives, advise the states and other organizations concerning resource and environmental issues and

collaborate with international interests in management of the Bay of Fundy/Gulf of Maine ecoregion, where they wield a strong influence among partners.

Communities - in both Canada and the U.S. have a growing influence over local development and other environmental issues though they generally lack authority or capacity to exert any far reaching governance influence in the ecoregion.

D4. Path Forward

a. An Issues Driven Framework:

The prime reason for Environment Canada to be involved in the Bay of Fundy/Gulf of Maine ecoregion is to address environmental problems and concerns of interest to Canadians and those communities surrounding the ecoregion. There are other reasons, such as meeting international obligations, complying with and enforcing environmental legislation and engaging in bi-national and multi-jurisdictional partnerships, but environmental issues are mainly what drive departmental involvement.

The primary environmental issues in the ecoregion have been carefully examined in this report. They are categorized under 8 main areas of activity or issue areas and in this sense they comprise an issues-based framework, which reflects the department's organizational and structural capacity to address them. The analysis undertaken in the report allows some priority to be assigned to particular issues in the context of urgency, based on current knowledge, capacity, ability to manage the issue and its relevance to others. The matrix in Appendix 2 indicates Environment Canada's strengths and weaknesses concerning each issue and where it is important for the department to fill gaps. Conclusions indicate that the department should focus attention on the following:

- Scientific understanding of some issues within wildlife and conservation and coastal development is weak.
- Monitoring is weak in almost all issue areas.
- Research is needed in the areas of wildlife and conservation, coastal development, and contaminants and toxic chemicals.
- Capacity and resources are low for all issue areas except for emergencies and oil spills.
- Community involvement is poor in the areas of atmospheric transport and deposition, climate change and coastal development.
- Industrial involvement is poor in some elements of contaminants and toxics, wildlife and conservation and meteorology and climatology.

Some key issues requiring greater departmental effort include:

- nutrient inputs
- non-point sources of contamination
- chemical use in aquaculture
- invasive species
- benthic habitat disturbance
- genetically modified species
- undesirable coastal resource harvesting
- long term climatic and environmental trends
- wetland and shoreline habitat disturbance and destruction
- public education and outreach

Issues that appear to be more in-hand or better dealt with include:

- bacterial and pathogen contamination
- closed shellfish growing areas
- marine and land-based emergency spills and impacts
- point source contamination
- ocean dumping
- obstruction of rivers and estuaries

In summary, this analysis indicates a need to focus additional departmental effort toward understanding the environmental implications of some issues through research and monitoring. Strengthening departmental capacity, particularly in the areas of available resources and expertise, is greatly needed. Greater efforts to involve communities and other elements of the public are necessary and will also help them to develop their capacity. The overall issue areas showing the greatest level of concern, and the largest need for improvements, include wildlife and conservation, contaminants and toxic chemicals, coastal development and climate change, in that order.

Strategic Consideration on Environmental Issues:

- Resolving environmental problems and issues is a key driver for EC - so framework should be issues-based.
- There is a general acceptance of common issues among partners.
- An issues-based framework will help to harmonize efforts with partners and meet their expectations.
- Common issues are useful in engaging all branches in a cooperative integrative approach to common objectives.

- The issue-based framework could be used in delivering national programs and establishing/using national protocols.

b. Departmental Resources and Capacity

According to the inventory of departmental activities in the Bay of Fundy/Gulf of Maine ecoregion, there is approximately $2.2 million and 22 person years applied annually in order to deal with various environmental issues and problems. The accuracy of this determination is only as good as the information provided by Working Group members to the project team for entry into the database and, therefore, may not reflect the full departmental effort in the ecoregion. Nevertheless, it allows some assessment of overall effort as far as resources are concerned. In respect to the scale of effort afforded to similar ecoregions (ecosystem initiatives) across Canada, this effort is minimal and does not reflect the relative importance of the ecoregion or the level of environmental stress or pressure upon the department to perform its mandated function in this part of the Region. In addition, the expectations on the department to uphold its part in the combined efforts of all players in this multi-jurisdictional, bi-national ecoregion are high.

It is important to note that according to the inventory information our partners in the ecoregion are contributing nearly $2.5 million annually, an amount slightly greater than departmental investment.

