Overview of Current Governance In the Bay of Fundy / Gulf of Maine: Transboundary Collaborative Arrangements and Initiatives

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Oceans and Coastal Management Report 2006-05

Fisheries and Oceans Canada Pêches et Océans Canada

Canada

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Oceans and Coastal Management Report 2006-05

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September 2006

Correct Citation for this publication:

ACZISC Secretariat and Marine & Environmental Law Institute of Dalhousie University. 2006. Overview of Current Governance in the Bay Of Fundy / Gulf of Maine: Transboudary Collaborative Arrangements and Initiatives. Oceans & Coastal Mngt. Rep. 2006-05: vii + 132 pp.

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ACKNOWLEDGEMENTS

The authors wish to acknowledge the funding support of the Oceans and Coastal Management Division, Fisheries and Oceans Canada, Maritimes Region, and of the Social Sciences and Humanities Research Council through a project entitled, "Strengthening Canada's Regional Fisheries Management Arrangements in Light of Sustainability Principles."

The authors also would like to gratefully acknowledge the information and assistance provided by the following in the preparation of this document:

- Joe Arbour, Manager, Oceans and Coastal Management Division, Fisheries and Oceans Canada, Maritimes Region

  Bob Branton, Head, Atlantic Canadian Centre for Ocean Biodiversity Informatics, Fisheries and Oceans Canada, Maritimes Region
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SECTION 1
Introduction

The Gulf of Maine region encompasses approximately 170,000 square kilometres of ocean. It is a semi-enclosed sea bordered by the Provinces of Nova Scotia and New Brunswick and the States of Maine, New Hampshire and Massachusetts. On its seaward side, the underwater continental shelf formations of Georges Bank and Browns Bank separate the Gulf from the Atlantic Ocean beyond. Refer to the map of the Gulf of Maine watershed on page 3.

The physical characteristics of the Gulf of Maine help support a distinct and highly productive ecosystem. This ocean region supports a productive fishery along with many other valuable resources. These critical resources are managed by a large, distributed community of organizations with a wide variety of mandates and associated data management environments.

The area is rich in cooperative structures, agreements and governance mechanisms, so it is imperative that these are considered in future planning processes. The current state of affairs must first be understood to advance the priority of enhancing Canada/US collaboration set out in Canada's Oceans Action Plan (OAP) and to advance integrated management in the Bay of Fundy/Gulf of Maine.

The study summarizes current collaborative transboundary governance structures and mechanisms in the Bay of Fundy/Gulf of Maine region in seven sections: Marine Environmental Protection and Conservation; Regional Cooperation on Acid Rain, Mercury Pollution, Climate Change and Ocean Initiatives - New England Governors and Eastern Canadian Premiers; Fisheries and Shellfish Sanitation; Science Programs; Informatics and Geomatics; Non-governmental Organizations; and Shipping and Security. The study recognizes, however, that there may be other informal linkages, for example, at personal and private industry levels and state-provincial working relationships.

The main objective of this work was to prepare an overview of existing mechanisms from which Fisheries and Oceans Canada and other partners will be able to further develop integrated management in the area.

Introduction

La région du golfe du Maine représente une étendue océanique d'environ 170 000 kilomètres carrés, semi-fermée et délimitée du côté continental par les provinces de la Nouvelle-Écosse et du Nouveau-Brunswick ainsi que par les États du Maine, du New Hampshire et du Massachusetts. Du côté de la mer, les formations sous-marines du plateau continental sur le banc Georges et le banc de Brown séparent le golfe de l'océan Atlantique sur lequel il s'ouvre. Voir la carte du bassin hydrologique du golfe du Maine à la page 3.

En raison de ses caractéristiques physiques, le golfe du Maine dispose d'un écosystème distinct extrêmement productif. Cette région de l'océan contient de fructueuses ressources halieutiques ainsi que d'autres ressources précieuses. Toutes ces ressources essentielles sont gérées par un vaste ensemble d'organisations, aux mandats et aux systèmes de gestion de données connexes très variés.

On trouve dans cette zone abondance de structures de coopération, d'ententes et de mécanismes de gouvernance, dont il importe de tenir compte dans les processus de planification futurs. Il convient de comprendre d'abord la situation actuelle pour ensuite améliorer la collaboration canado-américaine, qui est une des priorités du Plan d'action pour les océans du Canada, et pour instaurer la gestion intégrée dans la baie de Fundy et le golfe du Maine.

La présente étude décrit sommairement les structures et mécanismes de gouvernance transfrontalière concertée qui sont en place dans la baie de Fundy et le golfe du Maine. Elle est divisée en sept parties, soit la protection et la conservation du milieu marin; la coopération régionale en matière de pluies acides, de pollution par le mercure, de changement climatique et d'initiatives concernant l'océan (gouverneurs des États de la Nouvelle-Angleterre et premiers ministres des provinces de l'est du Canada); la salubrité des stocks de poissons et d'invertébrés; les programmes scientifiques, l'informatique et la géomatique; les organisations non gouvernementales et la navigation et la sécurité. Il est entendu, toutefois, qu'il peut exister de nombreux autres domaines de collaboration moins structurée à l'échelle personnelle et à celle de l'industrie ou dans les relations entre États et provinces.

Cette étude visait principalement à recenser les mécanismes qui sont en place et sur lesquels le ministère des Pêches et des Océans et d'autres partenaires pourront se fonder pour œuvrer à la gestion intégrée dans cette zone.

GULF OF MAINE WATERSHED

SECTION 2

Marine Environmental Protection and Conservation

Authors: Emily Pudden, David VanderZwaag, Thea Lowry and Michelle Kellam, Marine & Environmental Law Institute, Dalhousie University

2.1 Gulf of Maine Council on the Marine Environment [1]

The maintenance and enhancement of the environmental quality of the Gulf of Maine ecosystem, to allow for its sustainable resource use by existing and future generations, is the mission of the Gulf of Maine Council on the Marine Environment. By the late 1980s, growing evidence of declining water quality, resource degradation and user conflicts in the Gulf of Maine emphasised the need for a more cooperative, Gulf-wide management regime to address shared environmental concerns.[2] In response, planners and resource managers from the Provinces of Nova Scotia and New Brunswick and the States of Maine, Massachusetts and New Hampshire formed the Gulf of Maine Working Group in August 1988.[3] The Working Group was convened for two primary purposes, to facilitate and improve communication among the jurisdictions on Gulf topics and to compile a set of recommendations for the sustainable management of the Gulf ecosystem.[4]

Among the initial undertakings of the Working Group was the publication of a report assessing the ecological health of the Gulf of Maine and highlighting its importance as a single, shared marine ecosystem.[5] The report examined the presence and effects of

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1 Section 2.2 is an excerpt of a report prepared by Emily Pudden under the supervision of Dr. David VanderZwaag, Marine & Environmental Law Institute, Dalhousie University, entitled "The Gulf of Maine Council on the Environment: A Review" which examines in detail the role and actions of the Gulf of Maine Council in promoting and facilitating cooperative, ecosystem-based management initiatives in the Gulf of Maine watershed. The 65-page document provides additional information, including details on the roles and activities of the Council's current and former Committees, the work of the Council's Task Forces and Panels, and the broader Council programs, workshops and conferences conducted outside the scope of the more focused Committees and Task Forces.

2 Larry Hildebrand, "The Canada-US Gulf of Maine Program: Bureaucrats without Borders" in Toni Weyman Droscher & David A. Fraser, eds., *2003 Georgia Basin/Puget Sound Research Conference Proceedings* (February 2004) 1 at 2.

3 Gulf of Maine Working Group, *Turning the Tide*, Vol. 1, No. 1 (Winter 1989).

4 Gulf of Maine Working Group, *Turning the Tide*, Vol. 1, No. 2 (Summer 1989).

5 Katrina Van Dusen & Anne C. Johnson Hayden, *The Gulf of Maine – Sustaining Our Common Heritage* (Augusta: Maine State Planning Office, 1989).

environmental stresses and recommended a cooperative, ecosystem-based approach to managing the Gulf's diverse uses.[6] The Working Group also organized a conference on Gulf of Maine issues. In December 1989, representatives from numerous provincial, state and federal agencies, along with members from academia, the scientific community, and the public, met in Portland Maine to review the recommendations made in the Working Group's report and to discuss suggestions for an action plan for the Gulf of Maine programme.[7] At the Conclusion of this "Sustaining Our Common Heritage Conference", the Governors and Premiers of the five Gulf jurisdictions signed the *Agreement on the Conservation of the Marine Environment of the Gulf of Maine*.

2.1.1 Gulf of Maine Agreement

Although not legally-binding, given the states' and provinces' constitutional restrictions on making international commitments, the Gulf of Maine Agreement represents a commitment by State and Provincial governments to cooperate in addressing environmental issues in the Gulf of Maine.[8] Under the terms of the Agreement, the Parties pledged to establish the Gulf of Maine Council on the Marine Environment "to discuss and act upon environmental issues of common concern".[9] Among the topics to be addressed by the Council are ecosystem protection, pollution, sustainable resource use and the development of cooperative management programmes.[10] The Council was also charged with the preparation of an Action Plan, setting out environmental trends and conditions and providing specific recommendations for resource management, within 15 months of its appointment.[11] The Agreement further provides that the Parties will develop a coordinated monitoring program for the Gulf to assist managers in making informed decisions.[12] Finally, the signatory governments commit to work towards improving the environmental quality and sustainability of Gulf resources.[13]

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6 *Ibid*.
7 Gulf of Maine Working Group, *supra* note 3.
8 Allen L. Springer, "North American Transjurisdictional Cooperation: The Gulf of Maine Council on the Marine Environment" *Canadian-American Public Policy* (April 2002) at 12.
9 *Agreement on Conservation of the Marine Environment of the Gulf of Maine Between the Governments of the Bordering States and Provinces*, Article 1, printed in Gulf of Maine Council on the Marine Environment, *The Gulf of Maine Action Plan 1991-2000* (1991), Appendix.
10 *Ibid.,* at Art. 1.
11 *Ibid.,* at Art. 3.
12 *Ibid.,* at Art. 5.
13 *Ibid.,* at Art. 4.

2.1.2 Gulf of Maine Council

The Gulf of Maine initiative represents a cooperative effort to increase knowledge and understanding of the Gulf's resources and to develop action plans to be implemented by the participating states and provinces.[14] In its capacity as the initiative's policy-making body, the Gulf of Maine Council functions as a regional forum for exchanging information and engaging in long-term planning.[15] Councillors meet twice a year to set policy objectives, convene partnerships, and marshal the resources necessary to implement the programme's goals.[16] In carrying out these tasks, the Council partners with government agencies, environmental organisations, researchers, businesses and the public to sponsor research and education initiatives throughout the Gulf of Maine.[17] The Council also plays an important role in educating the public and raising awareness of the value of the Gulf of Maine ecosystem.[18] The Council's mission statement is "to maintain and enhance environmental quality in the Gulf of Maine to allow for sustainable resource use by existing and future generations".[19]

The Gulf of Maine Agreement originally called for two Council representatives from each of the five Gulf jurisdictions. In June 1992, the Agreement was amended to expand Council membership and each jurisdiction nominated an additional Councillor to represent the private sector. Currently, each Governor or Premier appoints two senior level government representatives and two non-profit or business sector representatives to serve on the Council.[20] Since 1992, federal agencies have also participated in Council meetings.[21] Space is also reserved on the Council for a senior member of the scientific community from each country who resides within the watershed and a tribal representative, nominated by the First Nations community.[22] The Secretariat, which rotates annually through the five Gulf of Maine jurisdictions, is responsible for all of the Council's administrative, organisational, and reporting needs.[23]

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14 Gulf of Maine Working Group, *supra* note 3.

15 Gulf of Maine Council on the Marine Environment, "About the Council: Overview", online at http://www.gulfofmaine.org/council/.

16 Hildebrand, *supra* note 2 at 2.

17 Gulf of Maine Council on the Marine Environment, *Gulf of Maine Times*, Vol. 2, No. 2 (Summer 1998), online at http://www.gulfofmaine.org/times/summer98/index.html.

18 Hildebrand, *supra* note 2 at 2.

19 Gulf of Maine Council on the Marine Environment, *supra* note 15.

20 Gulf of Maine Council on the Marine Environment, *Council Meeting, Forum, and Awards Reception June 5-7, 2006,* Briefing Document, Version 1 (May 30, 2006) at 27.

21 Gulf of Maine Council on the Marine Environment, *Gulf of Maine Times*, Vol. 3, No. 4 (Winter 1999), online at http://www.gulfofmaine.org/times/winter99/index.html [*Gulf of Maine Times*].

22 Gulf of Maine Council on the Marine Environment, *supra* note 20 at 27.

23 Gulf of Maine Council on the Marine Environment, *Gulf of Maine Times*, Vol. 1, No. 2 (Summer 1997), online at http://www.gulfofmaine.org/times/summer97/index.html.

The Council's operating budget is composed of annual contributions from the five participating Gulf States and Provinces.[24] Canadian federal Council participants also provide funds towards the Council's annual budget.[25] Numerous American federal agencies, including the US Environmental Protection Agency (EPA) and National Oceanic and Atmospheric Administration (NOAA), have funded Council actions through project-specific grants.[26] Canadian and American government departments provide both monetary and in-kind support, contributing staff time and other resources to Council activities.[27] As an additional means of fund-raising, charitable corporations have been established in both Canada and the United States.

The Council relies on participatory, consensus-based decision-making to achieve its aims. Council decisions are non-binding; instead emphasis is placed on voluntary cooperation in an effort to harmonize management goals and approaches among the five Gulf jurisdictions.[28] The programme aligns itself with existing, similarly oriented policies and projects and works to build on these initiatives.[29] Efforts are also undertaken to integrate Gulf of Maine programme objectives into governmental agendas as a means of garnering resources to carry out gulf-related projects.[30]

2.1.3 Gulf of Maine Working Group

The Working Group continues to play an important role in the Gulf of Maine management regime. The Council relies on the Working Group to conduct strategic planning, prepare policy options, and develop annual work programs and budgets for Council activities.[31] The Working Group is also responsible for approving and overseeing the work plans and operations of the Council's Committees.

The Working Group meets quarterly in one of the participating jurisdictions. Membership in the Group includes one representative for each state, provincial and federal Council member, in addition to the Canadian and US co-chairs of each Council Committee.[32] Although federal involvement in the Working Group was initially restricted to observer status, representatives from numerous federal agencies have participated as full members of the Working Group since 1990.[33]

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24 Springer, *supra* note 8 at 14.
25 *Gulf of Maine Times*, *supra* note 21 at 7.
26 *Ibid*.
27 *Ibid*.
28 Aldo Chircop, David VanderZwaag & Peter Mushkat, "The Gulf of Maine Agreement and Action Plan: A novel but nascent approach to transboundary marine environmental protection" (1995) 19 Marine Policy 317 at 325.
29 Gulf of Maine Working Group, *supra* note 3.
30 Chircop *et al.*, *supra* note 28 at 328.
31 Gulf of Maine Council on the Marine Environment, "About the Council: Working Group", online at http://www.gulfofmaine.org/council/committees/working_group.asp.
32 *Ibid*.
33 Springer, *supra* note 8 at 16.

2.1.4 Gulf of Maine Committees and Task Forces

The Committees are responsible for implementing the goals of the Council's Action Plan by developing and carrying out relevant projects. The Committees report quarterly to the Working Group.[34] Committee membership is composed of representatives from state, provincial and federal departments and agencies, as well as private individuals and public interest groups with expertise in relevant areas.[35] Each Committee is co-chaired by a Canadian and US member.

In June 2006, Council members approved a reorganization of the Gulf of Maine Council Committee structure to coincide with the development of the new 2006-2011 Action Plan.[36] The revised configuration is composed of:

Committees

1. Habitat Committee
    - Habitat Restoration Subcommittee
    - Habitat Monitoring Subcommittee
    - Habitat Conservation Subcommittee
    - Gulf of Maine Mapping Initiative (GOMMI) – refer to Section 6.2 on page 111
2. Contaminants Committee
    - Contaminants Monitoring Subcommittee
    - Gulfwatch Subcommittee – refer to Section 6.3 on page 113
    - Sewage Subcommittee
3. Maritime Activities Committee
    - Bi-valve Harvesting Industry Subcommittee
    - Energy Subcommittee
    - Sustainable Tourism Subcommittee
4. Ecosystem Indicator Partnership (ESIP) – refer to Section 6.4 on page 114
5. Climate Change Network

Internal Technical Support

1. Outreach Management
2. Information Management
3. Project Evaluation

Numerous Task Forces and Panels address key issues relevant to the Committees' and Council's work.

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[34] Gulf of Maine Council on the Marine Environment, "Committees and Task Forces: Overview", online at http://www.gulfofmaine.org/council/committees/.

[35] Chircop *et al.*, supra note 28 at 326.

[36] Gulf of Maine Council on the Marine Environment, "The Gulf of Maine Council on the Marine Environment Reference Handbook: Organizational Chart", online at http://www.gulfofmaine.org/council/internal/rh/gomcorgchart.pdf.

2.1.5 Gulf of Maine Council Action Plans

The *Gulf of Maine Agreement* sets out a requirement for the Council to prepare an Action Plan to guide its management and research initiatives in the Gulf of Maine. The Council has published three Action Plans over the course of its seventeen years in existence and is currently working on a fourth. Each Action Plan sets out the Program's goals, strategies, and priority objectives for dealing with shared, transboundary environmental issues, allowing managers, researchers, and decision-makers in the Gulf of Maine region to coordinate their efforts in addressing these concerns. In turn, the Council promotes the objectives through the work of its Committees and by supporting complementary activities undertaken by other Gulf of Maine agencies and organisations.

Action Plan 1991-2000

The Gulf of Maine Council's first Action Plan was published in July 1991.[37] The ten-year plan focused on five priority issues:

1. Monitoring and research
2. Coastal and marine pollution
3. Habitat protection
4. Public education and participation
5. Protection of public health

These topics were derived from recommendations made during the *Gulf of Maine – Sustaining Our Common Heritage Conference* held in Portland, Maine in 1989.[38] In the Plan, priority objectives and actions were set out for each of the five categories. Among the projects initiated under the 1991-2000 Action Plan were the Gulfwatch monitoring program, marine debris reduction schemes, the identification of regionally significant species and habitats, and the publication of a Program newsletter.

Action Plan 1996-2001

In 1994, the Council began the process of reviewing and revising its initial Action Plan by hosting the second *Sustaining Our Common Heritage Conference*. The new Action Plan was finally published in 1996.[39] With this five-year plan, the Council narrowed the scope of the Gulf of Maine Program to focus primarily on coastal and marine habitat protection issues. As with the earlier Plan, five priority objectives were identified:

1. Protect and restore regionally significant coastal habitats
2. Restore shellfish habitats
3. Protect human health and ecosystem integrity from toxic contaminants in marine habitats

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[37] Gulf of Maine Council on the Marine Environment, *The Gulf of Maine Action Plan 1991-2000* (1991).

[38] *Ibid*., at 6.

[39] Gulf of Maine Council on the Marine Environment, *Action Plan: 1996-2001* (1996), online at http://www.gulfofmaine.org/council/publications/action_plan1996-2001.pdf.

4. Reduce marine debris
5. Protect and restore fishery habitats and resources.

The Plan emphasised the importance of developing partnerships and building upon existing programs in developing projects to address these habitat goals.[40] For each of the five topics, the Plan outlined the role the Council would play in approaching the issue, measurable objectives required to achieve the goal, and specific strategies and actions for meeting each objective.

Action Plan 2001-2006

The 2001-2006 Council Action Plan was published in 2002.[41] The Plan is organized around three principal goals, the protection and restoration of coastal and marine habitats, the protection of human health and ecosystem integrity, and the promotion of sustainable maritime activities. As with the earlier documents, the Plan emphasises the importance of partnerships and focuses on transboundary environmental concerns requiring coordinated efforts across jurisdictional boundaries.[42]

Summary of the 2001-2006 Goals and Objectives [43]

Goal 1: Protect and restore coastal and marine habitats

Objectives:

- Increase awareness and improve management of regionally significant habitats
- Increase habitat protection
- Increase habitat restoration
- Increase awareness and improve management of aquatic nuisance species
- Enhance citizen stewardship.

Goal 2: Protect human health and ecosystem integrity

Objectives:

- Increase awareness and improve management of priority contaminants
- Identify reduction strategies for priority contaminants
- Enhance citizen stewardship.

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40 *Ibid*., at viii.

41 Gulf of Maine Council on the Marine Environment, *Action Plan 2001-2006* (2002), online at http://www.gulfofmaine.org/council/action_plan/action_plan2001-06.pdf.

42 *Ibid*., at 8.

43 *Ibid*., at 13.

Goal 3: Encourage sustainable maritime activities

Objectives:

- Create and implement a marine research and monitoring strategy that responds to pressing management issues and supports regional economic development
- Develop and implement a nature-based tourism strategy that sustains the environment and the well-being of local people.

Action Plan 2006-2011

The Council is currently updating its five-year Action Plan to guide the Council's policy and funding initiatives for the period 2006 to 2011. Three goals are being considered: Protect and Restore Habitat, Support Ecosystem and Human Health, and Support Vibrant Communities. The Council sought advice on these draft goals and long-term outcomes via, among other means, a brief web-based survey.[44]

Summary of the Proposed 2006-2011 Goals and Objectives

Goal 1: Protect and restore coastal and marine habitats to a healthy, productive and resilient condition.

Long-term Objectives:

- The adverse effect of marine invasive species on the coastal environment is minimized
- Support the desired functions and values of impaired regionally significant coastal habitats
- Land-based activities are not adversely affecting regionally significant coastal habitats
- Regionally significant marine habitats are managed in a way that maintains ecological integrity.[45]

Goal 2: Improve environmental conditions in the Gulf of Maine to support ecosystem and human health.

Long-term Objective:

- Environmental conditions of the marine environment improve as contaminant releases are reduced.[46]

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[44] Gulf of Maine Council on the Marine Environment, *supra* note 20, at 22.

[45] Gulf of Maine Council on the Marine Environment, "Goal 1: Protect and Restore Habitat (DRAFT)" (August 6, 2006) [copy on file with the authors].

[46] Gulf of Maine Council on the Marine Environment, "Goal 2: Environmental and Human Health (DRAFT)" (August 6, 2006) [copy on file with the authors].

Goal 3: Gulf of Maine coastal communities are vibrant and have marine-dependent industries that are healthy and globally competitive.

Long-term Objectives:

- Vibrant coastal communities are supportive of marine-dependent industries and the industries are implementing innovative best practices that position them favourably for the future
- Marine dependent industries are sustainable and competitive in global markets.[47]

2.2 North American Commission for Environmental Cooperation

Established pursuant to the North American Agreement on Environmental Cooperation[48], the North American Commission for Environmental Cooperation (CEC) has had a limited direct focus on the Gulf of Maine region, but the Commission is relevant to transboundary cooperation and understanding through its informational, recommendary, and potential roles. The CEC's most direct influence on the Gulf of Maine has been through a pilot project, launched in 1996, to promote the regional implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA).[49] The CEC has played an important informational role by documenting pollutant releases/transfers in North America, some of which may impact the Gulf of Maine region through long-range transport; by tracking health trends linked to pollutants in North America; and by responding to citizen complaints for lack of effective enforcement of environmental laws. The CEC, given a broad mandate to develop recommendations including transboundary issues such as long-range transport of air and marine pollutants,[50] has been particularly active in developing recommendary actions to address chemicals of regional concern and has also considered the threats posed by aquatic invasive species. The CEC has potential

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47 Gulf of Maine Council on the Marine Environment, "Goal 3: Support Vibrant Communities (DRAFT)" (August 14, 2006) [copy on file with the authors].

48 17 December 1993, 32 I.L.M. 1480 (1993).

49 United Nations Environment Programme, UNEP(OCA)/LBA/IG.2/7 (December 5, 1995).

50 The Council, the governing body of the Commission and consisting of environmental ministry/agency heads in the three countries, is given a broad scope to develop recommendations pursuant to Article 10 of the North American Agreement on Environmental Cooperation. For example, recommendations may be developed regarding: pollution prevention techniques and strategies; common indicators for reporting on the state of the environment; the use of economic instruments; scientific research and technology development in the environmental field; promotion of public environmental awareness; harmful exotic species; the conservation and protection of wild flora and fauna; the protection of endangered and threatened species; environmental emergency preparedness and response; human resource training; approaches to environmental compliance and enforcement; eco-labelling; and other matters as the Council may decide.

to affect transboundary cooperation in the region on various fronts[51] including through the North American Marine Protected Areas Network initiative and through the Marine Species of Common Conservation Concern (MSCCC) project.[52]

2.2.1 Gulf of Maine Pilot Project on Implementing the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities

Through a three-year funding commitment, the CEC initiated in 1996 a pilot project to assist GPA implementation in the Gulf of Maine region with four major bi-national workshops as key activities.[53] An initial workshop in Durham, New Hampshire, November 20-22, 1996 introduced about 45 representatives from the two countries to the GPA methodology and allowed discussions on how the GPA might be implemented in the region.[54]

A second workshop held in Saint John, New Brunswick, April 27-29, 1998 involving more than 100 participants, developed a consensus on a list of priority pollutant and habitat issues needing to be addressed on a regional basis. Seven pollutants for priority action included: pathogens, biocides, dioxins/furans, mercury, polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons and nitrogen. The eight major habitat issues identified were: development adjacent to and disruptive of coastal habitats; sewage and eutrophication in coastal waters; use of mobile fishing gear in estuaries and coastal embayments; protection and restoration of salt marsh; tidal and freshwater

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51 Since the Commission's operational and strategic plans do not specifically mention the Gulf of Maine, it seems likely that at least in the near future the CEC projects will largely be of indirect importance to the region, for example, by promoting transboundary cooperation on developing renewable energy capacities and trade in energy. See CEC, Operational Plan of the Commission for Environmental Cooperation 2006-2008 and CEC, Looking to the Future: Strategic Plan of the Commission for Environmental Cooperation 2006-2010, online at http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=1967.