In terms of the expertise the department is able to apply to this area, the capacity is minimal and diminishing. This erosion of capacity is due to several factors including: demographics and an aging/retiring scientific workforce, the removal of resources for research and monitoring, issues of succession that see departmental growth in non-scientific capacity, and a general shrinking of regional capacity with an increasing proliferation of non-regional demands.

The department needs to "ratchet up" its financial investment in work within the Bay of Fundy/Gulf of Maine ecoregion and its commitment to provincial and U.S. partners who are involved all levels. The department should play a stronger role with other federal departments, such as DFO, DFAIT, NRCan and POC, in

achieving synergy and obtaining the needed capacity and other resources to play an appropriate role in the ecoregion. The opportunity for enhancing capacity through linkages with communities, academic institutions and local organizations currently offered by BoFEP and GPAC should be carefully nurtured.

One important feature that makes it important for the department to maintain and strengthen capacity in this ecoregion is the position taken by the current administration in the U.S. on the environment. The 2002-2003 Canada-U.S. Environmental Strategy points out the essential role that regional relationships and arrangements with our U.S. partners and bilateral groups will play in securing environmental quality policies and regulations with the U.S. both regionally and nationally. In this context, it will be very important for EC Atlantic to be strategic in its long-term plans and vision and to be well equipped from a capacity point of view.

Strategic Considerations for Resources & Capacity:

- The context for environmental management is changing toward a more ecosystem oriented approach.
- EC is moving to a central national and international agenda and regional capacity and resources are weakening.
- Need deeper scientific understanding of the issues through research and monitoring.
- EC capacity and resources are low for many issues.
- Demographics make succession planning crucial for long term contiguous involvement in the ecoregion.

c. Governance

It is clear that governance of environmental issues in the Bay of Fundy/Gulf of Maine ecoregion is well dealt with through the existing bi-national and multi-jurisdictional structures of the Gulf of Maine Council on the Marine Environment, BoFEP and GPAC. Environment Canada is well represented on the Council and BoFEP, but its participation on GPAC is tenuous and its general demeanor to GPAC is uncertain. Also, the commitment of the Region to activities under the

NPA (National Programme of Action) and its relationship to GPAC needs further clarification. All 3 bodies allow for the identification and coordination of departmental issues, priorities and program delivery and they enhance the basic ongoing efforts of the department through its independent actions or its partnerships outside these important bodies.

Where the department has direct and clear responsibilities to carry out its programs independently, its performance in maintaining a network of action throughout the Atlantic Region is exemplary. Opportunities to work with others in the ecoregion, however, should be examined, particularly where it involves the central governance mechanisms. While partnerships need to be encouraged with OGDs, industry, U.S. agencies and others on a bilateral or multilateral basis, they should always be examined in the context of the current governance model. Interest and participation in this model, at the most senior departmental level will be important for establishing a strong place at the table for Environment Canada.

Strategic Considerations for Governance:

- Complex international, national and jurisdictional relationships call for an effective governance model.
- Center of governance model is the Gulf of Maine Council.
- Strong governance role for BoFEP and GPAC exists.
- EC participation in GPAC should be strengthened.
- EC is in harmony with the objectives of these bodies.
- Bilateral partnerships are important but should acknowledge governance umbrella.
- Demonstration of EC commitment and involvement is needed at the most senior level.

d. Future Opportunities

Change in the context for the environment and in the environmental field away from a science perspective is happening rapidly on many fronts. It is happening departmentally, nationally, internationally and globally. Ecological change is also shifting scientific precepts and understanding and bringing new stress to ecosystems. On a list of peoples' priorities, the environment has slipped from number 2 or 3, which it was a decade ago, to number 8 or 9. Policy shifts in the

U.S. on environmental matters are large and concerning. The environment has moved down the scale of importance within the overall national agenda, which is focused on economic growth and development and international. Environmental regulations, controls and legislation is seen as a constraint to this agenda and the attitude pervades aspects of the industry, growth and resource-based sectors.

The changing nature of Environment Canada from an "action-on-the-ground" scientific organization to a more strategic, nationally and internationally oriented department, with increasing resources at the center and weakened capacity in the regions, seems to be evident. Coastal development, climate change and pressures on marine and coastal resources are stressing and changing local ecosystems, not to mention the loss of habitat and other pressures on migratory species that range outside the ecoregion. New and innovative ways will be needed to deal with such changes and they will involve everything from better science to understanding about what is happening ecologically to educational efforts that influence public attitude and behavior.