52 This section of the report does not discuss the North American Bird Conservation Initiative (NABCI), launched by the CEC in 1999, since only a three-year funding period was provided. For a discussion, refer to page 35 of this report.

53 Various other bi-national meetings and topic specific workshops were also promoted, such as a workshop to explore how to inventory and monitor existing and potential tidal marsh restoration sites in the Gulf region. See H.A Neckles and M. Dionne (eds), Regional Standards to Identify and Evaluate Tidal Wetland Restoration in the Gulf of Maine, Wells National Estuarine Research Reserve Technical Report, Wells, Maine (2002). For a further description of bi-national measurable achievements, see The Gulf of Maine Pilot Project and The Bight of the California's Pilot Project, Implementing the Global Programme of Action in North America: Lessons Learned from Two Pilot Projects (Montreal: Commission for Environmental Cooperation, undated) 7-8.

54 For a workshop summary as well as a background paper for the workshop, see Judith Pederson and David VanderZwaag, Sustaining Resources in the Gulf of Maine: Toward Regional Management Actions Working Paper (Montreal: Commission for Environmental Cooperation, 1997).

hydraulic obstructions; impacts of aquaculture on habitats; harvesting of low trophic-level species; and absence of "no-take" reserves.[55]

A third workshop held in Portland, Maine, November 15-17, 1998, brought about 140 participants together to propose strategies and actions to address priority pollutant and habitat issues.[56] For example, in relation to addressing toxics, the workshop among other actions called for preparation of a booklet "50 Ways to Save the Gulf of Maine" to educate area residents on concrete measures to protect water quality, for example, using non-toxic household cleaners.[57] Workshop participants also called for the convening of a workshop to explore international agreements/arrangements for managing toxic chemicals and possible ways to strengthen bilateral arrangements for reducing toxics.[58]

A fourth workshop, "Exploring Transboundary Arrangements for Management of the Gulf of Maine Ecosystem: Focus on Sewage, Toxics and Coastal Development", was held in Saint John, New Brunswick, June 17-20, 2000. Approximately 50 participants reached a general agreement about the need for improved arrangements between Canada and the United States to address sewage, toxics and coastal development around the Gulf of Maine. Participants recommended that the use of existing institutional arrangements be maximized to deal with the priority issues and that the Gulf of Maine Council for the Marine Environment should incorporate the priority issues into their existing action plan. The Workshop also recommended that support should be sought for a formal request by the Canadian and US governments for an International Joint Commission reference which would investigate and report on the adequacy of existing measures and arrangements for maintaining the integrity of the Gulf of Maine ecosystem.[59] Subsequent efforts to gain support for a reference were not successful.

The CEC pilot project was successful in organizing a core group of representatives from each country, the Global Programme of Action Coalition for the Gulf of Maine (GPAC), which not only assisted with regional workshop planning efforts but also continued with various regional project activities and initiatives after the CEC's pilot funding ended. For example, GPAC was one of the organizers of the Gulf of Maine Summit held in St. Andrews, New Brunswick in October 2004 which largely focused on discussing and evaluating ecosystem health indicators relating to three high-priority concerns in the

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55 Global Programme of Action Coalition for the Gulf of Maine, Protecting the Gulf of Maine from Land-based Activities Workshop I: Issues, Priorities and Actions, Workshop Report (Montreal: Commission for Environmental Cooperation, 1998).

56 Global Programme of Action Coalition for the Gulf of Maine, Protecting the Gulf of Maine from Land-based Activities Workshop II: Developing Strategies and Actions, Workshop Report (Montreal: Commission for Environmental Cooperation, 2000) [Workshop II Report].

57 *Ibid.* at 7. The booklet, aimed at school children, was completed by J.A. Percy in 2002 with a list of things to do and not to do in order to protect the Gulf and is online at http://www.gpac-gom.org/Task%20Groups/50%20Ways/webbook.pdf.

58 Workshop II Report, *supra* note 56, at 7-8.

59 Draft Minutes of the GPA Orientation Session and the Seventh Meeting of the Global Program of Action Coalition for the Gulf of Maine (GPAC), St. Andrews, New Brunswick, May 9-11, 2001, Appendix E, Project Reports.

Gulf region – land-use, contaminants and pathogens, and fisheries and aquaculture.[60] The future of GPAC, made up of about 40 individuals from governments, research and academic institutions, industry, NGOs, First Nations of Canada and Native American tribes, remains uncertain in light of funding limitations and the completion of the CEC pilot project.[61] GPAC presently exists as a network of contacts rather than an actual committee.[62]

2.2.2 CEC Informational Role

Under the Pollutants and Health Program area, the CEC has substantially increased information about North American sources of pollutant releases, levels of emissions and potential impacts on children's health and the environment, although the various project reports and studies have not specifically addressed the Gulf of Maine region.[63] One of the leading areas for cooperation has been to track the quantities of chemicals released from industrial facilities into the air, water and land or transferred offsite. In October 2005, the CEC Executive Director announced a revised Action Plan to Enhance the Comparability of Pollutant Release and Transfer Registers in North America[64] and the three countries have continued to work at harmonizing their chemical reporting systems, for example, in the areas of reporting thresholds, chemical lists, and exemptions. An annual report, *Taking Stock*[65] summarizes the matching data on chemical releases and transfers and the report issued in July 2006[66] provides continued grounds for concern about transboundary pollutants. In 2003, of the almost 3 million tonnes of chemicals released and transferred in North America, nearly one-quarter, 733,700 tonnes, were released into the air at facility sites.[67] Almost 11 percent of all releases were chemicals known or suspected to be carcinogens and over 8 percent of all releases were chemicals known to cause reproductive or developmental harm.[68] Such reported releases do not include many sources of chemical releases, such as gas stations, cars,

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60 P. King and C. MacKenzie (eds), *Gulf of Maine Summit: Committing to Change, Summit Report* (Gulf of Maine Council on the Marine Environment and the Global Programme of Action Coalition for the Gulf of Maine, 2005), online at http://www.gulfofmainesummit.org.

61 The list of GPAC members was last updated in February 2002 and is online at http://www.gpac-gom.org/members/gpaccon.html.

62 William Borland, former GPAC Canadian Co-chair, personal communication, 10 May 2006.

63 Since the region is known to be one of the "transportation corridors" for transboundary atmospheric pollutants, the general information should nevertheless be of substantial regional concern. See Commission for Environmental Cooperation, Continental Pollutant Pathways: An Agenda for Cooperation to Address Long-Range Transport of Air Pollution in North America (Montreal: Commission for Environmental Cooperation, 1997).

64 Online at http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=1830.

65 Past volumes, going back to 1994, are online at http://www.cec.org/takingstock.

66 The report is the tenth of a series and covers releases in 2003. Commission for Environmental Cooperation, *Taking Stock: 2003 North American Pollutant Releases and Transfers* (Montreal: Commission for Environmental Cooperation, 2006).

67 *Ibid.* at xvii.

68 *Ibid.* at xx.

trucks, farms, retail shops or natural sources, such as forest fires.[69] Thousands of chemicals in commerce fall outside the reporting process.[70]

The Cooperation on North American Air Quality Issues project of the CEC has also generated information relevant to transboundary air pollution.[71] A 2004 report provides details on fossil fuel power plant air emissions for the year 2002 from Canada, Mexico and the United States.[72] The report covers plant-by-plant emissions of three key pollutants: sulphur dioxide, nitrogen oxide and mercury and also reports on releases of carbon dioxide from the power plants.[73] For example, power plants burning coal, 22 in Canada, 3 in Mexico and 376 in the United Sates, were estimated to have emitted 1,986 kg, 1,025 kg and 44,231 kg of mercury respectively.[74] A three-country comparative study of air quality and climate change regulatory and planning approaches has also been completed.[75]

A further information base has been fostered through the CEC's Cooperative Agenda for Children's Health and the Environment in North America.[76] A January 2006 report provides overviews of how North American children are faring in three priority areas, asthma and respiratory disease, effects of exposure to lead and other toxic substances and waterborne diseases. The report also suggests 13 indicators for measuring the status of children within the three areas of priority concern.[77] Among the indicators are prevalence of childhood asthma which has been increasing in North America,[78] blood levels of lead in children and the number of cases of childhood illnesses (morbidity) attributed to waterborne diseases.

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69 *Ibid.* at xv.

70 Only a limited number of chemicals must be reported to the Toxics Release Inventory (TRI) of the United States (about 650), the National Pollutant Release Inventory (NPRI) in Canada (over 260) and the *Registro de Emisiones y Transferencia de Contaminantes* (RETC) in Medico (about 100), while tens of thousands of chemicals are estimated to be in commerce. *Ibid.* at 10.

71 For a project overview, see CEC, Cooperation on North American Air Quality Issues online at http://www.cec.org/programs_projects/pollutants_health/project/index.cfm?projectID=22.

72 Paul J. Miller and Chris Van Atten, *North American Power Plant Air Emissions* (Montreal: Commission for Environmental Cooperation, 2004).

73 *Ibid.* at 2.

74 *Ibid.* at 3.

75 Commission for Environmental Cooperation, North American Air Quality and Climate Change Standards, Regulations, Planning and Enforcement at the National, State/Provincial and Local Levels (Montreal: Commission for Environmental Cooperation, 2004).

76 The Agenda was adopted through Council Resolution 02-06 of June 19, 2002.

77 Commission for Environmental Cooperation, Children's Health and the Environment in North America: A First Report on Available Indicators and Measures (Montreal: Commission for Environmental Cooperation, 2006) at xiv.

78 In Canada, the percentage of boys aged eight to 11 diagnosed with asthma increased from approximately 16 percent in 1994/1995 to about 20 percent in 1998/1999. In Mexico, 35 children out of every 10,000 aged five to 14 years had asthma in 2002, up from 28 per 10,000 in 1998. In the United Sates, over the period 1980 to 1995, the percentage of children with asthmas doubled. *Ibid.* at xvi.

A May 2006 report reviewed the health endpoints for children that may result from environmental pollution, including: cancer; learning, developmental and behavioural disabilities; birth defects; impaired endocrine function; and respiratory problems, such as asthma.[79] The report broke new ground in moving away from ranking toxic chemicals according to the volume of releases to their toxic equivalency potentials (TEPs).[80] For example, carbon tetrachloride was ranked # 1 in terms of toxic potential although ranked # 18 in terms of amounts for on-site air releases while lead and its compounds were ranked # 2 even thought they ranked # 11 in terms of release amounts.[81]

A further route for CEC information relevant to the Gulf of Maine is the citizen complaint procedure set out in Articles 14 and 15 of the North American Agreement on Environmental Cooperation.[82] Section 14 allows any non-governmental organization or person to file a submission with the CEC Secretariat that a Party is failing to effectively enforce its environmental laws. Article 15 authorizes the Secretariat to prepare a factual record if the Council by a two-thirds vote instructs it to do so and the Council may by a two-thirds vote make the final factual record publicly available. While most of the factual records published by the CEC by January 2006 were concerned with non-marine issues[83], a few have informational implications for the Gulf of Maine region. A submission by various environmental organizations that Canada has not effectively enforced its laws against pulp and paper pollution, primarily in Quebec and the Atlantic provinces, includes an allegation that the Irving pulp mill in Saint John, New Brunswick has not been subject to effective enforcement.[84] A submission by various Canadian and US NGOs regarding the failure of the United States to effectively enforce the federal *Clean Water Act* against coal-fired power plants for mercury emissions also holds

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79 Commission for Environmental Cooperation, *Toxic Chemicals and Children's Health in North America: A Call for Efforts to Determine the Sources, Levels of Exposure, and Risks that Industrial Chemicals Pose to Children's Health* (Montreal: Commission for Environments Cooperation, 2006).

80 The methodology, using "benzene equivalents" for weighing suggested or known carcinogens and "toluene equivalents" for non-cancer effects, is described in Appendix D of the report. *Ibid.*

81 *Ibid.* at 23.

82 The Citizen Submissions and factual records are online at http://www.cec.org/citizen.

83 For example, in January 2006, the CEC Secretariat published its eleventh factual record which concerned alleged illegal logging in the Sierra Tarahumara Mountains of Western Chihuahua, Mexico. See CEC, Activity Report June 2006 (Montreal: Commission for Environmental Cooperation, 2006).

84 Submissions by Friends of the Earth, Union Saint-Laurent, Grands Lacs, Conservation Council of New Brunswick, Ecology Action Centre and Environment North, May 6, 2002. On June 28, 2006 the CEC Secretariat submitted the final factual record to the Council and the Council may, by a two-thirds vote, make the factual record publicly available; normally within 60 days following its submission. CEC, "CEC Secretariat provides Council with the final factual record on Pulp & Paper", online at http://www.cec.org/news/details/index.cfm?varlan=english&ID=2714.

promise to shed informational insight on the regulation of US coal-burning power plants.[85]

2.2.3 CEC Recommendary Role

In light of concerns over the transboundary transport of persistent toxic substances, the CEC Council launched the Sound Management of Chemicals (SMOC) initiative in 1995[86] and tasked a Working Group to develop North American Regional Action Plans (NARAPs) setting out recommendary actions for reducing risks.[87] Three NARAPs have been completed for DDT, chlordane and PCBs.[88] Two other regional action plans – on mercury, and dioxins/furans/hexachlorobenzene - are in the process of being implemented.[89] Actions to address mercury include, among others; the use of regulatory and voluntary initiatives towards attaining a 50 percent reduction nationally in mercury emissions by the year 2006 from existing major stationary sources based on 1990 or equivalent emissions inventories;[90] investigation of options and strategies to reduce mercury emissions from the electric power generating sector;[91] support for programs to encourage the substitution or phase-out of mercury use in products or processes;[92] work with the automotive vehicle and equipment manufacturing sector to assist in the removal of mercury containing devices prior to scrapping or recycling operations;[93] and collaborate in developing a transnational strategy for achieving the goal of virtual elimination of mercury-containing waste from the health care sector waste stream (including from dental care).[94]

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85 The Secretariat informed the Council on December 5, 2005 that the submission warrants the development of a factual record. See CEC, Citizen Submission on Enforcement Matters, Coal-fired Power Plants, online at http://www.cec.org/citizen/submissions/details/index.cfm?varlan=english&ID=103.

86 Pursuant to CEC Council Decision 95-05 on the Sound Management of Chemicals.

87 The Sound Management of Chemicals Working Group, according to Decision 95-05, is to be comprised of two senior officials selected by each Party whose duties pertain to the regulation or management of toxic substances.

88 Copies of the Regional Action Plan are online at http://www.cec.org/programs_projects/pollutants_health/smoc/smoc-rap.cfm?varlan=english. As a result of the action plans, the use of chlordane has been reportedly eliminated and the production and use of DDT has also been eliminated in North America.

89 Commission for Environmental Cooperation, Working Draft for Public Input: The CEC SMOC Working Group Strategy until 2020 under the Public Priority Areas (Draft April 18, 2006) at 10. A regional action plan for lindane has been drafted but implementation of the plan has yet to be approved by the Parties.

90 North American Implementation Task Force on Mercury, North American Regional Action Plan on Mercury Phase II (16 March 2000) at Action item 1a.

91 *Ibid.*, Action item 1b.

92 *Ibid.*, Action item 2a.

93 *Ibid.*, Action item 2b.

94 *Ibid.*, Action item 2g.

The SMOC initiative appears likely to undergo major shifts in the future. The SMOC Working Group is proposing to move from an individual chemical to a group-of-chemicals or sector approach and to develop Strategies for Catalyzing Cooperation instead of NARAPs.[95] Increased coordination with other regional chemical initiatives is also proposed, for example with the NAFTA Technical Working Group on Pesticides and the North American Free Trade Agreement Working Group.[96]

The CEC has also held workshops and meetings[97], and initiated studies/reviews[98] under a project entitled "Closing the Pathways of Aquatic Invasive Species across North America." A 2001 Workshop on Preventing the Introduction and Spread of Aquatic Invasive Species in North America recommended five priority areas for trilateral cooperation in addressing invasive alien species from such sources as ship ballast-water, live bait and aquarium releases and aquaculture escapes.[99] The five recommended priorities were:

> Identify invasive species and invasive pathways of common continental concern;
> Develop a North American Invasive Species Information Network;
> Develop and distribute tools for raising awareness and empowering decision-makers;
> Identify tools to provide economic incentives to engage the industrial and economic sectors;
> Create a regional directory of legal institutions and frameworks for the three North American countries.[100]

2.2.4 CEC Potential Roles

Two initiatives under the CEC's Strategic Plan for North American Cooperation in the Conservation of Biodiversity[101] are potentially relevant to the Gulf of Maine region in light of their marine focus, the North American Marine Protected Areas Network (NAMPAN) and the Marine Species of Common Conservation Concern (MSCCC) project.

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95 CEC, *supra* note 89, at 14.

96 *Ibid.* at 15.

97 As of January 2004, the CEC had held three meetings/workshops on invasive alien species. See Jamie K. Reaser, Closing the Pathways of Aquatic Invasive Species across North America: Overview and Resource Guide (Montreal: Commission for Environmental Cooperation, 2003) at 3.

98 See for example, Meinhard Doelle, Legal and Policy Responses to Invasive Species: Background Paper (Montreal: Commission for Environmental Cooperation, 2001).

99 CEC, Preventing the Introduction and Spread of Aquatic Invasive Species in North America: Workshop Proceedings, 28-30 March 2001 (Montreal: Commission for Environmental Cooperation, 2001).

100 *Ibid.* at 56-57.

101 The Plan was launched in 2003. See http://www.cec.org/files/PDF/BIODIVERSITY/Biodiversitystrategy.pdf [Strategic Plan].

Northern American Marine Protected Areas Network

Including over 250 stakeholders, the North American Marine Protected Areas Network (NAMPAN) was established under the CEC with an aim to identify priority conservation areas (PCAs) in North America that should be considered for protection in light of shared marine migratory species crossing national boundaries.[102] While the CEC has identified the greater Gulf of Maine as a priority conservation region,[103] the Network has focused initial efforts on the Pacific Coast of North America.[104] A book and map identifying 28 aquatic environments that marine experts consider essential to safeguarding biological diversity off the West Coast of North America were published in 2005.[105] While NAMPAN has no current focus on the Gulf of Maine region, the potential exists for future extension of initiatives into the region.

Marine Species of Common Conservation Concern

To facilitate the conservation of marine and terrestrial species of common concern, Canada, Mexico and the United States have agreed upon an initial set of six species (three marine and three terrestrial) for which North American Conservation Action Plans (NACAPs) would be developed,[106] but initial planning efforts for marine species have initially focused on the Pacific Coast. The pink-footed shearwater (*Puffinus creatopus*), a seabird having a range from Chile to Alaska in the Eastern Pacific is the subject of one of the NACAPs[107] and the Pacific leatherback sea turtle (*Dormochelys coriacea*) is the subject of another.[108] The original action plan covering the humpback whale (*Megaptera novaeangliae*), while noting the Atlantic Ocean range and feeding of humpbacks in the Gulf of Maine region in particular,[109] focuses on conservation concerns in the Baja to Bering Region of the Pacific.[110]

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[102] CEC, "The North American Marine Protected Areas Network… Doing together what cannot be done alone", online at http://www.cec.org/files/pdf/BIODIVERSITY/NA-MPA-Network.pdf. NAMPAN is also a mechanism for sharing national information and experiences relating to the protection of marine biodiversity.

[103] Strategic Pan, *supra* note 101 at 11.

[104] CEC, "North American Marine Protected Areas Network Action Plan: Draft Framework" (03 Mar 2004), online at http://www.cec.org/files/PDF/BIODIVERSITY/NAMPAN-FRAMEWORK_en.pdf at 2.

[105] The documents are online at http://www.cec.org/news/details/index.cfm?varlan=english&ID=2672.

[106] CEC, North American Conservation Action Plans, online at http://www.cec.org/programs_projects/conserv_biodiv/nacap/index.cfm?CFID=4644714&CFTOKEN=13052862.

[107] Online at http://www.cec.org/files/PDF/BIODIVERSITY/NACAP-Pink-footed-Shearwater_en.pdf.

[108] Online at http://www.cec.org/files/PDF/BIODIVERSITY/NACAP-Leatherback-Seaturtle_en.pdf.

[109] Online at http://www.cec.org/files/PDF/BIODIVERSITY/NACAP-Humpback-whale_en.pdf.

[110] *Ibid.* at 4.

The potential exists for extending MSCCC action-planning activities to the Gulf of Maine region. A multilateral Advisory Group convened by the CEC to identify the first list of marine species of common conservation concern listed 16 species, a number of which frequent the Gulf of Maine region including the leatherback turtle, the right whale and blue whale.[111]

2.3 Species at Risk: Transboundary Issues and Recovery Initiatives

This report discusses those endangered species listed on the *Species at Risk Act* [112] (SARA) that inhabit the Gulf of Maine and where Canada-US collaborations have occurred. Because endangered species' habitats overlap the Canadian and US borders, there are transboundary issues such as commercial fisheries and environmental contamination that may affect species' recoveries. As such, collaboration between Canada and the US in research and recovery is important in order to conserve the species and their habitat. The following species at risk and recovery initiatives are discussed below: leatherback turtle, North Atlantic right whale and Atlantic salmon – Inner Bay of Fundy and Gulf of Maine Distinct Population Segments.

A Species at Risk Working Group under the auspices of the Canada-US Steering Committee (refer to page 64) was originally formed in 2003 to facilitate Canada-US discussions regarding the potential interactions between commercial fisheries and whales, particularly the North Atlantic right whale. In the spring of 2006 the Working Group was given an expanded mandate to discuss broader transboundary species at risk issues and, thus, its role in relation to many of the species discussed below will have to be tracked.

2.3.1 Leatherback Turtle

The leatherback turtle was listed as "endangered" by the *Species at Risk Act* (SARA), passed by Canada in 2002. In the US, it was first identified as endangered in 1970, and listed on the *Endangered Species Act* [113] (ESA) of 1973

Transboundary Issues facing the Leatherback Turtle in the Atlantic

Determining when and where leatherbacks are most at risk

- Crucial to helping conserve leatherbacks is understanding what migration routes they take (from tropical nesting beaches to temporal and boreal foraging grounds)

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[111] Tundi Agardy and Tara Wilkinson, "Conceptualizing a System of Marine Protected Areas in North America" (CEC), online at http://www.cec.org/files/PDF/BIODIVERSITY/IMpaper_en.pdf at 12.

[112] S.C. 2002, c. 29. Most provisions of the Act came into force in June 2003.

[113] 16 U.S.C. §§ 1531.

Commercial fisheries
- Accidental capture and entanglement in pelagic longlines, shrimp trawling, pot fisheries, and gillnets

Marine debris
- Ingestion of items such as plastic bags and fishing nets

Boat traffic
- Collisions with recreational, fishing and transportation vessels
- Possible offshore collisions with large vessels (undocumented)

Oil exploration/extraction
- Extraction carries risks of spills, blowouts, and increased marine traffic
- Exploration causes indirect threat to habitat

Environmental contamination
- Sewage, agricultural and industrial chemicals

Aquaculture
- Potential interaction with fish farms – noise, fecal pollution and parasite transmission

Threats in the nesting environment
- Despite remoteness from Canada, threats in the nesting environment are relevant to international projects and conventions involving Canada
- Threats include: poaching, habitat loss due to beach erosion, beach armouring, and beach nourishment, artificial lighting, increased human presence, contamination and pollution.[114]

Canadian Initiatives

A Recovery Strategy for the Atlantic leatherback turtle is in its draft stage with Fisheries and Oceans Canada (DFO), awaiting approval. An Atlantic leatherback recovery team has been established and is made up of a number of individuals from government and non-government organizations. DFO published a SARA compliant *National Recovery Strategy for the Leatherback Turtle in Pacific Canadian Waters*[115] in September 2003.

Canadian initiatives in research and recovery in Atlantic Canada include the Nova Scotia Leatherback Turtle Working Group (NSLTWG)[116] and the Canadian Sea Turtle Research Project (CSTRP)[117]. The NSLTWG is a collaborative marine turtle research and conservation initiative involving fishermen, coastal community members and university-affiliated biologists in Atlantic Canada. The CSTRP works in tandem with the NSLTWG and the Myers Research Lab at Dalhousie University to monitor the distribution, movement, and population dynamics of leatherback turtles in temperate

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[114] US, National Marine Fisheries Service and US Fish and Wildlife Service, *Recovery Plan for Leatherback Turtles in the US Caribbean, Atlantic and Gulf of Mexico*, (Washington, D.C: National Marine and Fisheries Service, 1992).

[115] Canada, Fisheries and Oceans Canada and the Pacific Leatherback Turtle Recovery Team, *National Recovery Strategy for the Leatherback Turtle in Pacific Canadian Waters*, (Vancouver, British Columbia, 2004).

[116] Nova Scotia Leatherback Turtle Working Group, online at http://www.seaturtle.ca.

[117] Canadian Sea Turtle Research Project, online at http://webdev.ucis.dal.ca/ramweb/cstrp/.

waters off Canada and the US. Through their research with satellite telemetry the CSTRP has been able to determine high use habitat and distribution, the focus of a March 2006 international conference held in Halifax. The conference was hosted by the US National Marine Fisheries Service (NMFS), and brought together leatherback researchers from around the world. CSTRP partners include: Asociación Anai (Costa Rica), Caribbean Conservation Commission, Endangered Wildlife Trust (Costa Rica), Florida Leatherback Project / Duke University and World Wildlife Fund Guiana.

US Initiatives

The National Marine Fisheries Service (NMFS) in the US published a *Recovery Plan for Leatherback Turtles in the US Caribbean, Atlantic and Gulf of Mexico*[118] in 1992. In July 2005 the National Wildlife Service and NMFS announced the undertaking of a 5-year review on endangered and threatened sea turtles. Under the ESA, section 4(c)(2)(A) requires a review of listed species at least once every 5 years.