Strategic partnerships will be crucial for Environment Canada. The most important of these will be in fisheries, health, land-use and coastal planning, economic development and education. Critical partners will be DFO, Health Canada, AgCan, NRCan and NRC and should include Industry Canada, INAC and DFAIT. Liaison and partnership with U.S. agencies will be equally important as will the strengthening of relationships with Nova Scotia, New Brunswick and the New England States. Environment Canada must be able to bring knowledge, expertise and resources to these tables. In all 3 of these areas we are currently weak and getting weaker.

On the non-government side, partnerships with industry, municipalities, communities and NGOs/ENGOs will be important. The department has a sporadic record in this area which needs upgrading. Such partnerships take time and effort and need resources to cement them. It will be important to connect the expertise and knowledge base of Environment Canada with the capacity of

industry and non-government organizations to obtain funding, in order to advance our programs and objectives. But we must maintain the expertise and knowledge as our equity to participate in such partnerships or we end up beggars at the table.

Incentive at the working level, innovation at the strategic level and involvement at the most senior levels in the department, along with adequate resources, would provide the lift necessary to make Environment Canada a substantial player in this ecoregion. The substantial "meat" of future opportunities will, however, ride on the nature and excellence of projects, ideas, programs and innovative solutions, which must form the backbone of partnerships, joint initiatives and collaborative work toward addressing the key environmental issues in the ecoregion. In other words, the framework of issues, and how they are to be addressed, will shape and drive future opportunities.

Strategic Considerations for Future Opportunities:

- Strategic partnerships will be crucial, especially bilateral partnerships with key OGDs, U.S. agencies and other organizations around the ecoregion.
- Ecosystem initiative status for the ecoregion (recognition in HQ) will be important for long-term success.
- Engagement of HQ in regional activities will be important.
- Public knowledge and education offer new challenges.
- Community involvement is poor in some areas (e.g. atmospheric transport and deposition, climate change and coastal development).
- Industrial involvement needs strengthening (e.g. contaminants and toxics, wildlife and conservation, and meteorology and climatology).

e. Program Options and Directions

While this analysis demonstrates a fairly inclusive and broad departmental involvement in the Bay of Fundy/Gulf of Maine ecoregion, there are some elements of our involvement that are intermittent or opportunistic and are not secure over the long-term. Generally, these activities are not supported by formal or informal agreements/arrangements or are conducted primarily through the interest or commitment of individual scientists or program managers. Situations, such as these, leave the department's involvement vulnerable

through retirement, internal movement and transfers or loss of supporting resources. It does not secure the necessary long-term substantial commitment that partners might expect. A few examples include, our involvement with the Gulf of Maine Council on the Marine Environment's Gulfwatch Program for monitoring of contaminants in blue mussels, air quality monitoring stations on the Bay of Fundy with year-to-year funding and sporadic studies of habitat loss due to resource harvesting or shoreline development.

This study confirms that there is no particular strategic approach to the departments work in the Bay of Fundy/Gulf of Maine ecoregion. While our contribution to the work of others, like the Gulf of Maine Council on the Marine Environment, BoFEP and GPAC, feeds their strategic plans, Environment Canada has had no well thought out, consolidated or articulated strategy for the work we are accomplishing in the ecoregion. It does not fit into a coherent departmental framework. Two things would help this situation: the establishment of a formal ecosystem initiative highly supported by the department and the development of a framework that bases action on the issues and activity areas outlined in this report. Also, the full engagement of a dedicated Working Group under such a mandate, with adequate departmental support, would enable the department to focus and harmonize its efforts in this ecoregion, along with those efforts of other key players in Canada and the U.S. This could be accomplished by building on the extensive existing activities, but would take clear management direction and full concurrence by all branches with the vision and objectives outlined in this report.

Strategic Considerations for Program Options and Directions:

- Strategic approach should follow an issues-based framework.
- Consolidated, coherent framework and action plan must be supported by all branches.
- Important to articulate clear support for the current governance model and EC's role in it.
- Incentive at the working level, innovation at the strategic level and involvement at the most senior levels are essential.
- Fully engaged EC Working Group is essential.
- Develop and enhance bilateral partnerships with key OGDs, U.S. agencies and other organizations around the ecoregion.

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Appendix 1: Agencies involved within the Ecoregion

INTERNATIONAL AGENCIES	
• United Nations Global Programme of Action for the Protection of the Marine Environment from Land Based Activities (GPA) • North American Commission for Environmental Cooperation (CEC) ~ North American Biodiversity Information Network (NABIN)	
CANADA	**UNITED STATES**
Federal Agencies	
• National Programme of Action • Environment Canada, Atlantic Region • Department of Fisheries & Oceans ~ Canadian Coast Guard • Transport Canada • Canadian Forest Services • Natural Resource Canada • Health Canada • Nature Conservancy of Canada • Agriculture & Agri-Food Canada • Canadian Wildlife Service • Canadian Parks Service • Canadian Food Inspection Agency • Geological Survey of Canada • Institute for Marine Biosciences National Research Council • External Affairs	• US Environmental Protection Agency • National Oceanic & Atmospheric Administration • U.S. Fish & Wildlife Service ~ Gulf of Maine Coastal Program • U.S. Geological Survey • U.S. Department of Transportation ~ U.S. Coast Guard • U.S. Department of Interior • U.S. Department of Agriculture ~ Natural Resources Conservation Service • U.S. Army Corps of Engineers • U.S. Forest Service • U.S. Department of Energy
Provincial Agencies	**State Agencies**
New Brunswick • Department of Environment & Local Government • Department of Agriculture, Fisheries & Aquaculture • Department of Natural Resource & Energy • Emergency Measures Organization • Department of Transportation Department of Environment & Labour • Department of Agriculture & Fisheries	***Maine*** • Department of Environmental Protection • Department of Conservation • Critical Areas Program • Coastal Program • Natural Resources Council of Maine • Department of Environmental Protection • Department of Inland Fisheries & Wildlife • Department of Marine Resources • Department of Economic & Community Development

- Department of Commerce & Technology
- Department of Municipal Affairs
- Land & Water Advisory Committee
- Department of Health & Community Services
- Department of Tourism, Recreation & Heritage

Nova Scotia

- Department of Natural Resources
- Service Nova Scotia & Municipal Relations
- Department of the Environment
- Department of Fisheries
- Land Use Policy Committee
- Department of Mines & Energy

- Department of Human Services Division of Health Engineering
- Department of Transportation Division of Ports & Marine Transportation
- Historic Preservation Commission
- Science & Technology Commission
- Waste Management Agency
- Marine research Board

Massachusetts

- Coastal Zone Management Program
- Department of Fisheries, Wildlife & Environmental Law Enforcement
- Board of Underwater Archaeological Resources
- Executive Office of Environmental Affairs
- Executive Office of Transportation & Construction (water-based)
- Natural Heritage & Endangered Species Program
- Department of Public Health
- Port Authority
- Water Resource Authority
- Coastal Zone Management Office
- Department of Environmental Management
- The Massachusetts Bays National Estuary Program
- Department of Environmental Protection
- Division of Environmental Law Enforcement
- Division of Marine Fisheries
- Division of Marine Fisheries Cat Cove Laboratory
- Division of Marine Fisheries state Lobster Hatchery & Research Station
- Metropolitan District Commission

New Hampshire

- Department Environmental Services
- Office of State Planning
- Department of Resources & Economic Development
- Fish & Game, Region 3
- Division of Parks & Recreation
- State Port Authority

CANADA	UNITED STATES
ENGO agencies	
• ACAP Saint John • Eastern Charlotte Waterways Inc. • Clean Annapolis River Project • St. Croix Estuary Project • Oceans Institute of Canada • Ecology Action Center • Conservation Council of New Brunswick • Bay of Fundy Ecosystem Partnership • Fundy Forum • The Nature Trust of NB • NS Nature Trust • Clean Nova Scotia • Ecology Action Centre • Ducks Unlimited Canada • Nature Conservancy of Canada • Bird Studies Canada • Atlantic Canada Conservation Data Center	• Massachusetts Audubon Society • Massachusetts Clean Water Action • Massachusetts Salem Sound 2000 • Maine Audubon Society • Maine Environmental Policy Institute • Maine Island Institute • Audubon Society of New Hampshire • New Hampshire Clean Water Action • New Hampshire Wildlife Federation • The Nature Conservancy • Conservation Law Foundation of New England, Inc. • National Fish & Wildlife Foundation • Ducks Unlimited • Trout Unlimited • American Rivers
CANADA ~ UNITED STATES JOINT AGENCIES	
• Gulf of Maine Council on the Marine Environment • Regional Association for Research on the Gulf of Maine (RARGOM) • Global Programme of Action Coalition for the Gulf of Maine (GPAC) • Coastal Network of the Gulf of Maine (CNet) • Canadian Climate Impacts & Adaptation Research Network (C-CIARN) • CANUSLANT Joint Response Team • St. Croix International Waterway Commission • Atlantic Salmon Federation (Non-profit organization) • New England Governors and Eastern Premiers	