The ESA Recovery Program actively pursues the objectives of the leatherback recovery plan. The biennial report to congress in 2004 outlined numerous recovery activities, including: development and use of turtle excluder devices, a Sea Turtle Disentanglement Network in the Atlantic Northeast, restrictions on gillnets and net leaders, and population assessment research. [119]

The Caribbean Conservation Commission (CCC)[120] is a not-for-profit organization based in Florida, established in 1959. They are involved in international sea turtle conservation, research and educational endeavours. The organization began its work in Costa Rica, but occasionally conducts research and conservation projects in all seven countries of Central America and throughout the Caribbean. The CCC began the Sea Turtle Survival League (STSL) as a public education and advocacy program to begin addressing the threats that face US sea turtle populations.

The US is a party to the Inter-American Convention for the Protection and Conservation of Sea Turtles[121]. The objective of the convention is “to promote the protection, conservation and recovery of sea turtle populations and of the habitats on which they depend, based on the best available scientific evidence, taking into account the environmental, socioeconomic and cultural characteristics of the Parties”.[122] The Convention promotes research, recovery and environmental education of sea turtles.[123]

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[118] *Supra* note 114.

[119] US, National Marine Fisheries Service Office of Protected Resources, *Biennial Report to Congress on the Recovery Program for Threatened and Endangered Species*, (Silver Spring, MD: National Marine and Fisheries Service, 2004), online at http://www.nmfs.noaa.gov/pr/laws/esa/biennial.htm.

[120] Caribbean Conservation Commission and Sea Turtle Survival League, online at http://www.cccturtle.org.

[121] *Inter-American Convention for the Protection and Conservation of Sea Turtles*, 1 December 1996, S. Treaty Doc. No. 105-48.

[122] *Ibid.*

[123] *Ibid.*

Canada-US Collaboration

The US supported satellite telemetry studies conducted in Canadian waters to research the behaviour and ecology of one of the largest seasonal foraging populations of leatherbacks in the Atlantic.[124] The US and Canada work cooperatively to identify and address threats to leatherback turtles in Canadian waters, and the US contributes to the development of recovery plans in Canada.[125]

Both Canada and the US attend and participate in the Annual Symposia on Sea Turtle Conservation and Biology hosted by NMFS.[126]

2.3.2 North Atlantic Right Whale

The North Atlantic right whale was listed as "endangered" under SARA in January 2005, and has been listed as "endangered" under the ESA since 1973.

Transboundary Issues facing the North Atlantic Right Whale

Critical habitat for the North Atlantic right whale occurs in both Canadian and US waters, with the Bay of Fundy and Gulf of Maine representing the primary foraging ground for the animals. All threats are therefore transboundary issues, and include:

- Vessel collisions due to commercial shipping lanes
- Entanglements/entrapments with fishing gear
- Disturbance from human activity
  - Acoustic deterrent devices (used to keep marine mammals away from aquaculture pens and fishing gear)
  - Whale watching
- Contaminants and habitat degradation
  - Pollution from human activities
  - Oil spills
  - Toxic substances associated with aquaculture
  - "Forage" fisheries that could affect the food supply[127]

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[124] *Supra* note 119.

[125] *Supra* note 119.

[126] Annual Symposia on Sea Turtle Conservation and Biology, online at http://www.nmfs.noaa.gov/pr/species/turtles/symposia.htm.

[127] North Atlantic Right Whale Recovery Team, *A Recovery Plan for the North Atlantic Right Whale*, 2000, prepared for World Wildlife Fund Canada and the Fisheries and Oceans Canada (Ottawa: DFO, 2000).

Critical habitat

- Roseway Basin/ Grand Manan Basin Conservation Areas
- Cape Cod Bay
- Great South Channel
- Southeastern US calving ground (Georgia and northern Florida).

Canadian Initiatives

The Canadian Right Whale Recovery Team prepared *A Canadian Recovery Plan for the North Atlantic Right Whale* [128] in 2000, in conjunction with WWF Canada and DFO. The Recovery Team has prepared a SARA compliant draft recovery strategy, which is now entering the approvals process with DFO.

Recovery activities to date include: projects through the federal Habitat Stewardship Program concerning assessments of distributions, assessments of the Fundy shipping lanes, fishing gear modification, sightings reporting, education and outreach, and rescue and disentanglement; Right Whale Conservation Zones in the Bay of Fundy; and a Code of Ethics for the Fundy whale watching industry. Transport Canada successfully petitioned the International Maritime Organization to move shipping lanes so as to skirt the area where most right whales congregate in the Bay of Fundy. The lanes were changed in 2003.

Identified areas of emphasis for future initiatives include working closely with the fishing industry on entanglements and gear modifications, conducting research on how right whales respond to oncoming vessels, and conducting research into acoustic deterrents.

US Initiatives

The NMFS published a *Recovery Plan for the North Atlantic Right Whale* [129] in 1991, with revisions in August 2004. Initiatives by NMFS include the Atlantic Large Whale Take Reduction Team, established to develop a plan to reduce the incidental serious injury and mortality of right, humpback, fin, and minke whales in the South Atlantic shark gillnet fishery, the Gulf of Maine and Mid-Atlantic lobster trap/pot fishery, the Mid-Atlantic gillnet fishery, and the Gulf of Maine sink gillnet fishery. The Atlantic Offshore Cetacean Take Reduction Team was formed to reduce the incidental injury and mortality of whales and dolphins in the Atlantic pelagic driftnet, pelagic longline and pair trawl fisheries. The NMFS has proposed new ship strike reduction regulations to reduce the likelihood of vessel collisions. The regulation would implement speed restrictions of 10 knots or less in certain times and areas along the US Atlantic seaboard, corresponding to right whale occurrence.[130]

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[128] *Supra* note 127.

[129] US, National Marine Fisheries Service, *Recovery Plan for the North Atlantic Right Whale (Eubalaena glacialis)* (Silver Spring, MD: National Marine Fisheries Service, 2004).

[130] 71 FR 36299. See also Proposed Strategy to Reduce Ship Strikes to North Atlantic Right Whales, online at NMFS http://www.nmfs.noaa.gov/pr/shipstrike/.

In order to reduce potentially disturbing situations from boats and the whale watching industry, NMFS published regulations in 1997 that prohibit vessels from approaching within 500 yards of right whales.

Other initiatives include Right Whale News[131] (a US recovery team publication), the New England Aquarium Right Whale Research Project[132] and the North Atlantic Right Whale Sighting Survey[133].

Canada-US Collaboration

The North Atlantic Right Whale Consortium[134] is an organization made up of both non-governmental and governmental organizations and individuals from the US and Canada who work to study and conserve North Atlantic right whales. The Consortium is maintained by the New England Aquarium, and partners include: DFO, Canadian Whale Institute, Woods Hole Oceanographic Institute, NMFS, and Provincetown Center for Coastal Studies (PCCS).

PCCS[135] is the lead organization in developing tools and techniques and in training other whale rescue organizations and individuals in Canada and the United States. PCCS has participated in the training of the Campobello Whale Rescue group which responds to entanglement events in Canadian waters. A formal three-year agreement was signed in August 2003 for the sharing of research, expertise and rescue equipment in the Bay of Fundy and Gulf of Maine between DFO and the Centre for Coastal Studies. (North Atlantic Right Whale Consortium website)

2.3.3 Atlantic Salmon – Inner Bay of Fundy Populations and Gulf of Maine Distinct Population Segment

The Inner Bay of Fundy (iBoF) populations of Atlantic salmon have been listed as endangered under SARA since June 2003. In the US, the Gulf of Maine Distinct Population Segment of Atlantic salmon (GOM DPS) was listed as endangered on the ESA in November 2000.

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131 *Right Whale News*, Publication of the Southeast United States Right Whale Recovery Team Implementation Team and the Northeast Implementation Team. (Athens, Georgia: Georgia Environmental Policy Institute), online at http://www.graysreef.nos.noaa.gov/rightwhalenews.html.

132 New England Aquarium Right Whale Research, online on the New England Aquarium website at http://www.neaq.org/scilearn/research/landing.php?linkname=Whales.

133 North East US Right Whale Sighting Advisory System, online on the North East Fisheries Science Centre website at http://rwhalesightings.nefsc.noaa.gov.

134 North Atlantic Right Whale Consortium, online at http://www.rightwhaleweb.org.

135 Provincetown Center for Coastal Studies, online at http://www.coastalstudies.org.

Transboundary Issues facing the iBoF and GOMDPS Atlantic Salmon

Common marine habitat in Canadian and US waters creates similar concern over threats to Atlantic salmon survival.

- iBoF salmon marine habitat is in the Bay of Fundy and northern Gulf of Maine.
- GOM DPS salmon marine habitat is in the Gulf of Maine and Bay of Fundy, and they migrate to the Labrador Sea in winter (off Labrador and the southwest coast of Greenland).

Low marine survival

- Little is known about the cause of the very low marine survival rate of Atlantic salmon.

Salmon farming operations in the western Bay of Fundy is a common concern due to the potential for escape, ecological effects and disease.

Commercial fisheries by-catch

Incidental catch/poaching in recreational fisheries

Commercial fishery off St. Pierre et Miquelon

Disease – particularly Infectious Salmon Anemia (ISA).[136]

Canadian Initiatives

DFO is working on a SARA compliant *National Recovery Strategy for Atlantic Salmon – Inner Bay of Fundy Populations*, and has in place an active Recovery Team and Planner. The recovery team is currently operating under the 2002 *National Recovery Strategy for Inner Bay of Fundy Atlantic Salmon* [137].

The primary focus of the iBoF salmon recovery program in Canada is identifying the source(s) of the unusually high marine mortality and protecting the salmon's genetic diversity. In addition, iBoF Atlantic salmon have faced significant historic reductions in fresh water habitat. Research has revealed known threats in the rivers, so groups are working to mitigate them. The Habitat Stewardship Program community-based initiatives for conserving iBoF Atlantic salmon include in-stream monitoring for salmon and viable salmon habitat, habitat enhancement and improvement, and an education/outreach component.

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[136] Canada, National Recovery Team for Inner Bay of Fundy Atlantic Salmon Populations, *National Recovery Strategy for Inner Bay of Fundy Atlantic Salmon (Salmo salar) Populations*, (Ottawa: National Recovery Strategy No. XX, Recovery of Nationally Endangered Wildlife, 2002), and US, National Marine Fisheries Service and US Fish and Wildlife Service, *Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (Salmo salar)*, (Silver Spring, MD: National Marine Fisheries Services, 2005).

[137] Canada, National Recovery Team for Inner Bay of Fundy Atlantic Salmon Populations, *National Recovery Strategy for Inner Bay of Fundy Atlantic Salmon (Salmo salar) Populations*, (Ottawa: National Recovery Strategy No. XX, Recovery of Nationally Endangered Wildlife, 2002).

US Initiatives

The NMFS published a *Final Recovery Plan for Gulf of Maine Distinct Population Segment of Atlantic Salmon*[138] in November 2005. The State of Maine prepared the *Atlantic Salmon Conservation Plan for Seven Maine Rivers* [139] in 1997 and is a key partner in the recovery efforts for the species. The plan contains a number of actions and measures to reduce potential impacts to Atlantic salmon from recreational fishing, agriculture, aquaculture, and forestry. The NMFS recovery plan was developed in close cooperation with Maine, and many of its elements are based on the Maine Conservation Plan.

Canada-US Collaboration

Both Canada and the US are contracting parties to the Convention for the Conservation of Salmon in the North Atlantic Ocean, and members of the North Atlantic Salmon Conservation Organization (NASCO) (refer to Section 4.6 on page 77).

The Atlantic Salmon Federation, an international non-profit organization, promotes the conservation and wise management of the wild Atlantic salmon and its environment, with participation from Gulf of Maine littoral Provinces and States (refer to page 105).

The Greenland Conservation Agreement, negotiated in 2002, reinforces a Regulatory Measure adopted by the West Greenland Commission of NASCO in 2003 which suspended commercial salmon fishing off West Greenland and restricted catches for internal subsistence consumption. This was important for Atlantic salmon as monitoring conducted by the Canadian and US Governments determined that between 75% and 90% of the salmon harvested in Greenland are salmon that have migrated from Canadian and US rivers.

Agencies from both Canada and the US cooperate in enhancement and management activities along the St. Croix River, which borders Maine and New Brunswick, and the Aroostook River, a tributary to the St. John River system.[140]

With regard to fish health relating to aquaculture, the Maine Department of Marine Resources, the NB Department of Agriculture, Fisheries and Aquaculture and the US Department of Agriculture have a strong consultative relationship regarding sharing information to the degree allowed by law, as well as conducting inspections of vessels to allow cross-border movement. NB and Maine have also participated in infectious salmon anemia (ISA) testing exercises designed to make results from the participating

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138 US, National Marine Fisheries Service and US Fish and Wildlife Service, *Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (Salmo salar)*, (Silver Spring, MD: National Marine Fisheries Services, 2005).

139 US, Maine Atlantic Salmon Task Force, *Atlantic Salmon Conservation Plan for Seven Maine Rivers*, 1997, State of Maine.

140 US, *2004 Annual Report of the Maine Atlantic Salmon Commission*, by Patrick Keliher *et al.*, eds (Augusta, ME: Atlantic Salmon Commission, 2004).

labs more uniform and have shared data for epidemiological studies. The governments often consult with each other prior to making new fish health testing and policy decisions.[141]

With regard to salmon aquaculture management, the area that includes Cobscook Bay, Campobello Island, Deer Island and the upper Passamaquoddy Bay is now being managed as a single-year class are on both sides of the border. The two jurisdictions consult each other about entry and removal dates, although both jurisdictions retain separate regulatory authority.[142]

2.4 North American Waterfowl and Migratory Birds Cooperation

The Gulf of Maine and Bay of Fundy play a critical role for resident and migratory bird (waterfowl, shorebirds, waterbirds, and landbirds) populations, providing critical habitat, food resources and breeding areas. In this region, dabbling ducks, sea ducks, swans and various goose species use coastal wetlands during winter and migration periods. Intertidal areas serve as important staging sites and wintering habitats for the Red Knot, Ruddy Turnstone, Sanderling, Semipalmated Sandpiper and Dunlin populations. Common Eiders, Black Guillemots, Leach's Storm-petrels, gulls, terns, and alcids breed in the regions coastal areas and offshore islands. Gull and tern species, including the endangered Roseate Tern, nest on offshore islands. Other priority species found in the region include the Piping Plover, American Oystercatcher, Black Rail and several sparrow species.

The bird populations face many threats in the Gulf of Maine region, and throughout out their migratory range, including:

- oil and chemical spills
- persistent contaminants, plastics, and pollutants
- harmful algal blooms
- entanglement in fishing gear and other debris
- disease
- lead shot and illegal hunting
- habitat loss and degradation
- wind energy development.

Across the region, population surveys suggest that many species have been or are in decline. As a result, several transboundary conservation and management initiatives have been put in place that are often continental in scope, but include specific initiatives in the Gulf of Maine or Bay of Fundy. This section describes several of these conservation initiatives including the North American Waterfowl Management Plan, the North American Bird Conservation Initiative, Western Hemisphere Shorebird Reserve

[141] Pers. comm., Samantha Horn Olsen, Maine Department of Marine Resources, July 20, 2006.

[142] *Ibid.*

Network (WHSRN), the National Shorebird Conservation Plan in Canada and the United States, and the Waterbird Conservation for the Americas initiative. Several collaborative research and monitoring initiatives in the Gulf of Maine region are also noted.

2.4.1 North American Waterfowl Management Plan

Waterfowl represent the most prominent and economically important group of migratory birds in North America. By the mid-1980s, declining waterfowl populations in Canada and the United States had reached record lows as wetlands across the continent were destroyed. The North American Waterfowl Management Plan (NAWMP) is a continent-wide initiative focussed on the conservation of migratory water birds. Canada and the United States initiated the Plan in 1986 to address the problem of critically-depleted waterfowl populations through wetland and associated upland habitat conservation measures. Mexico joined NAWMP in 1994.[143]

Management Plans

A series of Management Plans set out the guiding framework for the NAWMP. The first Plan, produced in 1986, outlined population and habitat objectives for numerous species of ducks, geese, and swans.[144] The Plan was updated in 1994[145] and 1998[146] and completely revised in 2004.[147] The Management Plans' strategy for waterfowl conservation is based on several principles:

- recognising the ecological and economic benefits of waterfowl;
- promoting a cooperative approach to management through the development of public-private partnerships;

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[143] Division of Bird Habitat Conservation, US Fish and Wildlife Service (FWS), "North American Waterfowl Management Plan", online at http://www.fws.gov/birdhabitat/NAWMP/index.shtm.

[144] Environment Canada (EC) & US FWS, *North American Waterfowl Management Plan* (1986), online at http://www.fws.gov/birdhabitat/NAWMP/files/NAWMP.pdf.

[145] EC & US FWS, *1994 Update to the North American Waterfowl Management Plan: Expanding the Commitment* (1994), online at http://www.fws.gov/birdhabitat/NAWMP/files/NAWMP1994.pdf.

[146] EC & US FWS, *North American Waterfowl Management Plan: A Strategy for Cooperation* (1998), online at http://www.fws.gov/birdhabitat/NAWMP/files/NAWMP.pdf [NAWMP 1998 Update].

[147] The revised 2004 Management Plan was released as two documents. The *Strategic Guidance* document provides a broad framework for developing conservation programs by setting out conservation directions and priorities. See: NAWMP Plan Committee, *North American Waterfowl Management Plan 2004, Strategic Guidance: Strengthening the Biological Foundation* (Canadian Wildlife Service, US Fish & Wildlife Service, Secreteria de Medio Ambiente y Recursos Naturales, 2004) [Strategic Guidance]. The companion document, *Implementation Framework*, includes more detailed information on conservation themes and technical information for implementing conservation measures. See: NAWMP Plan Committee, *North American Waterfowl Management Plan 2004, Implementation Framework: Strengthening the Biological Foundation* (Canadian Wildlife Service, US Fish and Wildlife Service, Secreteria de Medio Ambiente y Recursos Naturales, 2004) [Implementation Framework].

- managing waterfowl harvests;
- developing conservation, economic, social policies that support the ecological health of landscapes; and
- implementing conservation measures based on sound science.

The development of public-private partnerships, known as "joint ventures" is a key element of the NAWMP system (refer to page 34). The joint ventures are expected to implement Management Plan goals and objectives through the development of regional or species-specific conservation programs under the guidance of the broader NAWMP.

The 2004 Management Plan sets out specific population objectives for duck, goose and swan populations to provide a framework for regional planning efforts. Habitat objectives are to be determined based on the regional requirements for each joint venture. The 2004 Plan continues to emphasize the importance of expanding scientific knowledge of waterfowl and their habitats to allow regional joint venture programs to develop quantifiable objectives for conservation actions, design monitoring procedures and to evaluate program successes.[148]

NAWMP Administrative Structure

The NAWMP initiative is led by the international North American Waterfowl Management Plan Committee (Plan Committee).[149] The NAWMP Science Support Team (NSST) supplies technical advice on conservation planning, implementation and evaluation to the Committee and regional NAWMP partners.[150] The NSST also assists NAWMP joint ventures in developing methods for biological planning and performance evaluation in regional conservation programs. Federal agencies, in Canada, the United States, and Mexico, coordinate the NAWMP program domestically and administer funds for joint venture conservation projects through the North American Wetlands Conservation Act Grants Programs.

In Canada, the North American Waterfowl Management Plan Implementation Office administers NAWMP in cooperation with Canada's North American Wetlands Conservation Council (NAWCC).[151] In 2000, the North American Bird Conservation Initiative (NABCI) Canada Council assumed overall responsibility for coordinating bird conservation in Canada. The NAWCC continues to administer the NAWMP program in its role as a Standing Committee of the NABCI Canada Council. Under NAWMP, NAWCC reviews and endorses Canadian proposals for funding under the North American Wetlands Conservation Act Grants Program.[152] NAWCC also works in

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148 Strategic Guidance, *Ibid.*; Implementation Framework, *Ibid*.
149 Strategic Guidance, *Ibid*.
150 Implementation Framework, *supra* note 147.
151 The NAWCC was formed in 1990, by the federal Minister of the Environment, to provide leadership and advice on national and international wetland conservation issues. NAWCC members include representatives of the federal, provincial and/or territorial governments, NAWMP joint ventures, and non-government conservation organisations.
152 NAWCC (Canada) website at http://www.wetlandscanada.org/who.html.

cooperation with the US North American Wetlands Conservation Council and the Instituto Nacional de Ecologia in Mexico.[153]

In the United States, NAWMP is coordinated by the Fish and Wildlife Service's Division of Bird Habitat Conservation. The Division also allocates funding to US conservation projects awarded under the North American Wetlands Conservation Act Grants Program.

North American Wetlands Conservation Act Grants Programs

In 1989, the United States enacted the *North American Wetlands Conservation Act* (*NAWCA*) to help fund conservation initiatives under the NAWMP.[154] In 2002, the program was expanded to include all bird and habitat conservation activities associated with wetland ecosystems. Under the provisions of the Act, partners in the US, Canada and Mexico are eligible to apply for competitive, matching grants to help fund wetlands conservation projects.[155] Grants must be matched by partner contributions at no less than a one-to-one ratio from other US non-federal sources.[156] At least 25% of the funding for eligible Canadian projects must come from Canadian sources.[157] For the 2006 fiscal year, a total of $66.1 million was awarded under the Standard and Small Grants Programs.[158]

The Standard Grants Program supports projects that provide "long-term protection, restoration, and/or enhancement of wetlands and associated uplands habitats".[159] Half of the money distributed goes to fund projects in the United States, 45% supports projects in Canada and the remaining 5% is awarded to Mexican projects.[160] The Small

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153 NABCI/NAWMP Coordination Office, Canadian Wildlife Service, "North American Waterfowl Management Plan: Administration", online at http://www.nawmp.ca/eng/adm_e.html.

154 16 U.S.C. §§ 4401-4412.

155 Under the Standard Grants Program, applications follow a similar review process in Canada and the United States. Canadian joint venture grant applications are first submitted to NAWCC (Canada) to ensure that they meet the NAWCA funding requirements and Canadian conservation priorities. Appropriate proposals are then approved by the NABCI Canada Council. Following Canadian approval, applications are forwarded to the US North American Wetlands Conservation Council. The US Wetlands Council reviews and ranks all North American grant proposals and recommends projects to the Migratory Bird Conservation Commission, a US Congressional committee, which makes the final funding allocations. Under the Small Grants Program, funding of up to $75,000 is available to smaller-scale, long-term projects meeting the same selection criteria as those eligible under the US Standard Grants Program. Proposals are submitted to the US Division of Bird Habitat Conservation and reviewed by Division staff, Joint Venture coordinators and the North American Wetlands Conservation Council. The Migratory Bird Conservation Commission then allocates program funds to projects approved by the Wetlands Council.

156 Division of Bird Habitat Conservation, US FWS, "North American Wetlands Conservation Act", online at http://www.fws.gov/birdhabitat/Grants/NAWCA/index.shtm.

157 NAWCC (Canada), *supra* note 152.

158 Division of Bird Habitat Conservation, *supra* note 156.

159 *Ibid*.

160 *Ibid*.

Grants Program supports conservation projects based in the United States. A total of $2 million will be distributed under this program for the 2007 fiscal year.[161]

Joint Venture / Partnership Approach

NAWMP provides an over-arching international framework for conservation initiatives that are implemented at a regional level through a network of autonomous public-private partnerships. Each regional joint venture develops its own conservation management plan based on NAWMP objectives to meet the requirements of local bird populations and habitats. Joint venture partners include representatives from federal, provincial, state and municipal governments, conservation organisations, research institutions, industry, First Nations, landowners, and private individuals.[162]

NAWMP recognises two types of partnerships: habitat joint ventures and species joint ventures. Habitat joint ventures form the basic geographic planning unit for regional conservation initiatives. Each region represents one of the Management Plan's priority habitat areas.[163] There are currently 17 habitat joint ventures in the United States and 5 in Canada. Although NAWMP has an international focus, all but one of the habitat joint ventures operate within a single country.[164] The species joint ventures, dealing with the Black Duck, Sea Duck and Arctic Goose, are transboundary and focus on monitoring, research and protection of the species throughout their international ranges.[165]

The Gulf of Maine region is split by the boundaries of two joint ventures: the Eastern Habitat Joint Venture (in Canada) and the Atlantic Coast Joint Venture (in the United States). Within each region, joint venture partners develop and implement conservation plans focussed on securing, restoring, and enhancing wetlands and associated bird habitats; conducting research; monitoring bird populations; and providing environmental education to local communities.[166]

Eastern Habitat Joint Venture

The Eastern Habitat Joint Venture (EHJV) was formed, in 1989, by the governments of Canada, Ontario, Quebec, the four Atlantic Provinces, the Canadian Wildlife Service, Ducks Unlimited Canada and Wildlife Habitat Canada. In 1999 the Nature Conservancy of Canada joined the EHJV Management Board.[167] Under the terms of the agreement,

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161 *Ibid*.
162 Implementation Framework, *supra* note 147.
163 *Ibid*.
164 Division of Bird Habitat Conservation, US FWS, "North American Joint Ventures" map, online at http://www.fws.gov/birdhabitat/JointVentures/Map.shtm; Environment Canada, *Canadian Habitat Matters*, Progress Report (2006), online at http://www.nawmp.ca/pdf/HabMat2006e.pdf [Habitat Matters 2006].
165 Division of Bird Habitat Conservation, US FWS, "Joint Ventures", online at http://www.fws.gov/birdhabitat/JointVentures/index.shtm.
166 NAWMP 1998 Update, *supra* note 146.
167 Environment Canada, *Canadian Habitat Matters*, Progress Report (2003), online at http://www.nawmp.ca/pdf/chm2003-e.pdf [Habitat Matters 2003].

each Province established its own EHJV program. The provincial joint ventures represent partnerships of federal, provincial and non-governmental conservation agencies, as well as management agencies and private organisations from the United States.[168] EHJV partners recently completed a new 5-year strategic plan and are in the process of drafting accompanying implementation and evaluation documents.[169]

Among the habitat conservation initiatives undertaken by the EHJV in New Brunswick are salt marsh restoration and securement programs,[170] private land donation programs,[171] and the development of the New Brunswick Wetlands Conservation Policy to manage human impacts on wetland habitats through stewardship activities.[172] NB-EHJV has projects in the Tantramar Dykelands, Musquash estuary, the Saint John River floodplain, Grassy Island and Depow Marsh.[173] On average, 75% of the joint venture's funds are supplied by American partners with the rest provided by the provincial government and other Canadian member organisations.[174]

Nova Scotia's EHJV program, in collaboration with Ducks Unlimited Canada, has implemented the Owners Unknown Habitat Securement Project, securing, to date, over 2,750 hectares of wetlands and coastal habitat.[175] NS-EHJV also secures land through eco-gifts[176] and promotes community-based conservation through landowner and municipal stewardship conservation agreements, such as the Cape Sable Island Habitat Conservation Project.[177] NS-EHJV recently completed the Bay of Fundy Shorebird project,[178] which included $946,000 for habitat protection for shorebirds in the Upper Bay of Fundy.[179]

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[168] NB Dept of Natural Resources (DNR), "Introduction to the Eastern Habitat Joint Venture (EHJV)".