Appendix 2. **Issues Matrix**

1 - Science; Level of understanding and activity
2 - Level of stakeholder involvement
3 - Level of resources and capacity
4 - Level of control/enforcement
5 - Legislative basis (shared/sole mandated): SH/S

Status:
↑ - Improving
↓ - Needs improving

Level of concern:
● - High
● - Average
● - Low

	Science			Stakeholder involvement			Management		
	1			2			3	4	5
ISSUE	**Understanding**	**Research**	**Monitoring**	***Community***	***Industry***	***Gov't***			
Municipal Waste Disposal & On-Site Sewage									
• Nutrient inputs	↑	↓	↓	↑	↓	↓	↓	↓	SH
• Harmful algae blooms	↑	↓	↑	n/a	↓	↑	↓	↓	SH
• Bacterial & pathogen contamination	↑	↑	↑	↑	↓	↑	↓	↓	SH
• Closed shellfish growing areas	↑	↑	↑	↑	↑	↑	↓	↑	SH
Env. Emergencies & Oil Spills									
• Marine transportation spills & impacts	↑	↑	↓	↑	↑	↑	↓	↓	SH
• Land-based spills & impacts: *Industrial sources*	↑	↑	↑	↑	↑	↑	↑	↑	SH

	Science			Stakeholder involvement			Management		
	1			2			3	4	5
ISSUE	Understanding	Research	Monitoring	*Community*	*Industry*	*Gov't*			
Contaminants & Toxic Chemicals									
• Non-point sources of contamination	↓	↓	↓	↓	↓	↓	↓	↓	SH
• Chemical use in aquaculture	↑	↓	↓	↑	↓	↑	↓	↓	SH
• Point sources of contamination	↑	↑	↓	↑	↓	↑	↓	↓	SH
• Ocean dumping	↑	↓	↓	↑	↑	↑	↓	↓	SH
Wildlife & Conservation									
• Invasive Species	↓	↓	↓	↓	↓	↓	↓	↓	S
• Benthic habitat disturbance	↓	↓	↓	↓	↓	↓	↓	↓	SH
• Genetically engineered species	↓	↓	↓	↓	↓	↓	↓	↓	SH
• Declining/changing species diversity	↓	↓	↓	↓	↓	↓	↓	↓	SH
• Unsustainable coastal resource harvesting (rock-weed harvesting, aquaculture)	↓	↓	↓	↑	↑	↓	↓	↓	SH

	Science			Stakeholder involvement			Management		
	1			2			3	4	5
ISSUE	**Understanding**	**Research**	**Monitoring**	***Community***	***Industry***	***Gov't***			
Wildlife & Conservation (cont'd)									
• Water quality degradation	↑	↑	↓	↑	↑	↓	↓	↑	SH
• Birds oiled at sea	↑	↓	↓	↑	↑	↑	↑	↓	S
• Decline in migratory bird populations	↓	↓	↓	↑	↓	↓	↓	↑	SH
• Shorebird habitat disturbance	↓	↓	↓	↑	↑	↑	↓	↓	SH
• Species at risk	↑	↑	↓	↑	↓	↓	↑	↑	SH
Meteorology and Climatology									
• Long-term climate/ environmental trends	↓	↓	↓	↑	↓	↑	↓	↓	SH
• Meteorological impacts	↑	↑	↑	↓	↑	↓	↑	↑	SH
• Short-term environmental trends	↑	↑	↑	↑	↓	↑	↑	↑	SH
Atmospheric Transport & Deposition									
• Impact of atmospheric pollution transport and deposition	↓	↓	↓	↓	↑	↑	↓	↓	S

	Science			Stakeholder involvement			Management		
	1			2			3	4	5
ISSUE	**Understanding**	**Research**	**Monitoring**	***Community***	***Industry***	***Gov't***			
Climate Change									
• Worse tropical storms	↑	↓	↓	↓	↓	↓	↓	n/a	SH
• Sea level rise: erosion & coastal flooding	↑	↑	↓	↓	↑	↑	↓	n/a	SH
• Ecological change	↓	↓	↓	↓	↓	↓	↓	↓	SH
Coastal Development									
• Wetland & shoreline habitat disturbance/ destruction	↓	↓	↓	↓	↓	↓	↓	↓	SH
• Protection of fossil beds	↓	↓	↓	↓	↓	↓	↓	↓	SH
• Ecotourism/ human activity	↑	↓	↓	↑	↓	↓	↓	↓	SH
• Obstruction of rivers & estuaries	↑	↑	↓	↑	↑	↓	↓	↓	SH
• Benthic metal & aggregate extraction	↓	↓	↓	↓	↑	↓	↓	↓	SH

Appendix 3. Scope of EC activities

Municipal Waste Disposal and On-Site Sewage **Total activities: 6** **Departmental funding = 96 K Partner funding = 230 K**					
Problem / Issue	***Current activities***	***Gaps***	***Desired Results***	***Partnership Arrangements***	***Opportunities***
Introduction of bacteria, viruses and other pathogens as well as nutrients and chemical contamination, which have been known to cause: • human health hazards • reduction in areas of recreational use • hundreds of closures in shellfish growing areas • economic hardship to surrounding communities.	• Source identification • Water quality assessment and classification • Pollution prevention and prevention planning • Remediation of contaminated shellfish areas. • Socio-economic assessments • Wastewater assessment • Shoreline sanitary surveys	• Research on nutrients and phytotoxins • Monitoring for CEPA toxics, pathogens and nutrient inputs • Resources	• Improved water quality • Enhance management of rural & waste water systems • Remediate & restore contaminated shellfish growing areas. • Protect human health from waste water contaminants • Promote & monitor pollution prevention & remediation activities for contaminated shellfish areas.	• DFO • NBDELG • CFIA NSDMRA • ACAP-SJ • CARP • NB Health and Wellness • NBDAFA • relative municipalities and universities • Eastern Charlotte Waterways Inc.	• Increased Aboriginal involvement within the commercial shell-fishery in New Brunswick. • Integration of shellfish recovery into coastal resource management. • Science/research partnerships • Development of new technology • Increased industry involvement • Development of guidelines and training • Remediation at the community level • Closer community linkages and connections with ENGO networks

Environmental Emergencies and Oil Spills Total activities: 9 Departmental funding = 44 K Partner funding = 8 K					
Issues	***Current activities***	***Gaps***	***Desired Results***	***Partnership Arrangements***	***Opportunities***
Emergencies and oil spills threaten the health of the ecosystem and have long-term effects, which are difficult to track, control and/or remediate, including: • chronic oil pollution of coastal waters • damage to beaches and inter-tidal and aquatic habitats • impacts to aquatic and marine biota	• Shoreline Cleanup and Assessment Technique (SCAT) training to industry, communities and others • Spill modeling • Sensitivity mapping • Updating preparedness for inland spills affecting the Canada/US transboundary area.	• Research on fate and effects of oil pollution • Monitoring spills and ecological effects	• Improved spill preparedness and response. • Proper transport, storage and handling of Orimulsion® to minimize the threat of spills. • Better capability for tracking oil spills based on weather and ocean current data.	• CCG • USCG • USEPA • Irving ALERT • NBDOELG • DFO • ETAD • TC • CWS • NOAA • several ENGOs • surrounding communities and universities	• Coordinated mapping program with the US. • Assist in the creation of a new set of emergency response/ contingency plans for Orimulsion®. • Incorporate communities and First Nations into spill management processes. • Facilitate workshops to incorporate community interests