[169] Habitat Matters 2006, *supra* note 164.

[170] Environment Canada, *Canadian Habitat Matters*, Progress Report (2005), online at http://www.nawmp.ca/pdf/HabMat2005e.pdf [Habitat Matters 2005]; Environment Canada, *Canadian Habitat Matters*, Progress Report (2004), online at http://www.nawmp.ca/pdf/HabMattersE.pdf.

[171] Habitat Matters 2006, *supra* note 164.

[172] Habitat Matters 2003, *supra* note 167.

[173] NB DNR, "EHJV accomplishments".

[174] NB DNR, *supra* note 168.

[175] Under this program, NAWCA grants are used to purchase parcels of land, for which no owners are recorded, for the price of unpaid property taxes. Habitat Matters 2006, *supra* note 164.

[176] In this program, private landowners are encouraged to hand over title, or easements, to their property in return for tax credit. Environment Canada, *Canadian Habitat Matters*, Progress Report (2002), online at http://www.nawmp.ca/pdf/chm2002-e.pdf.

[177] Habitat Matters 2005, *supra* note 170.

[178] For final report of this project, which concluded in 2005, see Donald Sam *et al.*, "Report on 2004/05 Nova Scotia Eastern Habitat Joint Venture Bay of Fundy Shorebird Project" Project # 2.39C.4-04/05, online at http://www.whc.org/documents/2-39C-4FINALREPORT.pdf.

[179] Environment Canada, Press release "Environment Minister David Anderson attends public launch of new venture to help shorebirds in Upper Bay of Fundy" (August 12, 2001), online at http://www.atl.ec.gc.ca/press/01-08-13-ehjv_e.html.

Atlantic Coast Joint Venture

The Atlantic Coast Joint Venture (ACJV), established in 1988, coordinates the conservation of waterfowl and their habitats in the Atlantic Flyway (the east coast of the United States from Maine to Puerto Rico). ACJV partners include federal, regional and state agencies and non-governmental organisations. Conservation activities are governed by a regional management plan set out in the 2004 Strategic Plan[180] and 2005 Implementation Plan. The Implementation Plan includes habitat conservation goals and population indices for ACJV area birds; presents current status assessments for waterfowl and their habitats; and outlines localised conservation initiatives for "focus areas" within the joint venture region.[181] ACJV's conservation projects include land securement initiatives, salt marsh restoration activities, research and monitoring projects to fill knowledge gaps, and public education measures.[182] Focus Area Working Groups, such as the Great Bay Resource Protection Partnership, in New Hampshire, operate as localised partnerships, developing and implementing conservation measures tailored to smaller management areas within the ACJV region. In Maine, ACJV priority focus areas include Cobscook Bay and the Lower Kennebec River/Merrymeeting Bay.[183]

Broadening the Scope of NAWMP Joint Ventures

Both EHJV and ACJV have expanded the scope of their activities to focus on the conservation of all bird habitats, in line with the NABCI approach (refer to Section 2.4.2 on page 37).[184] New administrative bodies coordinate the expanded conservation efforts. The ACJV Integrated Bird Conservation Committee (IBCC) integrates the activities of autonomous bird conservation initiatives operating within the joint venture area. ACJV's Bird Conservation Region (BCR) Steering Committees, ecosystem-based regional management units created under NABCI, guide bird habitat conservation measures in support of the NABCI BCR conservation plans.[185] In 2002, the EHJV expanded its bird conservation program by completing individual management plans for waterfowl, shorebirds, waterbirds, and landbirds.[186]

Canadian and US joint ventures also collaborate in addressing international management issues in the Gulf of Maine region. In December 2002, EHJV and ACJV co-hosted a workshop to develop a collaborative management plan to address common conservation goals in the portions of the two joint ventures included in NABCI's BCR 14.

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[180] ACJV, *Atlantic Coast Joint Venture Waterfowl Strategic Plan* (2004), online at http://www.acjv.org/documents/acjv_strategic_plan.pdf.

[181] ACJV, *Atlantic Coast Joint Venture Waterfowl Implementation Plan Revision* (2005), online at http://www.acjv.org/wip/acjv_wip_executive_summary.pdf.

[182] Atlantic Coast Joint Venture website at http://www.acjv.org/.

[183] West Coast, Kennebec River/Lower Merrymeeting Bay, Downeast, and Cobscook Bay. For map, see http://www.fws.gov/northeast/migratorybirds/me_waterfowl_web_map.pdf.

[184] Atlantic Coast Joint Venture, *supra* note 182; Habitat Matters 2003, *supra* note 167.

[185] Atlantic Coast Joint Venture, *ibid*.

[186] Habitat Matters 2003, *supra* note 167.

The plan identifies conservation objectives and priorities and makes recommendations for implementing and evaluating conservation measures that region.[187] In July 2005, EHJV and ACJV held their first joint Management Board meeting to discuss international habitat conservation efforts and other transboundary issues spanning the two joint venture regions.[188]

2.4.2 North American Bird Conservation Initiative

The North American Bird Conservation Initiative (NABCI) was launched by the Council of the Commission for Environmental Cooperation (CEC) (refer to Section 2.2 on pages 13-14) in June 1999.[189] NABCI exists as "a statement of principles and approaches shared by individuals, organisations, agencies, and programs engaged in bird conservation".[190] NABCI promotes and facilitates cooperation among existing and new bird conservation regimes to improve their effectiveness in ensuring the long-term health of all of North America's bird populations.[191] The NABCI approach envisions a series of regionally-based habitat conservation partnerships covering the entire North American continent and engaged in a coordinated effort to preserve all bird populations and their habitats.[192] NABCI seeks to build on the conservation strategy developed by NAWMP by supporting autonomous partnerships employing a biologically-based landscape approach to bird habitat conservation.[193]

NABCI Administrative Structure

NABCI functions as a guiding framework for bird conservation across North America, to which autonomous conservation initiatives across North America voluntarily espouse, rather than as an organisation that issues directives and implements conservation activities on the ground.[194] Internationally, the initiative is supported by the Trinational NABCI Committee, which fosters broad international coordination among bird conservation groups.[195] National NABCI bodies are responsible for coordinating the NABCI vision in Canada, the United States and Mexico.

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[187] Atlantic Coast Joint Venture, *DRAFT: Blueprint for the Design and Delivery of Bird Conservation in the Atlantic Northern Forest*, by Randy Dettmers, online at http://www.acjv.org/documents/bcr14_blueprint.pdf [ACJV Blueprint].

[188] Habitat Matters 2005, *supra* note 170.

[189] NABCI International, "About NABCI", online at http://www.nabci.net/international/english/index.htm.

[190] NABCI Canada Fact Sheet, online at http://www.cws-scf.ec.gc.ca/mbc-com/6AB1762A-33AC-4F5D-9C0C-AEA338A1A8C9/NABCI_E.pdf.

[191] US NABCI Committee, "North American Bird Conservation Initiative: Bird Conservation Region Descriptions" (2000), online at http://www.nabci-us.org/aboutnabci/bcrdescrip.pdf; NABCI Canada, *ibid*.

[192] US NABCI Committee, *ibid*.

[193] NABCI Canada, *supra* note 190; US NABCI website at http://www.nabci-us.org/nabci.html.

[194] US NABCI website, *ibid*.

[195] The Trinational Committee is composed of three representatives from each of the Canadian, US and Mexican national NABCI committees. *Ibid*.

The NACBI Canada Council, administered by the Canadian Wildlife Service, sets national bird conservation priorities and strategies and collaborates with conservation partnerships across the country to ensure that NABCI objectives are integrated into regional bird conservation initiatives.[196] Council members include representatives of federal and provincial governments, non-governmental organisations, and partners from Canada's major bird conservation initiatives, such as NAWMP, Partners in Flight – Canada, the Canadian Shorebird Conservation Plan, and the North American Waterbird Conservation Plan.[197]

The US NABCI Committee serves as a national discussion forum, encouraging coordination and collaboration, and facilitating communication and information exchanges, among bird conservation initiatives throughout the United States. The Committee also seeks to build capacity and increase funding for regional conservation programs. US Committee members include representatives of federal and state government agencies, non-profit organizations, and regional bird conservation initiatives. In its annual work plans, the Committee seeks to develop a common framework for addressing issues such as conservation planning and monitoring schemes, international cooperation and state and federal support for bird habitat conservation.[198]

Bird Conservation Regions (BCRs)

As the first step in implementing NABCI, CEC initiated a project to divide the continent into a series of Bird Conservation Regions (BCRs).[199] Each BCR represents an ecologically distinct region, defined by common biophysical elements and designed to serve as the primary unit for planning and implementing integrated bird conservation initiatives.[200] A total of 67 BCRs were established across North America. The Gulf of Maine region is situated within portions of two BCRs, the Atlantic Northern Forest (BCR 14) and the New England/Mid-Atlantic Coast (BCR 30).

BCR 14 – Atlantic Northern Forest

The Atlantic Northern Forest BCR covers the entirety of Nova Scotia and New Brunswick, all but the southernmost coast of Maine and inland portions of New Hampshire and Massachusetts.[201] Representatives from Canada's EHJV and the US ACJV have developed a joint management plan for the region that identifies priority species and habitats in the region, and presents a range of issues, objectives, recommended implementation strategies, and methods for evaluating progress in meeting BCR 14 goals.[202] The plan presents 49 priority conservation projects including,

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196 Canadian Wildlife Service, Environment Canada, Québec Region, "NABCI at the International Scale", online at http://www.qc.ec.gc.ca/faune/icoan-nabci/html/echelle_internationale_e.html.
197 NABCI Canada, *supra* note 190.
198 US NABCI website, *supra* note 193.
199 NABCI Canada, *supra* note 190.
200 NABCI Canada, *supra* note 190; US NABCI website, *supra* note 193.
201 US NABCI Committee, *supra* note 191.
202 ACJV Blueprint, *supra* note 187.

land securement initiatives, research and monitoring activities, and education and outreach projects.[203] The Plan is designed to be flexible and was most recently updated in February 2006.[204]

BCR 30 – New England/Mid-Atlantic Coast

The New England/Mid-Atlantic Coast BCR includes the Gulf of Maine coastal regions of New Hampshire and Massachusetts and the southern tip of Maine.[205] In December 2004, the ACJV hosted a workshop to identify conservation priorities for BCR 30. A Steering Committee was formed and, in April 2005, issue-based Working Groups were established to address priority issues identified at the workshop. The Habitat Mapping Working Group will coordinate a systematic and standardised approach to habitat mapping within the region. The Regional Monitoring Working Group (RMWG) will develop tools for assessing tidal and freshwater marsh bird populations, within and between BCRs, to fill existing information gaps and develop more effective regional conservation strategies and monitoring regimes.[206]

2.4.3 Western Hemisphere Shorebird Reserve Network

The Western Hemisphere Shorebird Reserve Network (WHSRN) is a voluntary, non-regulatory alliance of individuals, organisations, corporations and government agencies dedicated to the conservation of shorebird species and habitats through a network of key sites across the North and South American continents.[207] The program was initiated in 1985 as a means of identifying, and promoting the protection of, breeding and migratory staging and stopover sites along shorebird migration flyways. WSHRN's goal is the designation and management of a network of protected sites, sufficient in number, quality, and location to sustain all native shorebird species throughout the western hemisphere. In achieving this goal, the initiative promotes communication and collaboration among conservation groups and programs at the regional, national and international level.[208]

Network Approach

Three potential designations are available for Network sites. To qualify as a site of hemispheric importance, the area must be visited by 500,000 or more shorebirds a year, and account for more than 30 percent of the biogeographic population for a particular species. Sites of international importance are visited by 100,000 or more shorebirds each year, and account for more than 10 percent of the biogeographic population for a species. Finally, regional sites are those frequented by more than

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203 *Ibid*.
204 Atlantic Coast Joint Venture, *supra* note 182.
205 US NABCI Committee, *supra* note 191.
206 Atlantic Coast Joint Venture, *supra* note 182.
207 Western Hemisphere Shorebird Reserve Network (WHSRN), "WHSRN Hemispheric Council: Terms of Reference", online at http://www.whsrn.org/about/organization/Hemispheric_Council/Terms.html.
208 WHSRN, "WHSRN Mission", online at http://www.whsrn.org/about/mission.html.

20,000 shorebirds a year, and which account for more than 5 percent of the biographic population for a species.

The participation of local landowners is critical to the success of the WHSRN venture. Before a location can be included in the Network, the WHSRN requires the express agreement of the site's landowners. These owners include government agencies, non-profit organisations, governing bodies for indigenous peoples, academic institutions, and businesses, among others. Property owners act as stewards in agreeing to prioritise, protect and manage shorebird habitat. To date, over 21 million acres of strategic shorebird habitat has been included within the WHSRN framework.

Administrative Structure

The initiative is led and coordinated by the WHSRN Hemispheric Council. The Council establishes programs to implement and assess the Network's conservation strategies[209] and facilitates communications and collaboration among existing conservation efforts and WHRSN partners. The final decision on the inclusion of a nominated site in the WHSRN, based on the recommendations of the Scientific Advisory Committee, rests with the Council. The Manomet Center for Conservation Sciences, in Manomet, Massachusetts serves as the Executive Office for the WHSRN. Network Partners are agencies and organisations that support the overall WHSRN initiative by providing connections, funding, services, or other forms of support to a variety of Network sites. Site Partners manage shorebird conservation at the local level. Technical Committees, including the Scientific Advisory Committee, provide advice and support to the Council and other partners.[210]

In Canada, a national framework for shorebird conservation is provided in the form of the Canadian Shorebird Conservation Plan (CSCP). The Plan supports the WHSRN approach to conserving shorebird populations and habitats through the creation of a network of protected habitat sites.[211] The Canadian Shorebird National Working Group (CSNWG) has the dual responsibilities of overseeing the implementation of the CSCP and facilitating the development and execution of the WHSRN in Canada. In its role as national council for the WHSRN, the CSNWG is also referred to as WHSRN-Canada. The responsibilities of WHSRN-Canada are set out in the CSCP as representing Canada as a member of the Hemispheric Council and encouraging and supporting new Canadian WHSRN site designations. The CSNWG also ensures that WHSRN activities in Canada are integrated with other bird conservation initiatives through NABCI.[212]

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209 WHSRN, *Strategic Plan 2004-2008* (Revised 3 March 2006), online at http://www.manomet.org/WHSRN/WHSRNStrategicPlan0603-03.pdf [WHSRN Strategic Plan].

210 WHSRN, "WHSRN Organization & Structure", online at http://www.whsrn.org/about/organization.html.

211 G.M. Donaldson *et al*., *Canadian Shorebird Conservation Plan* (Canadian Wildlife Service, Environment Canada, 2000), online at http://www.cws-scf.ec.gc.ca/publications/AbstractTemplate.cfm?lang=e&id=318 [CSCP].

212 Canadian Wildlife Service, "Migratory Birds Conservation: Canadian Shorebird Conservation Plan", online at http://www.cws-scf.ec.gc.ca/mbc-com/default.asp?lang=En&n=D1610AB7-1.

The US Shorebird Conservation Plan guides shorebird conservation initiatives in the United States.[213] In 2004, the US Shorebird Conservation Plan Council officially assumed responsibility for implementing the WHSRN initiative domestically through the newly designated WHSRN US Committee. The Committee, comprised of government and non-government members, develops an annual work plan to ensure the coordinated execution of WHSRN Strategic Plan and US Shorebird Conservation Plan objectives. The Committee also collaborates with regional partners to identify significant shorebird habitat sites, and reviews and recommends nominations for the inclusion of sites in the WHSRN initiative. The US Shorebird Conservation Plan Council helps facilitate the coordination of conservation strategies with the WHSRN by nominating members to the WHSRN Hemispheric Council.[214]

WHSRN Sites in the Gulf of Maine Region

To date, the WHSRN has sixty-four sites in eight countries, from Alaska to the southern tip of South America.[215] Three of the designated sites are located in the Gulf of Maine region. The Bay of Fundy is considered a site of hemispheric importance, while the Great Marsh and Monomoy sites, in Massachusetts, are regionally significant sites.

Bay of Fundy Western Hemispheric Shorebird Reserve

Two sections of the Upper Bay of Fundy, totalling 62,000 hectares, have been designated a hemispheric shorebird reserve. The Shepody Bay, New Brunswick section was designated in 1987, while Minas Basin, Nova Scotia was included in 1989. These locations support between 1,000,000 and 2,500,000 Semipalmated Sandpipers (*Calidris pusilla),* or up to 70% of the world population*,* during their southward migration each year.[216] The two provincial governments manage shorebird conservation initiatives in the intertidal zone, while the Canadian Wildlife Service manages areas beyond the low-tide mark. The beaches inland of the high-tide mark are privately owned. Other WHSRN partners include Ducks Unlimited Canada (refer to Section 7.3.2 on page 124) and the Nature Conservancy of Canada. The Nature Conservancy, in collaboration with the Canadian Wildlife Service, has purchased, monitored, and protected shorebird roosting beaches and marsh uplands, and created Shorebird Interpretation Centres in both provinces. The shorebird reserve is also an important education tool for raising public awareness of shorebird conservation issues.[217]

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213 Stephen Brown *et al.*, *United States Shorebird Conservation Plan* (Manomet Centre for Conservation Sciences, 2001), online at http://www.fws.gov/shorebirdplan/USShorebird/PlanDocuments.htm [US Shorebird Plan].

214 WHSRN, "WHSRN U.S. National Council", online at http://www.whsrn.org/about/organization/National-Councils/US.html.

215 WHSRN, "WHSRN Sites", online at http://www.whsrn.org/network/sites.html.

216 WHSRN, "WHSRN Sites: Bay of Fundy", online at http://www.whsrn.org/BayofFundy/index.html.

217 *Ibid*.

Great Marsh WHSRN Regional Site
The Great Marsh, in Massachusetts, was designated a WHSRN site of regional importance in November 2004. Area landowners supporting the WHSRN initiative for the 10,117 hectare site include the US Fish and Wildlife Service (FWS), the Massachusetts Department of Conservation and Recreation, Essex County Greenbelt, the Massachusetts Trustees of Reservations, and the Massachusetts Audubon Society. Among the significant shorebird habitat types at the Great Marsh site are barrier beach dunes, salt marsh, and the estuaries of five rivers. A comprehensive state-led management system is in place for the Great Marsh area and it has been designated an Area of Critical Environmental Concern (ACEC) by the government of Massachusetts. In addition, the USFWS manages Parker River National Wildlife Refuge, which is located within the WHSRN site. Finally, a number of non-profit organisations serve as WHSRN partners, engaging in conservation and education programs within the region.[218]

Monomoy National Wildlife Refuge WHSRN Regional Site
The Monomoy National Wildlife Refuge, a series of islands off Cape Cod, Massachusetts, was recognised in 1999. Approximately 40 species of shorebirds inhabit the area's mudflats, beaches, dunes, salt and freshwater marshes, and freshwater ponds. The US Fish and Wildlife Service manages the area under the National Wildlife Refuge system. In 1996, a beach habitat restoration project was undertaken to increase the diversity and abundance of beach nesting birds.[219]

2.4.4 National Shorebird Conservation Plans

A meeting of WHSRN partners in 1995 prompted discussion on the need for the development of national shorebird plans to provide a foundation for conservation programs in participating WHSRN countries. Following this meeting, work began on Canadian and US shorebird conservation plans identifying strategic issues and presenting recommendations for implementing conservation actions.[220]

Canadian Shorebird Conservation Plan

The Canadian Shorebird Conservation Plan (CSCP) was published in 2000 to provide a framework for the development and implementation of shorebird conservation projects in Canada. The purpose of the Plan is to attain "healthy populations of shorebirds distributed across their range and diversity of habitats in Canada and throughout their global range".[221] To help achieve this vision, the CSCP outlines five goals for conserving shorebird habitat:

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[218] Manomet Center for Conservation Sciences, "Great Marsh, Massachusetts", online at http://www.manomet.org/WHSRN/viewsite-new.php?id=77.
[219] WHSRN, "WHSRN Sites: Monomoy National Wildlife Refuge", online at http://www.whsrn.org/Monomoy/index.html.
[220] WHSRN, "Narrative History", online at http://www.whsrn.org/about/history/narrative.html.
[221] CSCP, *supra* note 211.

1. Restore and sustain shorebird populations;
2. Secure and enhance habitat sufficient to support shorebird populations throughout their ranges;
3. Facilitate the distribution of information on shorebird conservation needs and activities;
4. Facilitate and promote coordinated shorebird conservation initiatives throughout Canada;
5. Ensure shorebird conservation efforts are guided by common principles throughout the Western Hemisphere.[222]

Implementation of the CSCP is overseen and coordinated by the Canadian Shorebird National Working Group (CSNWG). The Working Group is composed a representatives from the federal and provincial governments, and various conservation organisations. The Science Support Team, a group of experts on shorebirds, advises the Working Group on addressing information gaps and other scientific matters.[223]

The CSCP emphasises the importance of coordinating shorebird conservation efforts at the regional, national and international level. Six regional shorebird conservation plans have been developed to implement the conservation framework set out in the national plan at the local level. The Atlantic Canada Shorebird Conservation Plan is responsible for governing shorebird conservation efforts in the Gulf of Maine region. On an international scale, the CSCP promotes communication and collaboration with those responsible for managing the US Shorebird Conservation Plan. Even broader integration is evidenced in the Plan's express support for the WHSRN program. CSCP initiatives are also integrated into the international NABCI framework, which guides all Canadian bird conservation planning efforts. Overlapping membership between the CSNWG and NABCI Canada Council facilitates this coordination.[224]

US Shorebird Conservation Plan

The US Shorebird Conservation Plan was completed in 2000, and a revised version was published the following year. The Plan outlines a conservation strategy for migratory shorebird populations and habitats, including a framework for identifying conservation priorities. The Plan's vision is to "ensure that stable and self-sustaining populations of all shorebirds are distributed throughout their range and diversity of habitats in the US and across the Western Hemisphere".[225] Companion technical reports outlining strategies developing conservation assessments, monitoring programs, and educational initiatives supplement the Plan document.[226]

Implementation of the management plan is led and coordinated by the US Shorebird Conservation Plan Council. The Council, which meets twice a year, is composed of

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[222] *Ibid*.
[223] *Ibid*.
[224] Canadian Wildlife Service, *supra* note 212.
[225] US Shorebird Plan, *supra* note 213.
[226] *Ibid*.

government and non-government representatives. Council members facilitate communication and collaboration among conservation organisations and initiatives at the regional, national and international scale. The Council is also responsible for reviewing and updating the Shorebird Conservation Plan.[227]

2.4.5 Waterbird Conservation for the Americas

Waterbird Conservation for the Americas (WCA) was established in 1998 as an independent, international, voluntary partnership to coordinate waterbird conservation efforts across North America, Central America, the Caribbean, and the Pacific and Western Atlantic oceans. The WCA defines waterbirds as "bird species dependent on aquatic habitats to complete portions of their life cycles".[228] In North America, the WCA initiative focuses primarily on seabirds, coastal waterbirds, wading birds, and marshbirds, as shorebirds and waterfowl are addressed by the WHSRN and NAWMP respectively.[229]

The WCA advocates the development of integrated, multi-tiered conservation programs, undertaken within the context of multi-species and multi-use management regimes. As part of this integrated process, the WCA promotes cooperation and collaboration with international and regional bird conservation schemes, such as NAWMP, NABCI, and the WHSRN. Partnerships with organisations and initiatives focused on water supply, flood control, wetland protection, fisheries, and recreation are also encouraged. In implementing its multi-tiered approach, the WCA relies on national and regional initiatives to develop management programs and plans in accordance with WCA principles and objectives.[230]

Two of the key initiatives of the WCA are the North American Waterbird Conservation Plan (NAWCP) and the Waterbird Monitoring Partnership. Established in 2002, the NAWCP sets out a broad continental framework for waterbird conservation and management and outlines an assessment of the resource and conservation issues, needs, and threats.[231] Generally, the NAWCP does not address specific conservation actions, but concentrates on principles and objectives, leaving the development and implementation of programs to existing conservation initiatives.

To help integrate regional waterbird conservation initiatives, the NAWCP proposed the development of a Waterbird Monitoring Partnership.[232] The Partnership is a continental network of collaborators who agree to and implement comparable population monitoring techniques and contribute to a centrally managed waterbird database. The Partnership

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227 *Ibid*.
228 WCA, "What Are Waterbirds?", online at http://www.waterbirdconservation.org/waterbirds/.
229 WCA, "Waterbird Conservation for the Americas", online at http://www.waterbirdconservation.org
230 *Ibid*.
231 J.A. Kushlan *et al*., *Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan*, Version 1. (Waterbird Conservation for the Americas, 2002) [NAWCP].
232 *Ibid*.

is coordinated by the USGS Patuxent Wildlife Research Center's Monitoring Program.[233]

The Waterbird Conservation Council coordinates the implementation of the WCA management plan, updates the NAWCP as required and facilitates communication and collaboration among waterbird conservation initiatives. Council membership is comprised of federal and regional government officials, and non-governmental conservationists and resource managers, from member countries.[234]

Wings Over Water (WOW) is the national management plan for the Canadian component of the WCA. The Plan's vision is "to ensure populations of waterbirds are sustained or restored throughout their historical range, in Canada and globally".[235] The WOW Plan outlines strategies for conserving a range of waterbird populations and identifies a list of priority species for conservation initiatives.[236] The WOW National Working Group coordinates the integration of regional, national and international bird conservation initiatives in implementing WOW as a component of the broader NABCI regime.[237] The Canadian Waterbird Technical Committee provides the National Working Group, and regional waterbird initiatives, with technical advice and recommendations on conservation, monitoring and research issues.[238]

In the United States NAWCP conservation principles and objectives are integrated into existing regional bird conservation initiatives. State-led conservation initiatives are coordinated through the International Association of Fish and Wildlife Agencies (IAFWA). The IAWFA Shorebird and Waterbird Working Group is responsible for supporting the WCA initiative.[239]

Regional Waterbird Conservation in the Gulf of Maine

The WCA regional planning units in Canada and the US have been developed based on amalgamations of NABCI Bird Conservation Regions (BCRs) and Pelagic Bird Conservation Regions (PBCRs). The PBCRs were created by the WCA to represent marine areas with particular seabird habitat characteristics, analogous to the NABCI BCRs. PBCRs are similar to the Large Marine Ecosystems employed by the World Conservation Union (IUCN).[240] The Gulf of Maine region falls within the Mid-Atlantic/New England/Maritimes (MANEM) WCA planning area, which runs from the Gulf of St. Lawrence to the southern end of Chesapeake Bay. This region encompasses the NABCI Atlantic Northern Forest BCR (BCR 14) and New England/Mid-Atlantic Coast BCR (BCR 30), as well as portions of the Canadian Eastern Habitat Joint Venture and

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233 Patuxent Wildlife Research Center website at http://www.pwrc.usgs.gov/cwb/.
234 NAWCP, *supra* note 231.
235 Robert Milko *et al*., *Wings Over Water: Canada's Waterbird Conservation Plan* (Canadian Wildlife Service, Environment Canada, 2003) at 1 [WOW].
236 *Ibid.*
237 *Ibid*.
238 *Ibid*.
239 NAWCP, *supra* note 231.
240 *Ibid.*

the US Atlantic Coast Joint Venture. Offshore, the region is divided into PBCR 78, the waters of the Northeast US Continental Shelf, and PBCR 79, the Scotian Shelf.[241]

The MANEM Working Group, comprised of government agencies and non-governmental conservation organisations, promotes and facilitates partnerships among resource managers, researchers and conservationists within the MANEM region. Members also produce and distribute information on waterbirds, habitats and conservation issues. The Working Group helps ensure that regional conservation initiatives are integrated into the continental NAWCP.[242]

One of the goals of MANEM is the development of a regional plan outlining strategies and recommendations for achieving waterbird conservation objectives. The Working Group has produced profiles of waterbird species[243] and habitats[244] for the region, as well as waterbird colony site maps and spreadsheets. Conservation projects throughout the Gulf of Maine include collaborative projects such as the bird surveys and monitoring programs described below.[245]

2.4.6 Collaborative Scientific Research and Monitoring Initiatives

Collaborative scientific research and monitoring initiatives involve governments, academic institutions, non-governmental organizations and individuals in support of conservation measures for migratory and resident aquatic birds.

Scientists from across the region have longstanding collaborative research programs and initiatives in the Gulf of Maine. In the 1970s and 1980s, the Canadian Wildlife Service and the National Audubon Society (US) worked together to restore puffins to historic nesting islands in the Gulf of Maine.[246] Current collaborative scientific initiatives include research on distribution and numbers of phalaropes in the Bay of Fundy and Gulf of Maine with support from the Canadian Wildlife Service (CWS) and US Fish and Wildlife Service (FWS).[247] Collaborative scientific programs on foraging ecology of shorebirds and monitoring of shorebird migrations are also conducted through CWS and FWS and the Manomet Center for Conservation Studies.[248] CWS has letters of

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241 WCA, "Mid-Atlantic/New England/Maritimes", online at http://www.fws.gov/birds/WATERBIRDS/MANEM/INDEX.HTML.

242 *Ibid*.

243 Species Profiles, online at http://www.fws.gov/birds/waterbirds/MANEM/Species%20Profiles.htm.

244 Gulf of Maine Region profile, online at http://www.fws.gov/birds/waterbirds/MANEM/PDFs/marine_GOMfinal2.pdf.

245 *Ibid*.

246 Project Puffin website at http://www.projectpuffin.org/what.html.

247 Pers. comm., John Chardine, Canadian Wildlife Service, 3 August 2006.

248 Pers. comm., Peter Hicklin, Canadian Wildlife Service, 9 August 2006. Manomet is an independent environmental research organization based in Massachusetts. For more information on its shorebird conservation program, see http://www.manomet.org/programs/shorebirds/.

agreement or memorandum of understanding with Guadeloupe, French Guiana and Suriname that would permit collaborative scientific research programs on shorebird migration, although no formal programs are currently in place.[249] These collaborative programs throughout the migratory and foraging range of aquatic bird species allow scientists to quantify why certain areas and habitats are important for species and facilitate designation of specific sites for conservation purposes.

Monitoring programs are designed to provide reliable information on the distribution, abundance and population trends of shorebirds. While consistent monitoring at any location is important to analysis of population change, for shorebirds, for example, a whole flyway approach to conservation planning is critical. Both the US and Canadian Shorebird Conservation Plans call for coordinated planning and implementation of shorebird conservation at international, national, regional and local levels.

Survey programs in the Gulf of Maine region support shorebird conservation programs. The Program for Regional and International Shorebird Monitoring (PRISM) coordinates and expands on existing shorebird survey efforts, including the International Shorebird Survey, the Western Shorebird Survey and the Canadian Maritimes Shorebird Survey. This closer coordination and expanded survey effort will increase the power of statistical analyses and more clearly define shorebird conservation issues on a continental scale.

Collaboration in monitoring of seabirds, in particular oiled birds, also relies on volunteers from across the Gulf of Maine region. The Seabird Ecological Assessment Network (SEANET), based at Tufts Cummings School of Veterinary Medicine in Maine, is a network of more than 60 seabird and ecological health organizations from the northeast coast of the United States and Canada.[250] Founded in 2002, SEANET is funded by the US federal government and private charitable foundations. One of SEANET's main projects is 'citizen-scientist beached bird surveys' where volunteers walk the coast collecting data on seabird mortality. They have surveyed over 4,000 km of beaches in 2, 278 surveys by 267 reporting volunteers.[251] SEANET also compiles a GIS-based data repository of seabird and environmental information, including causes of mortality, patterns of environmental contaminants and shipping, habitat, population distribution, and disease outbreaks.[252] In Canada, the Bay of Fundy Beached Bird Survey collaborates with the SEANET on training sessions for volunteers.[253] Its 2005 Report recommends closer ties and collaboration with SEANET on causes of seabird mortality.[254]

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[249] Pers. comm., Peter Hicklin, Canadian Wildlife Service, 9 August 2006.
[250] Seabird Ecological Assessment Network (SEANET), online at http://www.tufts.edu/vet/seanet/index.shtml.
[251] SEANET, *SEANET Volunteer Newsletter*, Vol.2, March 2006, p.1, online at http://www.tufts.edu/vet/seanet/pdf/seanet_vol_newsletter_mar_06.pdf.
[252] http://www.tufts.edu/vet/seanet/index.shtml.
[253] Greg Campbell, *Bay of Fundy Beached Bird Survey 2005 Report*, Bird Studies Canada – Atlantic Region, online at http://www.bsc-eoc.org/download/ACFundybeachbirds2005.pdf.
[254] *Ibid*, p.7.

SECTION 3

Regional Cooperation on Acid Rain, Mercury Pollution, Climate Change and Ocean Initiatives – New England Governors and Eastern Canadian Premiers

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3.1 Introduction

The New England Governors and Eastern Canadian Premiers (NEG/ECP) include the States of Maine, Massachusetts, Vermont, New Hampshire, Rhode Island, and Connecticut, as well as the Provinces of Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, and Québec. These jurisdictions have cooperated on a number of issues, including three key transboundary environmental issues: acid rain, mercury pollution, and climate change. There are action plans in place for each of these issues. Initiatives on Acid Rain [255] and Mercury [256] date back to 1997-1998, while the initial Action Plan for Climate Change was developed in 2000-2001.[257] More recently the NEG/ECP have begun to address initiatives on oceans.

3.2 Acid Rain Program

In 1997, the NEG/ECP recognized acid rain as "a joint concern for which a regional approach on research and strategic action is required". A draft framework for action was quickly developed, and a year later, the acid rain program was initiated with the approval of the 1998 Acid Rain Action Plan. The Action plan includes the following guiding principles:

1. Reductions in the discharge of sulphur and nitrogen into the environment are needed to avoid irreversible environmental damage;
2. Regional coordination is necessary for an effective response;
3. Goals and objectives shall be developed with a view to ecological, human health and economic benefits;
4. Appropriate controls outside the region are also needed.

[255] 1998 Acid Rain Action Plan.
[256] 1998 Mercury Action Plan.
[257] 2001 Climate Change Action Plan.

The Action Plan then identifies goals and recommendations for action in the following six areas:

Regional Coordination of Data Collection and Management
Monitoring Program for Surface Water Quality
Monitoring Program for Fine Particulate
Forest Mapping Research (on acidification and soil quality)
Sulphur and Nitrogen Control Strategies
Public Awareness and Education.

Targets for emission reductions for sulphur dioxide are 50% by 2010, and 20-30 % for nitrogen oxides by 2007. To achieve these targets, work has focussed on three areas, emission reductions, research and monitoring, and public education and outreach. An Acid Rain Steering Committee was established to coordinate implementation. Based on the August 2005 status report, considerable progress has been made to encourage jurisdictions within the NEG/ECP and beyond to agree to additional reductions in emissions; however, it is too early to tell whether the targets will be met in all NEG/ECP jurisdictions. The status report also points out that further reductions of sulphur and nitrogen emissions will be needed.[258] Significant progress on research and monitoring is also reported, particularly with respect to data management, water quality monitoring, fine particulate monitoring, and forest mapping.[259]

3.3 Mercury Program

Regional efforts on mercury were also initiated at the 1997 Conference of the NEG/ECP, which charged the Environment Committee to develop a Mercury Action Plan to "continue to advance the understanding of mercury in this region", to "support cooperative action" and "to begin to address mercury releases and resulting public health and environmental impacts".[260] A draft was prepared, refined in February 1998, and the final Action Plan approved in June 1998.

The following five guiding principles are identified in the Action Plan:

1. In order to protect human health and the environment, the precautionary principle shall be used;
2. Efforts to eliminate mercury in one media should not result in significant contamination in another media;
3. Regional coordination is necessary for an effective response;
4. Goals and objectives shall be developed with a view to ecological, human health and economic benefits;
5. Appropriate controls outside the region are also needed.

The Mercury Action Plan calls for the establishment of a Mercury Task Force to coordinate implementation and an overall regional objective of reducing mercury

[258] 2005 Status Report, at 5.
[259] *Ibid.*, at 2-3, 8-9.
[260] Mercury Action Plan, June 1998, at 1.

emissions from all sources of 50% by 2003 was established. More specific targets and recommendations are identified for municipal waste combustors, medical waste incinerators, municipal sewage sludge incinerators, coal fired power plants and other boilers, industrial sources, and area sources. Specific strategies for achieving reductions include source control (such as reducing or eliminating the use of mercury in households, hospitals, dental practices), waste segregation, and emission controls. Education and outreach as well as research and monitoring are important components of the Action Plan.

The 2005 Status Report suggest that some progress has been made, but "fish from waterbodies across the region are still not safe to eat", and further progress is therefore clearly needed.[261] The Mercury task Force is now working toward a target of 75% regional reduction in emissions by 2010.[262] The report suggests a wide range of jurisdictional targets, with Nova Scotia committing to 30% by 2005, and Massachusetts and Connecticut considering reductions in the range of 85% to 95 % by somewhere between 2007 and 2012.[263]

3.4 Climate Change Program

The climate change initiative of the NEG/ECP was the last of the three regional air initiatives to be developed, but the Climate Change Committee appears to have been the most active since the development of the 2001 Action Plan. Since then, in addition to annual updates to the NEG/ECP, there has been a symposium on adaptation, a regional GHG emissions report, the launch of a program for Colleges and Universities, and a 2006 discussion paper inviting public comment on the implementation of the Action Plan.

The original action plan was prepared by the Committee on the Environment and the Northeast International Committee on Energy, and approved by the NEG/ECP in August 2001. The plan recognizes the human influence on the climate system, and the benefits of regional cooperation in reducing GHG emissions, taking other mitigation measures, and planning for impacts and adaptation. The action plan also recognises a number of collateral benefits of climate change mitigation, such as energy security, competitiveness, reduced air pollution, and reduced vulnerability to energy price fluctuations. A climate change steering committee was established to oversee the implementation of the action plan.

The plan identifies four guiding principles for action on climate change. They are:

1. The need to identify constructive measures to reduce energy and non-energy related GHG emissions;
2. Actions that focus on "no regrets" measures, involve of all segments of society, and are mindful of the energy supply needs of the region;

[261] 2005 Status Report, at 2.
[262] *Ibid.*, at 3.
[263] *Ibid.*, at 4.

3. The need for long-term environmental and economic sustainability, including reducing GHG emissions and adapting to the already changing climate;
4. The need to work with the two federal governments.

The plan identifies a short, medium and long-term goal for the reduction of GHG emissions in the region:

> Short-term goal: Reduce regional GHG emissions to 1990 emissions by 2010
> Medium-term goal: Reduce GHG emission by at least 10% below 1990 emissions by 2020
> Long-term goal: Reduce regional emissions sufficiently to eliminate any dangerous threat to the climate (estimated to require reductions of 75-85 % below current levels)

Specific actions were then identified in four general categories to help achieve these goals in line with the guiding principles. On the information management side, specific actions identified include the need for standardized emissions inventories within the region, and the creation of a regional emissions registry, which in turn would lead to the exploration of a trading mechanism. The March 2004 report on GHG emissions in the participating jurisdictions responds to the first of these action items.[264] To date, no emissions registry has been developed, but based on the August 2005 Report of the Climate Change Committee, efforts in coordination with the emissions trading initiative for the US northeast are underway with the goal of establishing a registry and a trading system.[265]

A second category of actions relates to adaptation, including the anticipation and avoidance of negative social, economic and environmental impacts of climate change. Specific action items deal with the vulnerability of living organisms, sensitive habitats, and resource-based industries, such as forestry, fisheries, and agriculture. These particularly vulnerable sectors were the subject of a symposium in March 2004 which led to a number of recommendations. The symposium was noted by the NEG/ECP at its August 2004 meeting. The results were formally presented at its August 2005 meeting. At the symposium, specific recommendations were made with respect to impacts and adaptation for agriculture, biodiversity and wildlife, coastal regions, fisheries, and forestry.[266] There is no indication that these recommendations were formally adopted by the NEG/ECP. A range of other adaptation issues is identified in the 2001 Action Plan.[267] A third area of action identified is education and outreach. The College and University Linkage initiative, which has resulted in commitments from well over 100 educational institutions within the region to reduce GHG emissions and educate students on climate change, is one such educational effort.

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[264] Proceedings of the Symposium on Climate Change in New England and Eastern Canada: Natural Resource Impacts and Adaptation Responses, Boston, March 15, 2004.
[265] Climate Change Committee, August 2005 Report.
[266] March 15, 2004 Report, at 17 to 20.
[267] 2001 Action Plan, at 16.

The fourth category, dealing with various emission reduction initiatives, makes up the bulk of the action items. Each jurisdiction is to develop a plan for reducing GHG emissions and for conserving energy. States and provinces have committed to leading by example, by taking measures to reduce GHG emissions from activities within government control. Within the electricity sector, the parties have agreed to reduce CO2 emissions per unit of power by 20% by 2025. In addition, there is a general commitment to reduce energy demand by the year 2025 by 20% through efficiency and conservation.[268] Finally, the Action Plan makes various recommendations for GHG emission reductions in the transportation sector, including a shift to high efficiency vehicles, smart growth measures, and investment in mass transit.[269]

A particular initiative under way under the category of government leading by example is a partnership program with municipalities in participating jurisdictions.[270] As of August 2005, progress was also reported with respect to the preparation of some state and provincial plans, and the promotion of renewable energy and energy efficiency. In addition, an inventory of specific state and provincial initiatives on climate change is being compiled to serve as a repository of best practices.

Refer to http://www.neg-ecp-environment.org/page.asp?pg=62 for a complete list of the NEG/ECP Climate Change Steering Committee.

3.5 Initiatives on Oceans

In the process of implementing the United States Oceans Action Plan, the New England Governors committed to forming a Northeast Regional Ocean Council (NROC), one of seven nationally. In 2005, the NEG/ECP resolved to facilitate coordination with the eastern provinces by establishing an Oceans Working Committee comprised of the NROC and representatives from Canada. At the May 2006 meeting of the NEG/ECP there was a further resolution regarding the Oceans Working Group. The NEG/ECP has instructed its Oceans Working Committee to focus on the following tasks:

1. Prioritize regional issues for the councils to address including those related to:
    - marine and oceans-related research and development, education, exploration, observation, oceans management and security;
    - invasive species, disease identification and control and environmental factors; and
    - partnerships and synergies to facilitate existing initiatives such as the Gulf of Maine Council on the Marine Environment and encourage new initiatives and partnership.

[268] No baseline is given, so presumably this is a reduction relative to business as usual.
[269] 2001 Action Plan, at 17.
[270] Climate Change Committee, August 2005 Report.

2. Develop a long-term strategy to explore regional governance issues, such as:
    - monitoring and management actions to assess effectiveness of addressing regional ocean priorities; and
    - data sharing, technology development and coordinated funding strategies.

3. Work cooperatively with federal agencies to formulate a regional ocean plan and implementation strategy.

To date, the Oceans Working Committee has held planning meetings and Canadian and American co-chairs have been appointed. At the May 2006 NEG/ECP meeting, the Committee outlined its next steps:

- finalize the Committee's terms of reference;
- identify specific areas of mutual interest;
- identify any potential role that the Government of Canada can play on the Canadian side;
- complete the workplan; and
- work with federal governments in both Canada and the US to help support and evolve the ocean action plans in each country.

The role of the Committee was described as sharing information on science management, economic activities, how to incorporate best practices for governance and for integrated management, state of the oceans reporting, and technology development as a means of enhancing economic opportunities.[271] The Committee expects to submit its workplan to 2007 NEG/ECP conference.

3.6 Conclusion

Clearly, considerable effort has been made within the NEG/ECP to coordinate efforts on acid rain, mercury, and climate change. While it may be difficult to separate the impact of regional cooperation on the actions taken in the participating jurisdictions, it is apparent that all parties have benefited from the cooperative approach, and that these issues have benefited from the increased profile, and the added capacity that has resulted from this cooperation.

The climate change efforts are entering a particularly critical stage, as there is currently no leadership on this issue at the federal level in either country. However, opportunities for regional cooperation under the umbrella of the NEG/ECP hold some promise of ongoing progress on this issue.

Although at an early stage the recent initiatives on oceans also hold promise for further cooperation within the NEG/ECP.

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[271] Transcript of the Thirtieth Annual Conference of the New England Governors and the Eastern Canadian Premiers, Newport, Rhode Island, 12 May 2006, Report by Mr. Dennis Hogan, Assistant Deputy Minister of Innovation Research and Advanced Technology (Newfoundland and Labrador).

SECTION 4

Fisheries and Shellfish Sanitation

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4.1 Introduction

In the 1970s, Canada and the United States extended their respective offshore jurisdictions to 200 nautical miles and the Gulf of Maine became the exclusive domain of the Canadian and US fisheries.[272] Although the two countries periodically exchanged scientific information, their respective fisheries were managed independently. Two significant problems emerged as a result of this management scenario. In the first place, the two countries' claims overlapped in the region of the eastern end of Georges Bank, covering an area of approximately 30,000 square kilometres.[273] Furthermore, the disputed area was home to several transboundary commercial species, such as cod, haddock and scallops.

The jurisdictional issue was resolved, in October 1984, when the International Court of Justice (ICJ) established the Hague Line as the international boundary between the two countries in the Gulf of Maine. However, the problem of managing transboundary fisheries resources in the region remained. Following the ICJ's decision, fishing activities by Canadian and American fishers were confined to their respective national jurisdictions and cooperative management was virtually non-existent.[274] Meanwhile, increased fishing efforts on both sides of the boundary, throughout the 1980s, led to the overexploitation of the transboundary groundfish stocks that migrate back and forth between the Canadian and US jurisdictions.[275]

4.2 Domestic Fisheries Management Structure

4.2.1 Canada: Fisheries and Oceans Canada

In Canada, authority over the fisheries is centralized under Fisheries and Oceans Canada. Management efforts focus primarily on output controls, such as total allowable catch levels (TACs) and quotas. Limits are placed on the quantity of fish caught and the

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[272] Transboundary Management Guidance Committee (TMGC) website at http://www.mar.dfo-mpo.gc.ca/science/tmgc/introduction.html.

[273] Glen J Herbert, "Fisheries Relations in the Gulf of Maine: Implications of an arbitrated maritime boundary" (1995) 19 Marine Policy 301.

[274] TMGC website, *supra* note 272.

[275] *Ibid*.

areas in which fishing operations can be conducted.[276] Vessel-licensing schemes are also employed in the management of fish stocks.[277] All of these measures are enforced through a system of catch reporting and monitoring programs.[278]

Gulf of Maine Advisory Committee

The Gulf of Maine Advisory Committee (GOMAC) was established by DFO in 1984 to serve as a government-industry forum for discussing the management of fish stocks in the Gulf of Maine.[279] GOMAC is co-chaired by the Director General of the Scotia-Fundy Region of DFO and a senior member of the fishing industry.[280] Committee membership includes representatives from DFO, the Atlantic provincial governments, the fishing industry, the Department of Foreign Affairs and International Trade, and the Canadian Consul in Boston.[281] GOMAC provides DFO with consensus-based advice on transboundary fisheries issues in the Gulf of Maine, including "operational, technical and scientific analyses necessary to support any future formal discussions with the United States".[282] The committee is also responsible for liaising with the Transboundary Management Guidance Committee (TMGC) and recommending Total Allowable Catch levels for Gulf of Maine groundfish stocks to the Minister of Fisheries and Oceans.[283]

4.2.2 United States: New England Fisheries Management Council

In addition to extending US jurisdiction to 200 nautical miles offshore, the *Magnuson-Stevens Act*[284] established a series of regional councils to regulate fishing activities within this newly-expanded zone. The New England Fisheries Management Council (NEFMC) is responsible for managing the US fisheries in the Gulf of Maine region. The Council is composed of eighteen voting members, which include representatives from the National Marine Fisheries Service (NMFS), regional state governments, and nominated knowledgeable private individuals, usually fishermen.[285] A further four non-voting members, representing the US Coast Guard, the Atlantic States Marine Fisheries

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276 Herbert, *supra* note 273.
277 *Ibid*.
278 Erik Lindebo & Mark Lucas Soboil, "The Groundfish Fishery of Georges Bank: An Examination of Management and Overcapacity Issues" (2002) Institute of Food Resource Economics Working Paper.
279 Fisheries and Oceans Canada, *Georges Bank Haddock Report* (March 2006) [Haddock Report].
280 GOMAC Terms of Reference (document on file with DFO).
281 DFO Maritimes Region website at http://www.mar.dfo-mpo.gc.ca/e/ovrvu.htm.
282 *Ibid*.
283 Haddock Report, *supra* note 279.
284 The Magnuson Fishery Conservation and Management Act (1976) was amended 11 October 1996 and renamed the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. §§1801-1883.
285 NEFMC website at http://www.nefmc.org/about/index.html; Peter Hoagland, Hauke L. Kite-Powell and Mary E. Schumacher, *Marine Area Governance and Management in the Gulf of Maine: A Case Study* (Marine Policy Center, Woods Hole Oceanographic Institution, 1996).

Commission, the US Fish and Wildlife Service, and the State Department, also participate.[286] The NEFMC prepares fishery management plans (FMPs) for the fisheries under its jurisdiction. These plans are subject to final approval by the NMFS Regional Administrator under the authority of the Secretary of Commerce. The Secretary is also responsible for developing the regulations necessary to implement the management plans.[287] The NEFMC's Northeast Multi-species Fisheries Management Plan outlines the management measures in place for a variety of commercial finfish, including Georges Bank cod, haddock and yellowtail flounder.[288] The US groundfish fisheries have primarily been managed using input controls, such as, restrictions on fishnet mesh sizes, minimum fish sizes, seasonal closures of particular fishing areas, and limits on the number of "days at sea" for vessel owners.[289]

4.3 Bilateral Fisheries Management

Prior to 1994, Canada and the United States managed their respective fisheries in the Gulf of Maine completely independent of one another to the detriment of the over-exploited transboundary groundfish stocks.[290] In the early 1990s, Canada reduced its quotas in an effort to promote the recovery and sustainability of haddock stocks.[291] Following a series of informal discussions, Canada and the United States made a joint commitment, in 1994, to reduce fishing levels and rebuild stocks in the region of Georges Bank.[292] As a result, both countries extended their area and seasonal closures in the region.[293] The apparent success of these coordinated efforts facilitated increased communication and cooperation on fisheries management issues.[294] Regional level talks, between Canadian and American scientists, resource managers and fishing industry representatives, led to the formation of the Canada-USA Bilateral Steering Committee in 1995.[295]

In addition to formal fisheries consultation that focus specifically on the Gulf of Maine, Canada and the United States conduct regular informal consultations that include issues of mutual concern in the Gulf of Maine region.