Contaminants and Toxic Chemicals Total activities: 14 Departmental funding = 120 K Partner funding = 279.5 K					
Issues	***Current activities***	***Gaps***	***Desired Results***	***Partnership Arrangements***	***Opportunities***
Industrial effluents and emissions, ocean dumping and the use of chemicals and pesticides in agriculture, forestry and aquaculture are detrimental to the health and diversity of marine and aquatic organisms. Heavy metals and organic pollutants have been found in sufficient levels to: • threaten ecosystem health and sustainability • pose a human health risk.	• Review studies and monitoring by industry • Canada/US mussel watch • Identify and study land-based pollution sources. • Advice on chemical use and effects • Develop risk management strategies • Compliance promotion and review	• Research on the fate and effects of toxic chemicals • Monitoring and identification of sources and ecological effects • Resources to meet CEPA expectations and operational needs	• A cooperative approach to understanding and managing impacts at an ecosystem level • Reduce contamination to marine biota • Minimize cumulative impacts of increased salmon aquaculture on marine, water and sediment quality with industry cooperation. • Identify contaminants associated with marine salmon farming and assess their potential environmental impacts • Ensure that salmon farm operators obtain a better understanding of EC's roles and responsibilities related to marine salmon farming. • Ensure industries are in full compliance with regulatory requirements • Study Hg levels in the marine environment of the ecoregion	• NSDOE • NBDAFA • NBELG • DFO • USEPA • NOAA • Maine DEP • Mass. CMZ • NS Dept. Fisheries • Universities • Provincial environmental departments • Pulp and paper mills	• Closer working relationships with NB (through provincial offices) • Contract to identify SOA Offshore activities • Design and implement a regional study of cumulative effects. • Develop a regional contaminants monitoring network. • Knowledge / information sharing • Tapping resources through OGD environment - health initiatives • Improved technology for effluent treatment

Wildlife and Conservation Total activities: 32 Departmental funding = 665 K Partner funding = 251.8 K						
Issues	***Current activities***	***Gaps***	***Desired Results***	***Partnership Arrangements***		***Opportunities***
Coastal development, forestry expansion, over-fishing and aquaculture are threatening the health and well-being of wildlife species and entire communities through: • habitat loss • exposure to toxic chemicals • over harvesting/ exploitation • invasion of non-indigenous species • disease • genetic manipulation	• Water quality sampling, analysis, interpretation, publication and modeling. • Migratory bird surveys, monitoring, banding and trends analysis • Coordination of Maritime Breeding Bird Surveys • Conservation measures to secure critical upper Bay of Fundy shorebird habitat: EHJV • Research on mud-flat ecology, tidal barriers and toxic substances. • Wetland habitat research • Study impacts of aquaculture activity on coastal waterfowl and vice versa. • Biosphere Reserve Project input • Develop cooperative enforcement agreements. Coordination of EHJV	• Understanding of ecosystem interactions, saltmarsh interactions and functions and Atlantic Canada seabirds • Wildlife research • Monitoring endangered species • Resources for research, monitoring and enforcement	• Reverse the loss of saltmarshes; support restoration efforts. • Protect and restore important wetland habitat • Protect and conserve ecologically sensitive land • Restore abandoned diked lands to original salt marshes • Promote and coordinate stewardship program.	• Parks Canada • DFO • CFS • NSDOE • NBDOELG • NBDOT NBDSS • Atlantic Flyway Council • ACWERN • NSDNR • NBDNRE • NS and NB provinces • NCC • CCG • USFWS • NSAEC • EHJV & SDJV • NBDOE • NWRC • USEPA • NERC •	• Ducks Unlimited Canada • Acadia ACER • Irving • Huntsman Center • Tantramar Wetlands Center • NB Wildlife Federation • NB Wildlife Trust • CARP • UNB • Holland College • MSVU • NGOs • NB Conservation Council • Aquanet • NWRI Agriculture and Agri-Food Canada	• Produce code of practice for NB salmon • Develop network and reporting of environmental indicators. • Demonstrate constructed wetlands • Develop recovery plans for species under SARA • Potential designation of the Upper BoF as a Biosphere Reserve.

Climate Change Total activities: 7 Departmental funding = 140 K Partner funding = 45 K					
Issues	***Current activities***	***Gaps***	***Desired Results***	***Partnership Arrangements***	***Opportunities***
Affects to marine and coastal habitat, ocean circulation, food and timber production, the incidence of weather extremes, damage to infrastructure and human health and safety, including: • sea level rise (increased erosion, coastal flooding and tropical storm intensity) • specie shifts	• Understanding and response to the effects and impacts of climate change • Studies on sea level rise and increased coastal erosion and risk to infrastructure. • Research on tropical storm intensity and frequency • Development of temperature trend database, climate change scenarios and the regional climate change web site for the Atlantic region. • Assess climate change related forest die-back • Public information on climate change	• Research impacts of climate change and remediation options and alternatives • Long-term climate change monitoring • Resources for monitoring, research and outreach • Involvement and support of community, industry and government	• Better utilization of underground thermal energy storage. • Development of mapping for storm surge with tide to generate high water warnings. • Retrieval of historical temperature records. • Develop a database of various climate variables useful to impact researchers on a site-specific or small geographical scale.	• CFS • AIRG • Climate Change Research Branch • Province of NB • City of Saint John • ACAP-SJ • UNB	• Provide socio-economic impacts of high water • Studies on climate sensitive species in Eastern Canada • Development of a database that is based on precipitation records. • Increase capacity to deliver information.