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[286] NEFMC website, *ibid*.
[287] Hoagland *et al.*, *supra* note 285.
[288] NEFMC, *Fishery Management Plan, Environmental Impact Statement, Regulatory Impact Review and Initial Regulatory Flexibility Analysis for the Northeast Multi-Species Fishery* (August, 1985).
[289] Hoagland *et al.*, *supra* note 285.
[290] Haddock Report, *supra* note 279.
[291] TMGC website, *supra* note 272.
[292] *Ibid*.
[293] Haddock Report, *supra* note 279.
[294] TMGC website, *supra* note 272.
[295] Haddock Report, *supra* note 279.

4.3.1 Canada-US Bilateral Steering Committee

The Steering Committee functions as an overseeing body in guiding transboundary management issues in the Gulf of Maine.[296] This informal Committee is co-chaired by the Director General of the Maritime Region DFO and the Northeast Regional Administrator of NOAA's NMFS.[297] In addition to DFO and NMFS, Committee members include representatives of the NEFMC, GOMAC, and Canadian and US fishing industries.[298] The Steering Committee meets bi-annually to discuss transboundary resource management issues and cooperative actions to address them.[299] The Steering Committee was instrumental in the development of the Transboundary Resource Assessment Committee (TRAC) and Transboundary Management Guidance Committee (TMGC) processes that, in turn, led to the 2003 Canada-US resource sharing agreement for Georges Bank cod, haddock and yellowtail flounder.[300]

A recent initiative is the proposed development of a DFO-NOAA workplan under the auspices of the DFO Deputy Minister and the Director of NOAA (not yet approved).[301]

4.3.2 Transboundary Resource Assessment Committee

Under the auspices of the Steering Committee, scientists in Canada and the United States first compiled joint stock assessments for Georges Bank cod, haddock and yellowtail flounder in 1997. The success of this coordinated effort led to the formation of the Transboundary Resource Assessment Committee (TRAC) in 1998, which combined the stock assessment and peer review processes within the work of a single joint Canada-US committee.[302]

TRAC serves as the scientific arm of the TMGC.[303] TRAC seeks to ensure that the management efforts of both Canada and the United States, either pursued independently or cooperatively, are founded on a common understanding of resource status. Since its inception, TRAC has reviewed stock assessments and projections for the transboundary shared resources in the Gulf of Maine-Georges Bank region. TRAC

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296 *Ibid*.
297 F. Greg Peacock & Gerard Peters, "Canada/USA Regional Transboundary Guidance" (DRAFT), copy on file with the authors.
298 *Ibid.*
299 Maxine Westhead, "Canada/US Steering Committee", copy on file with the author.
300 F. Greg Peacock and Gerard Peters, "Bilateral Management of Transboundary Fish Stocks: An informal approach to ecosystem-based management", Paper presented at the *Sharing the Fish – Allocation Issues in Fisheries Management 2006 Conference*, Fremantle, Australia (March 2006), online at http://www.fishallocation.com/assets/pdf/papers/GregPeacock.pdf
301 Maxine Westhead, Project Leader, Bay of Fundy/Gulf of Maine, Fisheries and Oceans Canada, (Pers comm.).
302 Peacock & Peters, *supra* note 297.
303 Westhead, *supra* note 299.

has provided advice for management of cod, haddock and yellowtail flounder stock in the region to TMGC since its formation in 2000.

NMFS and DFO each appoint a person to act as TRAC co-chairs to oversee the review process and publication of documents. The first step in the review process is drafting the remit (a statement of the analyses and review that is requested of TRAC) which is completed by the TRAC co-chairs in consultation with the TMGC. Assessments are then prepared for each management unit by experts from the National Marine Fisheries Service and DFO. The experts coordinate data preparation, lead the conduct of analyses and facilitate preparation of working papers for presentation to TRAC.

TRAC periodically reviews each stock through a two-tiered peer review process. The *benchmark assessment review* is a periodic intensive peer review of the assessment model and assumptions which form the basis for the recommended approach upon which to base management advice. The benchmark assessment review is re-evaluated when the science so warrants. The most recent benchmark assessment review was the Gulf of Maine and Georges Bank Herring Benchmark Review, May 2006. Participants in this review included:

- Northeast Fisheries Science Centre (NMFS) and DFO Scotia Fundy stock assessment teams and other laboratory scientists
- Invited external (not from NEFSC or DFO Scotia Fundy) reviewers
- Representatives from Canadian and US management agencies
- Canadian provincial and US state representatives
- Canadian and US fishing industry participants.[304]

The annual *assessment review* applies the benchmark assessment framework to fishery, survey and biological data acquired since the last assessment to determine the current status of the stock. This assessment review is then provided to fisheries managers through the TMGC. Participants in the assessment review process include assessment scientists and stakeholders with insights into the fisheries and stocks under review. The most recent assessment review was conducted on Georges Bank cod, haddock, yellowtail Flounder in June 2006.[305]

4.3.3 Transboundary Management Guidance Committee

The Transboundary Management Guidance Committee (TMGC) was established, in 2000, to provide Canadian and US decision-makers with non-binding advice on the management of transboundary cod, haddock and yellowtail flounder stocks in an effort to ensure the consistent management of these shared resources.[306] The group is

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[304] TRAC, 2006. Gulf of Maine-Georges Bank Herring Stock Complex. TRAC Status Report 2006/01, online at http://www.mar.dfo-mpo.gc.ca/science/TRAC/meetings.html.

[305] TRAC. 2006. Eastern Georges Bank Cod. TRAC Status Report 2006/04; TRAC, 2006. Georges Bank Yellowtail Flounder. TRAC Status Report 2006/03; TRAC. 2006. Eastern Georges Bank Haddock. TRAC Status Report 2006/02. Reports online at http://www.mar.dfo-mpo.gc.ca/science/TRAC/meetings.html.

[306] TMGC website, *supra* note 272.

composed of two government, and four fishing industry representatives, from each country.[307] The Committee is responsible for developing guidance documents, such as harvest strategies and resource sharing approaches, for fisheries management authorities in the two countries.[308] The TMGC's terms of reference are:[309]

1. Develop a process for implementing the TMGC's recommendations.
2. Recommend fishing mortality based harvesting strategies that are consistent with US and Canadian objectives.
3. Provide guidance on principles and options for determining a Canada-US resource sharing strategy.
4. Make recommendations for actual Canadian and US harvest levels.
5. Make other recommendations that are mutually beneficial to Canadian and US fisheries.

TMGC Sharing Allocation Proposal

One of the first tasks undertaken by the TMGC was the development of a resource sharing formula for allocating eastern Georges Bank cod, haddock and yellowtail flounder stocks between the United States and Canada. The Committee's Sharing Allocation Proposal, published in January 2002, recommends a common fishing mortality based Canadian-US harvest strategy for groundfish resources in a management area corresponding to the NAFO unit 5Zjm for cod and haddock stocks and unit 5Zhjmn for yellowtail flounder.[310] The report provides recommendations for determining resource distributions within this management area and sets out a seven-year transitional schedule for proportionally allocating shares in the stocks between the two countries.

Initial Canadian and US Sharing Proposals

The TMGC Sharing Allocation Proposal represents a compromise between the disparate sharing proposals initially suggested on behalf of Canada and the United States. In its submission, Canada argued for a sharing agreement that allocates the groundfish using a weighted formula based on resource distribution and past fisheries landings. The proposal accorded the greatest emphasis to resource distribution patterns, which were assigned a weighting of 95%, while resource utilisation was weighted at 5%. Canada also maintained that resource utilisation prior to the delineation of the Gulf of Maine boundary was irrelevant in allocating groundfish stocks between the two countries, since they did not correspond with future opportunities for resource

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307 TMGC website, "Structure & Membership" online at http://www.mar.dfo-mpo.gc.ca/science/tmgc/structure.html; Maxine Westhead, *supra* note 299.

308 TMGC, Guidance Document 2005/01 (2005) [Guidance Document 2005/01].

309 Transboundary Management Guidance Committee, *Development of a Sharing Allocation Proposal for Transboundary Resources of Cod, Haddock and Yellowtail Flounder on Georges Bank*, Fisheries Management Regional Report 2002/1 (Fisheries and Oceans Canada, 2002) [Sharing Proposal].

310 *Ibid*.

utilisation. Finally, Canada favoured a sharing agreement calculated using either NAFO unit 5Z for the combined groundfish stocks, or unit 5Zjm for cod and haddock.[311]

The United States, on the other hand, argued that equal emphasis should be placed on past fisheries landings and resource distribution. The Americans argued that the information used to calculate historical landing patterns and stock distribution estimates should reflect the state of the groundfish stocks at a time when they were healthy "to best reflect the yield potential of a rebuilt stock".[312] The US also asserted that historical investment in scientific research should be taken into consideration in allocating shares in the transboundary fish stocks. In a further departure from the Canadian submission, the American proposal was calculated based on past resource use and stock distribution for the entirety of Georges Bank.[313]

Canada-US Consensus

Following the submission of the disparate Canadian and US proposals, the two countries reached consensus on a number of issues that needed to be resolved for the development of the resource sharing agreement. In the first place, agreement was reached that NAFO unit 5Zjm would serve as the management unit for transboundary cod and haddock stocks. The parties also agreed to use an average of the three NMFS and DFO surveys carried out each year, to which a responsive smoothing procedure would be applied, to determine groundfish resource distribution patterns. A compromise was reached with regard to the time period on which historical resource utilisation patterns would be based. The years 1967-1994 were selected in order to exclude landings data from the period following the collapse of the Georges Bank cod and haddock stocks. Finally, the decision was made to develop a fixed 7-year transitional schedule for implementing the sharing agreement.[314]

Resource Distribution Predictions

Accurate predictions of groundfish stock distributions are an important component of an effective fisheries management strategy. The TMGC was given the mandate of developing a mechanism that would allow the sharing agreement to reflect changes in resource distribution patterns over time. Stock distribution in the designated management areas is calculated using the results of bottom trawl surveys carried out by the NMFS and DFO. In its Sharing Allocation Proposal, the TMGC recommends combining the results of the NMFS's spring and fall surveys with DFO's annual winter survey to produce yearly stock distribution averages. For estimating yellowtail flounder distributions, a simple average of the three surveys conducted each year is sufficient, since this species does not exhibit marked migration patterns.

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311 *Ibid.*
312 *Ibid.*, at 38.
313 *Ibid.*
314 *Ibid.*

For Cod and haddock, which migrate seasonally, the TMGC proposed two alternative options for combining the annual survey data. The first method is a simple average of available surveys for each year, as recommended for yellowtail stocks. Alternatively, the surveys may first be classified according to the time of year in which they were conducted to produce average distributions for both the colder winter-spring half of the year and the warmer summer-fall half. These two seasonal distribution averages would then be combined to produce a yearly average. The report also proposes the application of a statistical smoothing procedure to the final averaged results of the survey data to compensate for any anomalous results due to statistical sampling variation or natural, but unpredictable, fluctuations in resource distribution. The final result should be a reliable near-term (1-3 years) estimate of stock distributions on either side of the Canada-US maritime boundary.[315]

Determining Resource Allocation Percentages

The TMGC Sharing Allocation Proposal provides recommendations for determining the apportionment of groundfish resources within the management areas between Canada and the US. The report sets out a seven-year transitional schedule with allocation percentages that take into account both contemporary resource distribution and historical utilisation patterns. Resource distribution is calculated annually, using the results of the three bottom trawl surveys for the most recent 33 years, to determine the proportion of the groundfish stocks on either side of the international boundary. Historical use percentages, based on fishery landings data from 1967-1994, are fixed. In the first year of the agreement, 2003, the sharing formula assigns a weighting of 60% to resource distribution and 40% to historical landings. This weighting ratio gradually shifts over the course of the seven-year transition period until resource distribution is weighted at 90% and historical landings 10% by 2010.[316]

Allocation Formula

% country share = α_{year} country utilisation + β_{year} resource distribution

where α_{year} = percentage weighting for utilisation in year
β_{year} = percentage weighting for distribution in year
resource distribution = 30% loess smoothing of most recent 33 years

country utilisation:

	USA	CANADA
Cod	40%	60%
Haddock	45%	55%
Yellowtail	98%	2%

percentage weighting:

2003	2004	2005	2006	2007	2008	2009	2010
60/40	60/40	65/35	70/30	75/25	80/20	85/15	90/10

[315] The report recommends the application of a robust locally weighted regression scatterplot smoother. *Ibid.,* at 50-51.

[316] *Ibid.*

Implementation of the Sharing Agreement

In 2003, Canada and the United States formally agreed to implement the resource sharing allocation proposal for Georges Bank cod, haddock and yellowtail flounder. Canada implemented the agreement in its fisheries management plan in 2003. The United States moved towards implementation in 2005 with the passage of Amendment 13 to the Magnuson-Stevens Act.[317]

TMGC Guidance Documents

The TMGC publishes a Guidance Document each year containing a summary of the basis for the Committee's recommendations to Canadian and US fisheries management authorities.[318] The report sets out the determination of resource allocation percentages to be applied by each country in drafting their respective fisheries management plans for the coming year. For the 2006 fishing year, the Guidance document recommends a combined Canada-US TAC for Eastern Georges Bank cod of 1700mt. Based on the 2006 allocation weighting ratio of 70% resource distribution and 30% historical use, Canada is entitled to 78% of the TAC, or 1326mt, and the United States to 22%, or 374mt.[319] The same formula is applied to Eastern Georges Bank Haddock and a recommended combined TAC of 22,000mt is apportioned with 66% (14,520mt) to Canada and 34% (7480mt) to the United States. For Georges Bank yellowtail flounder stocks, of the suggested 3000mt TAC, 31% would go to Canada (930mt) and 69% (2070mt) to the United States. In addition to recommending national quotas for the three groundfish species, the Guidance Documents provide information on past exploitation of these fisheries, the state of the resources in terms of biomass indices, species productivity levels and catch risk assessments for the coming fishing year.

Database for Transboundary Resources

The TMGC was given the responsibility of establishing a common database for transboundary resources in the Gulf of Maine. The database was to cover "as long a time period and as fine a spatial scale as reasonable" and include details of historical landings, research vessel survey data and biological information on stock migration patterns, spawning areas and nursery grounds.[320] In 2001, a TMGC Technical Working Group developed a pilot database, for Gulf of Maine cod, haddock and yellowtail flounder, incorporating fishery landings and bottom trawl survey information. The database was amended, in 2002, using data gathered as part of the TRAC process. Among the additions were yearly Canadian and US catch totals for groundfish stocks on the eastern and western portions of Georges Bank. Estimated biomass indices for strata sections partitioned by the international boundary, as well as summary biomass indices, by location and survey, for the Canadian and US sides of the boundary, were also

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317 Haddock Report, *supra* note 279.

318 TMGC website, "Guidance Documents", online at http://www.mar.dfo-mpo.gc.ca/science/tmgc/tgd.html.

319 Guidance Document 2005/01, *supra* note 308.

320 Sharing Proposal, *supra* note 309.

included. Finally, summaries of seasonal and annual biomass variations were presented.[321]

Summary of Annual Process for Determining Harvest Levels

1. Steering Committee and TMGC draft remit for TRAC
2. TRAC completes stock assessments for Georges Bank cod, haddock and yellowtail flounder and submits TRAC Status Report to TMGC
3. TMGC applies TRAC assessment data to set target TACs for the three groundfish species and applies the sharing agreement to determine resource allocation for Canadian and US fisheries
4. TMGC submits its recommendations to GOMAC and NEFMC
5. GOMAC and NEFMC review status and management measures
6. DFO and NEFMC implement management measures.

For the purposes of activities 1-4 (above), TMGC goes directly to NEFMC and GOMAC with guidance. However, for item 5 it reports to the steering committee via the Canada-USA International Integration Committee. It should be noted that only TMGC/TRAC are international with the delivery in each case being domestic and under domestic law.

Canada-USA International Integration Committee

The latest transboundary management development under the framework of the Canada-US Steering Committee was the approval of a Canada-USA International Integration Committee, as a pilot project, in September 2005.[322] The Integration Committee (IC) serves as the operational arm of the Steering Committee, to which it will report on a semi-annual basis.[323] The IC will also provide a direct link to the TMGC and Working Groups that operate under the umbrella of the Steering Committee.[324] The Species at Risk Working Group, Habitat Working Group, and Oceans Working Group will report directly to the IC. IC membership will be equally divided between Canada and the United States, with the Canadian and US co-chairs selecting ad hoc members from the TMGCs and Working Groups, to join the four core members, on an issue-by-issue basis.[325] The Integration Committee's mandate, as authorized by the Steering Committee, is:

1. Ensure consistency in approach across the TMGCs and Working Groups
2. Provide multi-disciplinary feedback to the TMGCs and Working Groups on reports and proposed recommendations
3. Provide analyses and submit recommendations to the Steering Committee co-chairs

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321 *Ibid*.
322 Peacock & Peters, *supra* note 300; Westhead, *supra* note 299.
323 Westhead, *ibid*.
324 *Ibid.*
325 *Ibid.*

4. Recommend dispute resolution processes to the TMGCs, Working Groups and Steering Committee
5. Provide record keeping, archival, coordination and general secretariat services to the Steering Committee, TMGCs and Working Groups.[326]

Additional TRAC/TMGC Processes

The TRAC/TMGC Process is continuing to develop and will soon be expanded to include other transboundary commercial fish species. A TRAC specific to herring was formed in 2005[327] and a related TMGC is scheduled to be established in 2006.[328] A TRAC and TMGC for mackerel have also been proposed and may be in place as early as 2008.[329] Finally, the possibility of developing TRACs for halibut, mackerel, dogfish and pollock has been discussed.[330]

Machias Seal Island Ad Hoc Working Group

The Canadian and US lobster fisheries have not been subjected to a cooperative initiative and continue to be managed independently. This approach has the potential to create problems in the disputed waters surrounding Machias Seal Island and North Rock, where Canadian and US jurisdictional claims continue to overlap. The area is part of the Canadian management applications for all species fished in the area and during normal seasons. In addition, there have been extraordinary efforts put forward since 2002 to develop specific fisheries designated for only the disputed area. These fisheries include lobster where vessels from both countries fish in these waters during the normal closed Canadian period, scallops during the normal closed period, Jonah crab under special arrangement with lobster, sea urchin and possibly shrimp.[331] This issue has been addressed at every Canada-US bilateral discussion since 2000. An ad hoc working group was developed among fishers from both countries and was facilitated by representatives from DFO, NMFS and the State of Maine. The group was assigned the task of developing recommendations for coordinated management approaches for the Canadian and US lobster fisheries located in the disputed grey zone around the island. Nothing has materialized and the group is non-functional.[332]

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326 Haddock Report, *supra* note 279.
327 *Ibid*.
328 Westhead, *supra* note 299.
329 *Ibid.*
330 *Ibid.*
331 Peacock and Peters, *supra* note 300.
332 Email from Greg Peacock, Executive Director, Federal/Provincial Relations, DFO Maritimes.

4.3.4 Informal Fisheries Consultations between the Government of Canada and the Government of the United States

Canada and the United States conduct regular informal consultations on bilateral, multilateral and global fisheries conservation and management issues of mutual benefit.[333] These informal consultations are held to exchange views and enlist support for fisheries trade, conservation and management initiatives. Parties meet annually, alternating meetings between the United States and Canada. This meeting generally takes place in late July or early August.

These consultations are designed to provide broad coordination on issues of concern as opposed to negotiation of final agreements. Discussions on bilateral issues generally focus on improving communication and coordination with regard to conservation and management of shared stocks (including species of mutual concern in the Gulf of Maine). In many cases, separate negotiations are underway on these species, and this meeting allows officials on both sides to discuss avenues for future progress. In addition to bilateral issues, the consultations include discussions on improving international fisheries governance, international fisheries management agreements and multilateral organizations, and global fisheries issues of mutual interest.

The most recent Informal Fisheries Consultations between the United States and Canada were held on 26 July 2006 in Silver Springs, Maryland. Bilateral meeting topics included: the Machias Seal Island lobster fishery, border inspections of Canadian fish and right whale ship strikes. Multilateral issues discussed included mutual interests in ICCAT, NAFO and sea turtle conservation.

4.4 Fisheries Enforcement in the Gulf of Maine

Non-compliance with fisheries management regulations has been cited as a contributing factor in the overexploitation of fish stocks on Georges Bank.[334] The Gulf of Maine boundary delineation led to an increase in illegal fishing, particularly by US scallop fishers. The location of the boundary line resulted in a substantial difference in the scallop beds allocated to each country, with Canada gaining the majority of the resource. Many US scallop fishers, displaced from their traditional fishing grounds, continued to cross into Canadian waters to fish illegally.[335] Incidents of US groundfish vessel boundary violations were also recorded in the years following the ICJ decision.[336]

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[333] NOAA Fisheries, Office of International Affairs, online at http://www.nmfs.noaa.gov/ia/bilateral/docs/US-Canada%20-%2005.doc.
[334] Hoagland *et al*., *supra* note 285.
[335] Herbert, *supra* note 273.
[336] *Ibid*.

Numerous incentives existed for fishers to violate the boundary, including financial motives, enforcement difficulties and weak penalties.[337] US scallop vessels fishing illegally in Canadian waters could expect a catch worth US$100,000 per trip, in comparison with a US$30,000 trip fishing legally.[338] This monetary incentive was compounded by the difficulties faced by Canadian officials in enforcing the boundary. In order to be prosecuted in Canada, illegal fishing vessels first had to be apprehended. By staying near the international boundary, fishers were often able to escape back across the border when a Canadian patrol vessel was spotted. Even if charges were to be brought by US authorities, the potential penalties were fairly insignificant in comparison with the harsher Canadian regulations. Canadian penalties included CDN$100,000 fines, confiscation of catch, impoundment of vessel, and possible jail sentences. In comparison, many US scallop fishers treated the possibility of a US$10,000 fine, under the US *Lacey Act*[339], as a justifiable business expense.[340] Furthermore, the successes of such non-compliers likely prompted additional imitators.[341] Finally, many fishers simply felt that the boundary had been wrongly decided and some simply chose to ignore it.[342]

4.4.1 1990 Canada-US Fisheries Enforcement Agreement

In an effort to address the problem of illegal fishing, Canada and the United States signed a reciprocal Fisheries Enforcement Agreement in September 1990.[343] The Agreement obliges each country to enact domestic prohibitions making it illegal for its nationals to violate the fisheries laws and regulations of the other state within the jurisdiction of that Party.[344] As a result, boundary violators will now be violating the laws of both countries.

The Parties also committed to consultations with each other regarding the implementation of the agreement, including the effectiveness of penalties and fisheries enforcement practices to be carried out in the vicinity of the maritime boundary.[345] In the years following the Agreement, Canada and the United States have held regular Implementation Meetings to review enforcement practices and discuss the development of cooperative standards, policies and strategies. Among the subjects that have been addressed are prosecution practices, evidentiary requirements, notification procedures,

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337 Hoagland *et al*., *supra* note 285.

338 Douglas Day and Glen Herbert, "Fisheries Violations of an Arbitrated Maritime Boundary: The Gulf of Maine Case", in G. Blake *et al.* (eds*)*, *The Peaceful Management of Transboundary Resources*, International Law and Policy Series (London: Graham Trotman/Martinus Nijhoff, 1995) 427.

339 Lacey Act Amendments of 1981, 16 U.S.C*.* §§ 3371-3378.

340 Herbert, *supra* note 273.

341 Hoagland *et al*., *supra* note 285.

342 Herbert, *supra* note 273.

343 *Agreement Between the Government of Canada and the Government of the United States of America on Fisheries Enforcement*, 26 September 1990, 30 I.L.M. 420 (*Fisheries Enforcement Agreement*).

344 *Ibid.*, Article 1.

345 *Ibid.*, Article 2.

the interpretation of regulations and hot pursuit.[346] Finally, the Agreement obliges Canada and the United States to make an effort to inform their nationals, who fish in the vicinity of the boundary, as to the law enforcement practices of the other Party.[347]

4.4.2 Canadian and US Cooperative Enforcement Measures

Following the signing of the Enforcement Agreement, Canada and the United States have cooperated in patrolling the areas on either side of the Gulf of Maine boundary to deter illegal fishing activities and monitor compliance with applicable regulations. Fisheries surveillance operations take the form of sea patrols, including onboard inspections of fishing vessels, and aerial overflights. A more recent technique for monitoring vessel catch locations is the use of Vessel Monitoring Systems (VMS), which applies satellite technology to electronically monitor vessel locations.[348] Both countries have also implemented the Agreement through domestic laws, making it an offence for non-authorized fishing in the other's waters, and providing for consistent penalties.[349]

To help ensure a coordinated approach to fisheries enforcement on both sides of the border, the NMFS Office for Law Enforcement meets regularly with its counterparts in DFO to exchange enforcement information. Data sharing is also facilitated by both countries' memberships in the International Network for the Cooperation and Coordination of Fisheries-Related Monitoring Control and Surveillance Network (MCS Network).[350]

4.4.3 Effect of Cooperative Enforcement and Management Measures on Boundary Violations

DFO records detailing the incidence of boundary violations in the Gulf of Maine from 1988 to 2006 demonstrate the positive effect of the Fisheries Enforcement Agreement, and the cooperative fisheries management measures implemented by Canada and the US, in reducing illegal fishing. Violation numbers, which had been on the rise in the years following the maritime boundary delineation, peaked in 1989.[351] Increased levels of cross-border cooperation, coinciding with the signing of the Enforcement Agreement,

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346 Office of International Affairs, *International Agreements Concerning Living Marine Resources of Interest to NOAA Fisheries* (National Marine Fisheries Service, National Oceanic and Atmospheric Administration, 2005-2006), online at http://www.nmfs.noaa.gov/ocs/mafac/meetings/2006_02/docs/05-06%20International%20Agreements-1.pdf

347 *Fisheries Enforcement Agreement*, Article 2.

348 Jeffrey K. Randall, "Improving Compliance in U.S. Federal Fisheries: An Enforcement Agency Perspective" (2004) 35 Ocean Development and International Law 287.

349 See International Fisheries Regulations, United States-Canada Fisheries Enforcement, 50 C.F.R. §§ 300.140-300.144 and *United States Waters Fisheries Regulations*, SOR/91-660, replaced in 1994 by *Fishery (General) Regulations*, SOR/93-53.

350 Office of International Affairs, *supra* note 346.

351 DFO, "USA Transboundary Violations Canada/USA Boundary Line" (unpublished document on file with the authors).

contributed to the substantial drop in recorded incidents of illegal fishing from 1990.[352] A further decrease in boundary violation numbers occurred from 1994, following the two countries' joint commitment to reduce fishing levels and rebuild stocks in the Gulf of Maine.

Scallop Fishery

Boundary violations by US scallopers declined when the NEFMC closed large areas of the US portion of Georges Bank to multispecies fishing activities, in December 1994, in an effort to restore declining groundfish populations.[353] Among the closed zones was a section bordering a significant length of the Gulf of Maine boundary, designated as Closed Area II. Since June 1999, the southern part of this closed area has been re-opened, as a controlled access area, to allow limited scallop harvesting operations to take place.[354] Fishing activities within this area have been closely monitored, however, through the use of surveillance patrols, on-board observers and the electronic reporting of catches.[355] There has been no recorded increase in illegal transboundary fishing in this region since the limited re-opening.[356] This management regime has probably helped reduce the number of boundary violations committed by US scallop vessels on Georges Bank.[357]

Groundfish Fisheries

Boundary violations by groundfish fishers were less of a problem in the years preceding the Enforcement Agreement, as these stocks were in decline on both sides of the border. In such cases, the risk of being caught did not justify the potential rewards from fishing illegally.[358] In addition, Closed Area II, on the US side of the Gulf of Maine boundary line, has continued to remain closed to groundfish fishing operations. The cooperative management of groundfish resources by Canada and the United States, through the Sharing Allocation Agreement, since 2003, is also seen as an important factor in the prevention of current and future boundary violations by groundfish fishing vessels.[359]

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[352] Day and Herbert, *supra* note 338.

[353] Dvora Hart, "Sea Scallops" (January 2001), online at http://www.nefsc.noaa.gov/sos/spsyn/iv/scallop/.

[354] NEFMC, *Framework Adjustment 18 to the Atlantic Sea Scallop FMP, Including an Environmental Assessment, Regulatory Impact Review, Regulatory Flexibility Analysis and Stock Assessment and Fishery Evaluation (SAFE) Report* (2005), online at http://www.nefmc.org/scallops/frame/fw18/fw18_dec05_sec01.pdf.

[355] Hart, *supra* note 353.

[356] DFO Spreadsheet, "Canada/USA Enforcement Treaty - Since 1991: Vessel Occurrences - Canada/USA Boundary - Atlantic Coast" (on file with DFO).

[357] Greg Peacock, Executive Director, Federal/Provincial Relations, DFO Maritimes, Regional Director General's Office, (pers. comm., July 19, 2006).

[358] Herbert, *supra* note 273.

[359] Peacock, *supra* note 357.

4.4.4 Fisheries Enforcement in the Disputed Zone (Machias Seal Island)

The Zone surrounding Machias Seal Island remains an area of disputed jurisdiction caused by overlapping Canadian and US claims. Lobster fishers from both countries have been fishing concurrently in these waters during the summer and fall period since 2002. In the last 2 years expanded effort in a number of species areas has occurred. Because of the dispute over control of these waters, the issue of which country's fisheries regulations apply is also a matter of debate. As a result, a system of flag state enforcement is in place, whereby each country enforces its domestic fisheries laws on its own fishing vessels.[360]

4.5 International Commission for the Conservation of Atlantic Tunas (ICCAT)

Cooperation between Canada and the United States in the conservation and management of tuna and tuna-like species has been indirect multilateral cooperation through their common participation as members of the International Commission for the Conservation of Atlantic Tunas (ICCAT)[361] which was established by the Convention for the Conservation of Atlantic Tunas signed in Rio de Janeiro in 1966.[362] ICCAT serves as a vehicle for cooperation among countries having a mutual interest in the populations of tuna and other highly migratory species of the Atlantic roaming vast areas of the ocean encompassing the excusive economic zones of coastal states like Canada and the United States as well as the high seas beyond. The ICCAT Convention existed long before the 1982 United Nations Convention on the Law of the Sea[363] and the 1995 UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks[364], but anticipated the concerns of those agreements, both of which have been ratified by Canada and the second of which has also been ratified by the United States. Article 64 of the 1982 LOS Convention requires coastal states and other states whose nationals fish for highly migratory species on the high seas to cooperate directly or through

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360 Susan Jones, "Maine Fishermen to Share Disputed Waters", *Commercial Fisheries News* (October 2003), online at http://www.fishresearch.org/Articles/2002/09/sharing.asp.

361 Online at International Commission for the Conservation of Atlantic Tunas (ICCAT) http://www.iccat.es.

362 International Convention for the Conservation of Atlantic Tunas. Signed in Rio de Janeiro 14 May 1966, 673 U.N.T.S. 63 [hereinafter referred to as the ICCAT Convention].

363 United Nations Convention on the Law of the Sea, 10 December 1982, online at http://www.un.org/Depts/los/convention_agreements/convention_overview_convention.htm (Hereinafter 1982 LOS Convention). Ratified by Canada 7 November2003. Not yet ratified by the United States.

364 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, 4 December 1995, online at http://www.un.org/Depts/los/convention_agreements/convention_overview_fish_stocks.htm (hereinafter referred to as the UN Fish Stocks Agreement). Ratified by Canada 3 August 1999 and by the United States on 21 August 1996.

appropriate international organizations to conserve the stocks and to promote their optimum utilization both within and beyond the exclusive economic zones of coastal states. The UN Fish Stocks Agreement elaborates upon what is required to implement the provisions of the 1982 LOS Convention dealing with straddling stocks and highly migratory species, and bolsters the role of regional fisheries management organizations (RFMOs) such as ICCAT in the management of highly migratory species. It addresses issues relating to the membership and functions of such RFMOs, the application of the precautionary approach, and the authority to conserve stocks.

The ICCAT Convention has been ratified by 42 states[365], including Canada, the United States, Japan and most major fishing nations of the North Atlantic Rim. The ICCAT Convention area corresponds to the Atlantic Ocean and its adjacent seas. The jurisdiction of the Convention area includes areas under national jurisdiction of coastal states as well as the high seas. However, Article II of the ICCAT Convention provides that nothing in the Convention shall be considered as affecting the rights, claims, or views of any of the contracting parties with regard to the limits of the territorial waters or the extent of coastal state jurisdiction over the fisheries in international law. Accordingly, the jurisdiction of the ICCAT Convention may extend to the areas under the jurisdiction of coastal states but only to the extent that those states believe that ICCAT is not interfering with the rights and claims that the coastal states concerned have under international law. The ICCAT Convention applies to more than 30 species of tuna and tuna-like species including northern and southern bluefin, skipjack, albacore, bigeye and yellowfin tuna, billfish, sharks, and swordfish.[366]

4.5.1 Organizational Structure, Authority, and Process for Development and Adoption of Conservation Measures

Membership in ICCAT consists of three delegates of each member state. ICCAT has the authority to make non-binding recommendations on the basis of scientific evidence for conservation and management measures designed to maintain the populations of stocks that may be taken in the Convention area at levels "which permit the maximum sustainable catch" (MSC), which is functionally equivalent to the maximum sustainable yield (MSY).[367] Stock assessments are carried out by the Standing Committee on Research and Statistics (SCRS) of ICCAT which meets annually and reviews and coordinates the results of the research programs of member states. The SCRS regularly conducts assessments of 13 targeted species or groups of targeted species. Its reports

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[365] Review Conference on the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Stocks, new York, 22 to 26 May 2006, *Information on ICCAT Compliance with Article 10 of UNFSA, Part 1, p.1,* online at http://www.un.org/depts/los/convention_agreements/reviewconf/ICCAT_submission.pdf.

[366] *Supra* note 365.

[367] ICCAT Convention, *supra* note 362, Article VIII.

are published and transmitted to all meeting participants each year.[368] ICCAT has a number of ongoing research programs including programs on bluefin tuna and billfish.

ICCAT also has four review Panels responsible for keeping under review the species or groups of species falling under their mandate. The advice formulated by the SCRS is reviewed by each Panel and by the Commission when management measures are being developed for individual stocks. TACs are allocated in accordance with the guidelines contained in the *ICCAT Criteria for the Allocation of Fishing Possibilities*.[369] The binding measures taken by ICCAT, including quotas, TACs, size limits, and other measures, are contained in more than 70 recommendations adopted in accordance with Articles VIII and IX of the ICCAT Convention.

4.5.2 Status of Stocks

Many of the major stocks managed by ICCAT are in a depressed state, including bigeye, western bluefin, yellowfin, and swordfish, which are fished in the Gulf of Maine.

> The spawning biomass of West Atlantic bluefin tuna declined from approximately 50,000 metric tons in 1970 to approximately 3000 metric tons in 2001.The SCRS assessment indicates that the fishing mortality on the Western Atlantic bluefin tuna exceeds the level necessary to maintain the MSY and that the potential for rebuilding the stock is unclear.[370]
>
> According to the 2004 assessment of Atlantic bigeye tuna catches of this stock exceeded MSY between 1993 and 1999, causing the stock to decline considerably. The current spawning biomass is slightly below or above the MSY and the SCRS assessment regards further stock declines as likely with a continuation of current catch levels.[371]
>
> At the beginning of 2002 the biomass of North Atlantic swordfish was estimated to be at 94% of the level needed to produce MSY, but high recruitment levels in recent years have resulted in a more optimistic outlook for this stock since reported catch has been below the estimated replacement yield.[372]
>
> Reported Atlantic yellowfin tuna landings in 2001 were above the MSY level estimated during the 2003 assessment and fishing effort and mortality appear to have been in excess of the levels associated with the MSY, with the result that declines in the stock biomass are likely at current catch levels.[373]

The depressed state of many ICCAT-managed stocks has been blamed on a variety of factors. These factors include: the adoption of optimistically high MSY levels as a result of the need of the SCRS and the Commission to rely on biased, inaccurate and

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368 *Supra* note 365, pp.2-3.
369 ICCAT Rec. 01-25.
370 *Supra* note 365, at 21.
371 *Ibid.* p.8.
372 *Ibid.* pp.10-11
373 *Ibid*. pp.13-15.

incomplete data provided by member states;[374] the non-compliance of member states with ICCAT conservation measures;[375] ICCAT's lack of effective enforcement powers;[376] the inability to deal effectively with non-member states whose nationals engage in unregulated fishing in the Convention area;[377] and the failure of ICCAT to implement modern fisheries management approaches, such as the precautionary approach.[378] There is no doubt that all of these factors have contributed to the diminished state of the stocks and that more will have to be done to tackle these issues if ICCAT is to achieve its conservation objectives in the future.

4.5.3 Enforcement and Compliance

ICCAT has few effective enforcement mechanisms. It must rely upon member states to enforce ICCAT conservation and management measures against their own flag vessels and has no ability to control the fishing activities of non-contracting parties. The Conservation and Management Measures Compliance Committee of ICCAT monitors the implementation of the measures adopted through the analysis of statistical and other information submitted by the contracting parties. The submission by contracting parties of data on nominal catch, catch and effort, size sampling, catch by size, fleet size, as well as other biological information is mandatory within the framework of the ICCAT Convention. The Secretariat prepares annual Compliance Tables which include annual reports by contracting parties on the status of their compliance with ICCAT measures, and publishes an annual *Statistical Bulletin*, which includes the total nominal catch, by species, gear, year, and flag.

To improve compliance by contracting parties, in 1996 ICCAT adopted a deterrence mechanism for Atlantic bluefin tuna and North Atlantic swordfish whereby any contracting party that exceeds its annual quota will have its quota for the next management period reduced by the full amount by which its previous quota was overfished.[379] Recent attempts by ICCAT to improve compliance include two resolutions adopted in 2003. The *Recommendation by ICCAT Concerning the Duties of Contracting Parties, Entities or Fishing Entities in Relation to their Vessels in the ICCAT Convention Area* [380] is intended to reinforce international minimum standards for the responsible conduct of fishing operations, consistent with Article 10 (c) of the UN Fish Stocks

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[374] Elizabeth de Lone, "Improving The Management Of the Atlantic Tuna: The Duty To Strengthen The ICCAT In Light Of The 1995 Straddling Stocks Agreement", (1998) 6 N.Y. Envtl.L.J. 656, p.671.

[375] Christopher Carr, "Recent Developments In Compliance And Enforcement For International Fisheries", (1997) 27 Ecology L.Q. 847, p.856.

[376] *Supra* note 375.

[377] *Supra* note 375.

[378] *Supra* note 374, at 672.

[379] *Draft Recommendation by ICCAT Regarding Compliance in the Bluefin Tuna and North Atlantic Swordfish Fisheries*, Rep. of the Meeting of the Compliance Committee, app. 4 (1996); and Christopher Carr, "Recent Developments In Compliance And Enforcement For International Fisheries", 24 Ecology L. Q. 847, p.859.

[380] ICCAT Rec.03-12.

Agreement and the FAO Code of Conduct for Responsible Fisheries.[381] The *Recommendation by ICCAT Concerning Minimum Standards for the Establishment of a Vessel Monitoring System in the ICCAT Convention Area*[382], is intended to improve the capacity of contracting parties to detect violations of ICCAT measures in the Convention area.

4.5.4 Implementation of Modern Approaches to Fisheries Management: Precaution, Biodiversity and the Ecosystem Approach

Precaution

Both the UN Fish Stocks Agreement[383] and the UN Convention on Biological Diversity[384] identify the need for the application of a precautionary approach to marine resource management.

In 1997 ICCAT established an *Ad Hoc* Working Group on the Precautionary Approach to develop a discussion document on what the precautionary approach means in the context of ICCAT stocks. The *Ad Hoc* Committee produced a report in 1999.[385] The report recognized that information underpins the precautionary approach and that increased funding was required at all levels, including data collection, analysis, monitoring and enforcement, to improve the quality of information available for stock assessment. The report recommended that simulation studies are desirable to facilitate the definition of limit reference points by ICCAT by stock as required by the precautionary approach, and that "the establishment of operational guidelines for the application of the precautionary approach requires clear, effective and interactive communication between scientists and decision-makers".[386] The principal impact of this report to date has been in the commitment of the SCRS to continue to encourage and to guide research designed to (a) better measure uncertainty in stock status, (b) reduce uncertainty through improved knowledge, and (c) to evaluate management strategies,

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[381] Food and Agriculture Organization, Code of Conduct For Responsible Fisheries, 1995. Online on FAO website at http://www.fao.org/DOCREP/005/v9878e/v9878e00.htm.

[382] ICCAT Rec. 03-14.

[383] UN Fish Stocks Agreement, *supra* note 364, Article 6.

[384] *Convention on Biological Diversity, with Annexes (I and II)*, 5 June 1992, online at http://www.biodiv.org. See Report of the Second Meeting of the Conference of the Parties to the Convention on Biological Diversity, held at Jakarta, Indonesia, 6 November to 17 November 1995, COP, Decision II/10, UNCBDOR, 1995, UN Doc. UNEP/CBD/COP/2/19,59. Paragraph 3 (a) of Decision II/10 provides that the precautionary approach should be used as guidance for all activities affecting marine and coastal biological diversity, being relevant as well to many other international agreements such as the UN Fish Stocks Agreement and the Code of Conduct for Responsible Fisheries.

[385] International Commission for the Conservation of Atlantic Tunas, *Report of the Meeting of the Ad Hoc Working Group on the Precautionary Approach*, UNICCATOR, 1999, UN Doc. COM-SCRS/99/11, online at http://www.iccat.es/Documents/SCRS/DetRep/PA_dublin.pdf.

[386] *Ibid*. p.17.

recognizing that such research is important not only to a precautionary management approach, but also to the basic conduct of fishery science.[387]

Biodiversity and the Ecosystem Approach

The ecosystem approach which underpins the UN Convention on Biological Diversity[388] and which is also reflected in various provisions of the 1982 LOS Convention[389] and of the UN Fish Stocks Agreement[390], recognizes the need to obtain and to evaluate scientific advice and to review the impact of fishing of target species on non-target and associated and dependent species. Elements of the ecosystem approach have been implemented by ICCAT. ICCAT takes into consideration the advice given by the SCRS Sub-Committee on By-Catch[391] and has taken measures for sharks, seabirds and marine turtles. ICCAT has carried out assessments on two shark species and maintains the most complete database currently available on shark statistics in the Convention area.

At its annual meeting in 2002, ICCAT adopted a Resolution on Incidental Mortality of Seabirds[392], urging parties to implement National Plans of Action for Reducing Incidental Catches of Seabirds in Longline Fisheries (NPOA-Seabirds) and to inform ICCAT's SRCS and ICCAT of the status of such NPOAs. The resolution also states that when feasible and appropriate the SCRS should present an assessment of the impact of incidental catch of seabirds resulting from the activities of all the vessels fishing for tunas and tuna-like species in the Convention area.

In 2003 ICCAT adopted a resolution to encourage contracting parties to collect and provide all available information on interactions with sea turtles in ICCAT fisheries, including reporting incidental catches and other impacts on sea turtles in the Convention

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387 International Commission for the Conservation of Atlantic Tunas, *Report for Biennial Period 2000-2001, Part I (2000)- Vol. 2 Commission & National Reports*, UNICCATOR, 2001, Appendix 5:Report of the Ad hoc Working Group on the Precautionary Approach (Executive Summary), online at http://www.iccat.es/Documents/BienRep/REP_EN_00-01_I_2.pdf.

388 *Convention on Biological Diversity, supra* note 384.

389 1982 LOS Convention, *supra* note 363, Article 61 (4) requires coastal states in designing conservation and management measures to "take into consideration the effects on species associated with or dependent upon harvested species with a view to maintaining or restoring populations of such associated or dependent species above levels at which their reproduction may become seriously threatened".

390 UN Fish Stocks Agreement, *supra* note 364, Article 5 (e) requires states to adopt measures to conserve species belonging to the same ecosystem as the target species, while Article 5 (g) requires states to protect biodiversity in the marine environment.

391 ICCAT, *Report for the Biennial Period 2004-05, Part II (2005) - Vol.2 SCRS*, UNICCATOR, 2006, Appendix 11: Report of the Sub-Committee on By-Catch, p.206.

392 ICCAT, Resolution by ICCAT on Incidental Mortality of Seabirds, ICCAT Res. 02-14, UNICCATOR, 2002, UN Doc. PLE-010/2005, 62, online at http://www.iccat.es/Documents/Recs/PLE-010-EN.pdf.

area, such as the deterioration of nesting sites and swallowing of marine debris.[393] The resolution also encourages the release of sea turtles that are incidentally caught alive, and the sharing of all available information such as technical measures to reduce the incidental catch of turtles and to ensure the safe handling of turtles that are released to ensure their survival. The resolution also pledged support to the FAO in addressing the holistic conservation and management of sea turtles.

Integration of the ecosystem approach into ICCAT management, going from a single species management approach to a multi-species approach, was recommended in a 2004 plenary session of ICCAT and summarized in the 2005 Report of the Sub-Committee on Environment.[394] The same report proposed that the Sub-Committee on Environment and the Sub-Committee on By-Catches be merged into an "Ecosystem" Sub-Committee. This was accepted but the details and terms remain to be worked out.

4.5.5 Strengthening ICCAT

ICCAT faces a number of challenges in the future. It must develop more robust stock assessments, implement modern fisheries management approaches such as the precautionary approach, rebuild depleted stocks, achieve improved compliance with agreed management and conservation measures, and reduce IUU fishing in the Convention area.[395] The members of ICCAT have recognized the need to strengthen the organization. A resolution adopted by the Commission in 2005 called for a review of ICCAT's conservation and management program in light of the provisions of relevant international fisheries instruments, such as the 1982 LOS Convention and the Food and Agriculture Organization Code of Conduct for Responsible Fisheries, and for the development of a workplan to address the strengthening of the organization.[396]

4.5.6 Domestic Implementation of ICCAT Measures

Canada has issued multi-year management plans for bluefin, swordfish, sharks and other tunas, such as bigeye, yellowfin and albacore, which incorporate all relevant ICCAT regulatory recommendations. They are implemented under the *Fisheries Act of Canada*[397]. The necessary ICCAT regulatory recommendations are either specified in the *Atlantic Fisheries Regulations*[398] (1985) made pursuant to the *Fisheries Act* or are

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393 ICCAT, *Resolution by ICCAT on Sea Turtles*, ICCAT Res. O3-11, UNICCATOR, 2003, UN Doc. PLE-010/2005, 64, online at http://www.iccat.es/Documents/Recs/PLE-010-EN.pdf.

394 ICCAT, *Report for the Biennial Period 2004-05, Part II (2005) - Vol.2 SCRS*, UNICCATOR, 2006, Appendix 12: Report of the Sub-Committee on Environment, p.212.

395 Capitol Hill Hearing Testimony by Williams Gibbons-Fly, Director The Office of Marine Conservation Bureau Department of State, Committee on House resources, Subcommittee on Fisheries and Oceans, February 16, 2006.

396 ICCAT, *Resolution by ICCAT to Strengthen ICCAT*, ICCAT Res.05-10, UNICCATOR, 2005.

397 R.S.C. 1985, c.F-14.

398 SOR/86-21.

handled as written Conditions of Licence, issued pursuant to the *Fishery (General) Regulations*[399], both of which are binding on fishermen.

Implementation of the obligations of the United States as a member of ICCAT occurs under the provisions of the *Magnuson-Stevens Act*[400], a comprehensive statute dealing with the regulation of all United States fisheries and governing the contents of fisheries management plans in the United States, and under the *Atlantic Tuna Conservation Act*[401], a special statute limited to the conservation of Atlantic tunas and codification of the obligations of the United States under the ICCAT Convention. Detailed descriptions of Canadian and United States management and conservation measures, research programs, monitoring and compliance measures, catch statistics, and other information concerning the implementation of their obligations as members of ICCAT can be found in their annual reports to ICCAT which are incorporated into the biennial reports of ICCAT.

4.6 North Atlantic Salmon Conservation Organization (NASCO)

Being Parties to the 1982 Convention for the Conservation of Salmon in the North Atlantic Ocean,[402] Canada and the United States have pledged to cooperate in conserving, restoring and enhancing salmon stocks which originate in and migrate across the Gulf of Maine region. The Convention prohibits fishing of salmon on the high seas beyond coastal state fisheries jurisdiction and limits fishing of salmon to areas within the 12 nautical mile territorial sea of coastal states with exceptions for West Greenland (up to 40 nautical miles from territorial sea baselines) and the Faroe Islands.[403] The North Atlantic Salmon Conservation Organization works through a Council and three regional Commissions, a North American Commission, a West Greenland Commission and a North-East Atlantic Commission. Canada and the United States are the sole members of the North American Commission which covers maritime waters within national jurisdictions off the east coast of North America. The Commission provides a forum for consultation regarding the minimization of harvests of transboundary salmon and the control of activities that may adversely affect salmon.[404] The role of the Commission in providing fisheries management advice has been limited in light of the closure of US waters to commercial and recreational fisheries for sea-run Atlantic salmon due to listing of the Gulf of Maine Distinct Population Segment (DPS) as endangered[405] and Canada's prohibition against commercial salmon fisheries on the east coast and both commercial and recreational bans on fisheries for Atlantic salmon in

399 SOR/93-53.
400 16 U.S.C. §§ 971.
401 16 U.S.C. §§ 1801.
402 2 March 1982, 1338 U.N.T.S. 33 Can. T.S. 1983 No. 11.
403 *Ibid.*, Art. 2.
404 *Ibid.*, Art. 7.
405 NASCO, Report of the Twenty-Second Annual Meeting of the Commissions, Vichy, France, 6-10 June 2005, Annex 3, Report on US Atlantic Salmon Management and Research Activities in 2004.

rivers in the Inner Bay of Fundy due to listing of those populations under Canada's *Species at Risk Act*.[406]

Other than setting regulatory measures for salmon fisheries off Western Greenland[407] and Faroe Islands,[408] NASCO had largely operated through recommendary means and various "soft" instruments. NASCO has adopted an Agreement on the Adoption of a Precautionary Approach[409] and has developed a Plan of Action for the Application of the Precautionary Approach to the Protection and Restoration of Atlantic Salmon Habitat which, among other things, urges each Party to develop a salmon habitat protection and restoration plan or plans.[410] Guidelines on the Use of Stock Rebuilding Programmes in the Context of the Precautionary Management of Salmon Stocks provide guidance on how to develop stock rebuilding programmes for salmon stocks below their conservation limits.[411] Guidelines for Incorporating Social and Economic Factors in Decisions under the Precautionary Approach urge Parties to use socio-economic impact assessments to support and inform decision-making that may affect wild Atlantic salmon.[412]

The Williamsburg Resolution, adopted in 2003 and amended in 2004 and 2006,[413] focuses particular attention on addressing the potential impacts of aquaculture on wild salmon. The Resolution to Minimize Impacts from Aquaculture, Introductions and Transfers, and Transgenics on the Wild Salmon Stocks addresses the burden of proof in implementing the precautionary approach, brings under a single "umbrella" five previous NASCO instruments and puts in place annual national reporting obligations. Article 3 of the Resolution urges each Party in accord within the Precautionary Approach to require activity proponents to demonstrate that their activities will not have a significant adverse impact on wild salmon stocks or lead to irreversible change. The five previous NASCO documents incorporated include: Resolution to Minimize Impacts from Salmon Aquaculture on the Wild Salmon Stocks (the Oslo Resolution); Guidelines on Containment of Farm Salmon; Guidelines for Action on Transgenic Salmonids; North-East Atlantic Commission Resolution to Protect Wild Salmon Stocks from Introductions and Transfers; and North American Commission Protocols for the Introduction and Transfer of Salmonids.[414] The Resolution sets out various annual reporting obligations including actions taken to minimize escapes of farmed salmon, to

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406 *Ibid.*, Annex 4, Review of Atlantic Salmon Management Measures for 2005 (Tabled by Canada).
407 NASCO, Regulatory Measures – West Greenland Salmon Fishery, online at http://www.nasco.int/greenlandmeasures.htm.
408 NASCO, Regulatory Measures – Faroe Salmon Fishery, online at http://www.nasco.int/faroesmeasures.htm.
409 NASCO, CNL (98) 46.
410 NASCO, CNL (01) 51.
411 NASCO, CNL (04) 55.
412 NASCO, CNL (04) 57.
413 NASCO, CNL (04) 54.
414 *Ibid.*, Annexes 2-6 and CNL (06) 18 Appendix 1.

protect wild salmon from introduction of non-indigenous fish, to address the case of transgenic salmonids and to mitigate/correct adverse impacts on wild salmon stocks.[415]

In order to reconcile different methods within Canada and the United States for authorizing introductions and transfers of aquatic species, the countries entered into a Memorandum of Understanding (MOU) in 2005.[416] Through the MOU the Parties agreed to consult over proposals for introductions/transfers that may have an impact on the other and to convene a North American Commission Scientific Working Group to review introductions and transfer developments in the North American area and to provide recommendation to the Parties, if required.[417]

In 1990, NASCO established the Atlantic Salmon Rivers database. The database categorized salmon rivers according to their stock status (not threatened with loss, threatened with loss, restored, maintained or lost). The database included the river name, category and location and in some cases additional information (*e.g.*, catchment area, mean annual flow, details of threats or the cause of loss). Information on approximately 2,200 rivers was included. In applying the precautionary approach and implementing its Plan of Action (CNL(01)51), the Council agreed, with funding from the United States, to put the database online.[418] The Council has agreed that Parties should update the original database information and provide additional river data, basic salmon habitat and habitat impacts information, and juvenile and adult salmon production data as data and resources permit. The database currently contains information on 2,135 rivers.