Meteorology and Climatology Total activities: 5 Departmental funding = 40 K Partner funding = none identified					
Issues	***Current activities***	***Gaps***	***Desired Results***	***Partnership Arrangements***	***Opportunities***
Short-term environmental/ climatological trends and variability and meteorological impacts play havoc on aspects of marine safety, shoreline infrastructure and coastal developments.	• Predicting weather and storm events, storm surges, changes or trends in climate and other meteorological - ocean linked phenomenon. • Contribute to safety of marine interests, protection of shoreline infrastructure and long-term planning of coastal developments. • Focus on safety in agriculture, forestry and other sectors where weather is critical • Data collection and management of ocean based meteorological and surface ocean and of a wide variety of other meteorological parameters.	• Understanding for long-term meteorology. • Long-term monitoring	• Continue to be part of on-going, long-term, regional data acquisition program. • Contribute to predicting capacity to protect humans and infrastructure from weather impacts	• DFO • CCG • Dalhousie University	• Strengthen Canada/US cooperation on data collection and research • Incorporate socio-economic analysis into understanding and outreach

Atmospheric Transport and Deposition Total activities: 3 Departmental funding = 130 K Partner funding = 100 K					
Issues	***Current activities***	***Gaps***	***Desired Results***	***Partnership Arrangements***	***Opportunities***
Atmospheric deposition from sources beyond the region is a diffuse and widespread source of contaminant input into the ecoregion, which threatens ecosystem health and the health of humans.	• Study source and movements of pollutants and their risk to biodiversity • Work through international channels for better controls. • Use of a Human Health Damage Model to provide a broad view of the impact of poor air quality and guide mitigating measures. • Address environmental issues such as deposition, ground level ozone, air toxins and particulate matter. • Measure selected atmospheric pollutants in ambient air.	• Monitoring • Resources • Involvement and support from community stakeholders • Understanding pathways and ecological effects needs more research effort • Long-term monitoring of deposition. • Resources for research and monitoring.	• Continue to be part of on-going, long-term, regional data acquisition program. • Identify the Human Health Damage Model most suitable for use in the Atlantic Region • Identify atmospheric contaminants with potential harmful impacts on human and ecosystem health. • Increase use of computer models to predict contaminant concentrations and sources.	• Health Canada • NRCan • DFO • Universities • Various NGOs	• Further development of Canada Wide Standards (CWS) for various air pollutants • Development of provincial policies to respond to CWS • Work with US partners to affect regulations and controls.

Coastal Development Total activities: 6 Departmental funding = 130 K Partner funding = 36 K					
Issues	***Current activities***	***Gaps***	***Desired Results***	***Partnership Arrangements***	***Opportunities***
The impact of uncontrolled and expanding coastal development , including forest harvesting, agriculture, coastal in-filling, highway construction, housing developments and growing tourism.	• Programs are directed toward enforcement, environmental assessment, municipal waste management, ecological effects monitoring and wildlife and wetland conservation • Assess environmental impacts of coastal development • Manage municipal and industrial wastes • Conduct ecological effects monitoring • Address wildlife and wetland conservation • Enforce legislation aimed at coastal environmental protection.	• Research • Monitoring • Involvement and support from community and government stakeholders • Research into ecological effects of human activities • Monitoring of trends and impacts.	• Maintain the health of the international watershed and marine zone through land-use planning. • Update and implement the Gulf of Maine Council Action Plan • Train/update a skill workforce in the event of an environmental emergency. • Reduce the human "footprint" in the BoF/GoM ecoregion	• NRCan • CCG • Alert Inc. • ACWERN • DFO • NBDOE • Dalhousie University • UNB-SJ • Acadian ACER	• Better advice on coastal and marine ecological changes. • Improve spatial description of tidal flats. • Better land-use planning on an ecoregion basis.