4.6.1 International Atlantic Salmon Research Board

The International Atlantic Salmon Research Board was established by NASCO in 2001.[419] Its purpose is "to promote collaboration and cooperation on research into the causes of marine mortality of Atlantic salmon and the opportunities to counteract this mortality."[420] To this end the Board is mandated to "establish and administer an International Atlantic Salmon Research Programme,"[421] the SALSEA Programme.[422]

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[415] *Ibid.*, Art. 10. For national reports, see NASCO "Returns Made in Accordance with the Williamsburg Resolution" CNL (05) 20.

[416] NASCO, Report of the Twenty-Second Annual Meeting of the Commissions, Vichy, France, 6-10 June 2005, Annex 6 (NAC (05) 7).

[417] *Ibid.*, para. D.

[418] Online at http://www.nasco.int/asd/.

[419] The Board was originally called the International Cooperative Salmon Research Board.

[420] International Atlantic Salmon Research Board, "The King of Fish: Lost at Sea!", online at http://www.nasco.int/sas/background.htm.

[421] International Atlantic Salmon Research Board, "About the Board", online at http://www.nasco.int/sas/about.htm.

The Board is composed of NASCO state parties and NGO members. NASCO state parties and others contribute to the International Atlantic Salmon Research Fund to support research projects. The Board leads NASCO private sector cooperation and has started fund raising for new multi-disciplinary projects.

A Scientific Advisory Group reviews the inventory of ongoing research, identifies gaps in the research and research priorities, and develops recommendations for enhanced coordination of existing research. The Scientific Advisory Group also evaluates and advises the Board on proposals to conduct research.

The Board has established an online inventory[423] of research projects relating to salmon mortality in the sea in five topic areas:

Long term monitoring;
Distribution/migration in the sea;
Life history/biological processes;
Development of methods;
Specific natural and anthropogenic factors.

The inventory includes 51 ongoing projects as well as details on 21 completed projects. Current expenditure on the research included in the inventory is in excess of £5.1 million per annum.

Unfortunately, the research inventory does not separate research by geographic area. Research specifically on the Gulf of Maine and Bay of Fundy must be searched by relevant topic, *e.g.*, 'fish farms.'

The Atlantic Salmon Federation (ASF) has observer status with NASCO (refer to Section 4.6 on page 77) and has pledged support of the SALSEA program and to coordinate their research with SALSEA.[424]

4.7 The International Atlantic Salmon Accord

The International Atlantic Salmon Accord is a comprehensive plan to combat the threats to salmon at all life stages, in both its freshwater and marine habitats. It was created and launched at Edinburgh, Scotland in 1998 by the Atlantic Salmon Federation of

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[422] International Atlantic Salmon Research Board, The Salmon at Sea, SALSEA, Programme, online at http://www.nasco.int/sas/salsea.htm. Additional research priorities include analysis of tagging data and genetic stock identification. See International Atlantic Salmon Research Board, "Report of the Fourth Meeting of the Scientific Advisory Group of the International Atlantic Salmon Research Board," Saariselkä, Finland, 4 June 2006 SAG(06)7, online at http://www.nasco.int/sas/pdf/sag_06_07.pdf.

[423] International Atlantic Salmon Research Board, Inventory of Research Relating to Salmon Mortality in the Sea, online at http://www.nasco.int/sas/research.htm.

[424] International Atlantic Salmon Research Board, "Report of the Fifth Meeting of the International Atlantic Salmon Research Board" CNL(06)11, 5 June 2006, p.6, online at http://www.nasco.int/sas/pdf/cnl_06_11.pdf.

North America (refer to Section 5.4.3 on page 105) and the Atlantic Salmon Trust of the United Kingdom.[425]

Over 30 conservation organizations, including the Atlantic Salmon Federation and various NGOs in the United States[426], have signed the International Atlantic Salmon Accord.[427] The Accord calls for conservation actions to address seven major issues affecting wild salmon: in-river production inhibition due to obstructions and pollution; aquaculture impacts; impact of fisheries targeting other species; low marine survival; impact of mixed-population fisheries and predation.

4.8 Shellfish Sanitation

Cooperation between Canada and the United States on transboundary fisheries issues affecting the Bay of Fundy and the Gulf of Maine has involved both direct bilateral cooperation and indirect multi-lateral cooperation through regional fisheries management organizations. Cooperation with respect to shellfish sanitation provides an example of the former while cooperation with respect to Atlantic salmon and Atlantic tuna and tuna-like species are examples of the latter.

The Conferences of New England Governors and Eastern Canadian Premiers have occasionally discussed transboundary fisheries issues in a general way. At Conference meetings of the Conference held between 1993 and 1995, Governors and Premiers, faced with the local impacts of the collapse of the ground fisheries of the Northwest Atlantic, urged cooperation on finding a solution to overfishing of groundfish stocks on the high seas. The Conference also urged support for any treaty that might be concluded at the U.N. Conference on Conservation of Straddling Stocks and Highly Migratory Stocks.[428] However, the New England Governors and Eastern Canadian Premiers have rarely focused their discussions on specific transboundary fisheries issues.

Cooperative arrangements to deal with shellfish sanitation and conservation of Atlantic tuna and other highly migratory species of the Atlantic pre-date the establishment of the Conference and the Gulf of Maine Council, while other cooperative efforts, such as cooperation on conservation of Atlantic salmon and reciprocal fisheries laws enforcement arrangements post-date the establishment of the Conference. The purpose

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[425] Atlantic Salmon Federation website at http://www.asf.ca/Nasco/Nasco.html.

[426] US organizations include, World Wildlife Fund, National Audubon Society, Natural Resources Defence Council, National Fish and Wildlife Foundation and Centre for Marine Conservation. The Atlantic Salmon Federation, created in 1948, has members in all five eastern provinces and in New England. Policy Research Initiative, *The Emergence of Cross-Border Regions, Interim Report* (November 2005) at 17.

[427] Online at http://www.asf.ca/Nasco/Nasco.html.

[428] Conference of New England Governors and Eastern Canadian Premiers: Overview of Discussions, 1973-2002, online at http://www.negc.org/documents/NEG-ECP_Overview07_03.pdf, pp.29, 30-31, and 35.

of this section is to provide a brief introduction and overview of the cooperative fisheries and fisheries–related arrangements currently in place.

4.8.1 Shellfish Sanitation: Gulf of Maine

Shellfish sanitation became a public health concern in the early 20th century, following a widespread outbreak of typhoid fever during the winter of 1924. The outbreak was traced to the consumption of raw oysters and involved approximately 150 deaths, prompting the US Surgeon General to issue recommendations for the safe sanitary control of the shellfish industry.[429] Because of the intimate relationship Canada and the United States share in importing and exporting shellfish, a formal bilateral agreement was signed on April 30, 1948 to deal with the sanitary practices of each country.[430] The memorandum of agreement required that: (1) a manual be used (approved by both the US Public Health Service and Canadian Department of National Health and Welfare) setting forth sanitary principles to govern the certification of shellfish shippers; (2) notification be given of each country's respective degree of compliance; and (3) permission be given to inspect shellfish handling facilities or growing areas by either party.[431] Initially, the Department of National Health and Welfare was the designated Canadian agency for the administration of the agreement, and the US Public Health Service was the corresponding American agency. Currently, the US Food and Drug Administration (FDA) is the designated agency in the United States, and the responsibility in Canada is shared among Fisheries and Oceans Canada (DFO), the Canadian Food Inspection Agency (CFIA), and Environment Canada (EC). The *Canada – US Shellfish Agreement* of 1948 remains the foundation for the respective shellfish sanitation programs of the two countries.

4.8.2 National Shellfish Sanitation Programs

Canadian Shellfish Sanitation Program (CSSP)

The Canadian Shellfish Sanitation Program has two main objectives: to protect the public from the consumption of contaminated shellfish and to fulfill the *Canada-US Shellfish Agreement*.[432] The laws governing the CSSP include the *Fisheries Act,*[433] the *Management of Contaminated Fisheries Regulations,*[434] the *Fish Inspection Act,*[435] and

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429 US, United States Food and Drug Administration, *National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish* (Washington, DC: FDA/CFSAN, 2003), online at Food and Drug Administration Centre for Food Safety and Applied Nutrition, http://www.cfsan.fda.gov/~acrobat/nssp2003.pdf [*NSSP Guide*].

430 *Exchange of notes regarding sanitary practices in the shellfish industries and related matters, with memorandum of agreement*, Canada and United States, 4 March 1948 and 30 April 1948, Can. T.S. 1948 No. 10 [*Canada-US Shellfish Agreement*].

431 *Ibid.*

432 *Ibid*.

433 R.S.C. 1985, c. F-14.

434 SOR/90-351.

435 R.S.C., 1985, c. F-12.

the *Fish Inspection Regulations.*[436] These statutes and regulations allow the respective government departments to prohibit the harvesting of contaminated shellfish[437], to prohibit the import or export of tainted shellfish or shellfish believed to be from waters that do not ensure they are wholesome,[438] to control the labelling standards of all shellfish imported into Canada from licensed providers,[439] to require an investigation when shellfish quality is questionable,[440] to control the import and export of shellfish between provinces,[441] and to require testing for toxins before shellfish may be packed, sold, imported or exported.[442]

The CSSP is a shared responsibility among CFIA, DFO and EC. Their respective roles are affirmed and defined in a Memorandum of Understanding (MOU) effective March 1, 2000.[443]

The CFIA is responsible for the handling, processing, import and export of shellfish, and the marine biotoxin monitoring program. In addition, they are the lead agency with respect to liaising with foreign government shellfish control.[444] As such, they have evaluated the shellfish sanitation programs of foreign countries to determine whether they meet established Canadian sanitation requirements. Countries that currently have approved shellfish shippers for export to Canada are the US, New Zealand, France, Korea, Japan and Ireland.[445]

DFO is responsible for the harvesting of shellfish, and thus controls the opening and closing of shellfish growing areas based upon recommendations from EC and the CFIA relating to bacteriological water quality and marine biotoxin levels. In addition, DFO controls relaying and depuration operations, licensing, and development of new shellfish fisheries.[446]

EC is responsible for conducting comprehensive sanitary and bacteriological water quality surveys in accordance with the CSSP Manual of Operations. In addition, they promote pollution prevention, regulatory compliance, remediation and restoration of shellfish growing areas together with other federal, provincial and municipal agencies.

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436 C.R.C., c. 802.
437 *Management of Contaminated Fisheries Regulations*, *supra* note 434, s. 3(1).
438 *Fish Inspection Regulations, supra* note 436, s. 6(1).
439 *Fish Inspection Regulations, supra* note 436, s. 6(2).
440 *Fish Inspection Regulations, supra* note 436, s. 6.01.
441 *Fish Inspection Act, supra* note 435, s. 16.
442 *Fish Inspection Regulations, supra* note 436, s. 23(b).
443 Canada, *Memorandum of Understanding between the Canadian Food Inspection Agency and the Fisheries and Oceans Canada and Environment Canada Concerning The Canadian Shellfish Sanitation Program*, 1 March 2000, online on the CFIA website at http://www.inspection.gc.ca/english/anima/fispoi/manman/cssppccsm/append5e.shtml.
444 *Ibid*.
445 Canada, Canadian Food Inspection Agency, *Importing Live and Raw Shellfish*, (Ottawa: CFIA, 2005), online at http://www.inspection.gc.ca/english/anima/fispoi/import/molimpe.shtml.
446 *Supra* note 443.

Representatives from all three agencies form the Interdepartmental Shellfish Committee to implement the MOU.[447]

United States National Shellfish Sanitation Program

The United States National Shellfish Sanitation Program (NSSP) is a cooperative program between federal and state authorities for the sanitary control of commercial shellfish operations. The purpose of the NSSP is to promote and improve shellfish sanitation, interstate and internationally, and to create uniform state shellfish programs. Under international agreements with the FDA, foreign governments also participate in the NSSP. The Interstate Certified Shellfish Shippers List (ICSSL) governs shellfish importing in the US. This list is composed of shippers who have been certified in accordance with NSSP sanitation requirements, and currently includes shippers from the US, Canada, Chile, Korea, New Zealand and Mexico.[448]

Formed in 1982, the Interstate Shellfish Sanitation Conference (ISSC) regulates shellfish sanitation between states. The ISSC has a Memorandum of Understanding with the FDA that recognizes the ISSC as the lead regulatory agency in shellfish sanitation control.[449] As such, they are responsible for developing the Model Ordinance in the *NSSP Guide* to provide nationwide sanitation guidelines and procedures.[450] In accordance with the *NSSP Guide*, state or local enforcement authorities are responsible for establishing a statewide shellfish sanitation program to regulate: (1) the classification of shellfish growing areas; (2) the harvesting of shellfish; (3) shellfish processing procedures and facilities; (4) product labelling; (5) storage, handling and packing; (6) shellfish shipment in interstate commerce; (7) shellfish dealers; and (8) bivalve aquaculture.[451]

4.8.3 Shellfish Sanitation and Public Health Concerns

The filter feeding mechanism of bivalve molluscan shellfish allows them to accumulate pollutants and toxins from the water they feed from. Contamination is caused by bacteriological pollution, chemical pollution and naturally occurring marine biotoxins. Sources of bacteriological and chemical pollution can be characterized as point and non-point.[452] A point source of pollution enters the water at a distinct, measurable location such as a sewage treatment plant or pulp mill. A non-point source diffuses into

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447 *Supra* note 443.

448 US, Food and Drug Administration, Department of Health and Human Services, *Interstate Certified Shellfish Shippers List*, June 1, 2006, online at FDA/CFSAN http://www.cfsan.fda.gov/~ear/shellfis.html.

449 See generally: *Interstate Shellfish Sanitation Conference*, online at ISSC http://www.issc.org [ISSC].

450 NSSP Guide, *supra* note 429, at 11.

451 NSSP Guide, *supra* note 429, at 19.

452 See generally: Environment Canada, *Shellfish and Water Quality*, online on the Environment Canada Atlantic Region website at http://www.ns.ec.gc.ca/epb/factsheets/sfish_wq.html.

the environment and can include urban and agricultural runoff, mining, and sewage discharge from boats.[453]

Bacteriological contamination in shellfish is a public health concern because of the potential for concentrated amounts of bacteria and viruses from human and animal feces.[454] The criteria used to indicate bacteriological contamination is the level of fecal coliform bacteria. The presence of these organisms in shellfish growing waters will usually indicate a potential health hazard, depending on concentrations.[455] The NSSP also recognizes the numerically different "total coliform" as an alternate indicator; however, the two indicators are believed to afford the same level of public health protection.[456]

Chemical contamination results from metals, pesticides and chlorinated organic chemicals associated with discharges from industrial and municipal treatment processes.[457] Chemical pollutants are analyzed using current methods from either the Association of Official Analytical Chemists (AOAC) or the American Public Health Authority (APHA).[458] Canada and the US have established common action levels and tolerances for poisonous or deleterious substances that may be found in shellfish.[459]

Control of marine biotoxins is another important aspect of shellfish sanitation programs. Toxins occur naturally as a result of microscopic algae blooms, sometimes referred to as "red tides". Shellfish accumulate the toxins while using the algae as a food source. Shellfish in Canadian waters have been contaminated with three types of biotoxins: Paralytic Shellfish Poison (PSP), domoic acid poisoning also known as Amnesic Shellfish Poison (ASP), and Diarrhetic Shellfish Poison (DSP).[460] The primary occurring toxins in the US are PSP, ASP, and neurotoxic shellfish poisoning (NSP).[461] All are dangerous to human health, and both PSP and ASP have been known to cause death.

In Canada, each fisheries region has established sampling stations and frequencies to monitor changes in PSP and ASP. DSP testing will only occur in suspect harvesting areas or as a result of consumer complaints. In addition, samples are periodically taken

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[453] Menon, Amar, "Shellfish Water Quality Protection Program" (1997), *Science Review*, Bedford Institute of Oceanography, Gulf Fisheries Centre, the Halifax Fisheries Research Laboratory, St. Andrews Biological Station (DFO Maritimes Region, 1997).

[454] *Supra* note 452.

[455] *Supra* note 453.

[456] NSSP Guide, *supra* note 429, at 34.

[457] *Supra* note 452.

[458] Canada, Environment Canada, Canadian Food Inspection Agency, Fisheries and Oceans Canada, *Canadian Shellfish Sanitation Program Manual of Operations* (Ottawa: CFIA, 2005), Appendix I, at 11, online on the Canadian Food Inspection Agency website at http://www.inspection.gc.ca/english/anima/fispoi/manman/cssppccsm/shemolalle.pdf [*CSSP Manual*].

[459] *Ibid*., Appendix II. See also: *NSSP Guide*, at 185.

[460] *Supra* note 452.

[461] NSSP Guide, *supra* note 429, at 141.

for toxin analysis from processing plants.[462] In the US, representative samples of shellfish are collected during all harvest periods from those areas where marine biotoxins are likely to occur. In addition, States are required to adopt a marine biotoxin contingency plan. The plan must include an early warning system involving a phytoplankton and/or shellfish-monitoring program at sample stations where toxins have been known to occur first. The NSSP Model Ordinance also recommends establishing channels of communication with other states, countries (in the case of MOU countries), FDA, and other responsible officials concerning shellfish toxicity.[463]

4.8.4 Guidelines for Classification of Growing Areas

The CSSP and NSSP both have detailed manuals providing standards and administrative practices necessary for the sanitary control of shellfish. The CSSP Manual of Operations follows closely the NSSP guidelines.[464] A major component of each is the identification of safe shellfish growing areas for commercial harvesting. Under CSSP and NSSP program guidelines, shellfish growing areas must undergo a comprehensive survey before they can be approved for harvesting. This involves an evaluation of pollution sources that may affect the area, the meteorological and hydrographic factors that may affect distribution of pollutants throughout the area, and an assessment of water quality. Annual reviews are conducted to determine any change in pollutants and sanitary conditions, with complete re-evaluations taking place at least every three years.[465]

Growing areas are classified into categories of approved, conditionally approved, conditionally restricted (US only), closed/restricted and prohibited. For an area to be approved, the contamination from fecal material, pathogenic micro-organisms, poisonous/deleterious substances or marine biotoxins must not exceed established standards. Fecal coliform densities in the water may not exceed a median or geometric mean Most Probable Number (MPN) of 14/100 mL, and not more than 10% of the samples may exceed a fecal coliform MPN of 43/100 mL.[466]

Shellfish may still be harvested from closed areas if special permits are obtained, requiring a decontamination plan before commercial use. Contaminated shellfish purify themselves if placed in clean water, so methods such as “relaying” to approved areas or “depuration” (controlled purification in water tanks), are frequently used.[467]

The conditional classifications are used to address growing areas that are subject to intermittent pollution. They allow respective authorities an alternative to closing the area

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462 CSSP Manual, *supra* note 458, c. 11, at 1.
463 NSSP Guide, *supra* note 429, at 141.
464 *Supra* note 453.
465 CSSP Manual, *supra* note 458, at 2.1.
466 CSSP Manual, *supra* note 458, at 2.3.1.
467 CSSP Manual, *supra* note 458, at 2.3.3.

year round when, under certain predictable or controllable conditions, shellfish may be safely harvested.[468]

Prohibited areas are defined as those areas in the immediate vicinity of sewage treatment plants or marinas or where, due to the degree of contamination, it may not be possible to adequately depurate or naturally purify the shellfish. An area may also be classified as prohibited if it is contaminated with high concentrations of biotoxins, poisonous or deleterious substances. Shellfish may not be harvested from prohibited growing areas except for the collection of seed.[469]

4.8.5 Program Partnerships in the Gulf of Maine

Both the CSSP and NSSP gain valuable information for the classification and regulation of shellfish growing areas through links with extra-governmental monitoring programs. In Atlantic Canada, volunteers from the Atlantic Coastal Action Program (ACAP) monitor water quality in shellfish growing areas at a number of different coastal locations, contributing to EC's Shellfish Water Quality Monitoring Program. ACAP groups are also involved in remediation activities to clean up bacterial contamination, contributing to the re-opening of closed shellfish growing areas.[470]

In the US, the Maine Phytoplankton Monitoring Program is a volunteer based program monitoring harmful algae blooms in the Gulf of Maine. The volunteers monitor phytoplankton in the water column in order to detect toxicity before it may be found in shellfish.[471] Similar phytoplankton monitoring programs are in place across the Gulf of Maine, including New Hampshire and Massachusetts.[472]

The Gulf of Maine Council on the Marine Environment (GOMC) administers Gulfwatch, a chemical contaminants monitoring program. Scientists from agencies and universities around the Gulf of Maine use blue mussels to measure the type and concentration of

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468 CSSP Manual, *supra* note 458, at 2.3.2.

469 CSSP Manual, *supra* note 458, at 2.3.4.

470 Environment Canada, Ecological Monitoring and Assessment Network, *Partnerships in Community-based Approaches to Achieving Sustainability: The Atlantic Coastal Action Program* by Lawrence P. Hildebrand, Colleen McNeill and Francine P. Rousseau (Ottawa: Environment Canada, 2004), online on the EC Ecological Monitoring and Assessment Network website at http://www.eman-rese.ca/eman/reports/publications/2005/camesa/page4.html. See also: Environment Canada, *The Atlantic Coastal Action Program*, online on the Environment Canada Atlantic Region website at http://atlantic-web1.ns.ec.gc.ca/community/acap/.

471 Maine, Department of Marine Resources, The University of Maine and United States Food and Drug Administration, *Maine Phytoplankton Monitoring Program*, online on the University of Maine Cooperative Extension website at http://www.umaine.edu/umext/ssteward/phyto.htm.

472 See generally: *Great Bay Coast Watch*, University of New Hampshire Cooperative Extension, online at http://www.gbcw.unh.edu, and Massachusetts Division of Marine Fisheries, Shellfish Sanitation and Management, online at http://www.mass.gov/dfwele/dmf/programsandprojects/pspmoni.htm.

contaminants in the coastal marine environment.[473] Both Canadian and US authorities have used Gulfwatch data in making sanitary survey reports to determine whether it is safe to harvest shellfish from an area.[474] A similar nationwide initiative is the US National Oceanic and Atmospheric Administration's National Status and Trends Mussel Watch program, the longest chemical contaminant monitoring program in US coastal waters.[475]

[473] Gulf of Maine Council on the Marine Environment, *Gulfwatch*, online on the Gulf of Maine Council on the Marine Environment website at http://www.gulfofmaine.org/gulfwatch/.

[474] Fried, Suzy, "Gulfwatch: Putting a little mussel into Gulf of Maine marine monitoring efforts" (1999), *Gulf of Maine* Times, v. 2, No. 4.

[475] US, NOAA National Center for Coastal Ocean Science, *National Status and Trends Mussel Watch Program*, online at http://ccma.nos.noaa.gov/stressors/pollution/nsandt/.

SECTION 5

Science Programs

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5.1 Introduction

The Gulf of Maine has a long history of regional (bi-national) collaboration and cooperation in science programs that explore the oceanographic, biological, ecological and economic processes that shape the marine ecosystem and form the basis of human activity in the Gulf of Maine region. The focus of this scientific research is threefold:

- exploration and explanation of these ecosystems and processes (data collection)
- integration and sharing of data
- application of science to management.

Participants in scientific programs include government and intergovernmental organizations, universities, non-governmental organizations and community groups.

Collaborative scientific research programs with cross-border funding are difficult to arrange in both Canada and the United States. Increasingly, governments are reluctant to fund foreign scientists' participation in research programs. As a result, both governments fund scientific research projects in the Bay of Fundy/Gulf of Maine that are executed by scientists from their respective countries. However, while formal transboundary arrangements might be limited, collaboration is common in the form of sharing data or participation on scheduled cruises or assistance with specific projects arranged between scientists.[476] Since December 2005, DFO and NOAA have had an informal agreement to coordinate cruise schedules. As a result, scientists can apply to participate in a cruise or arrange for collection of data on their behalf. While these are not joint cruises, advertising cruise schedules facilitates collaborative arrangements to conduct research projects. Non-governmental organizations and community groups face similar challenges in executing scientific research and monitoring[477] in the Bay of Fundy/Gulf of Maine region.

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[476] For example, participation in the most recent cruise to the Discovery Corridor (July 2006) was limited to Canadians. American scientists from the Gulf of Maine Area Program (GoMA) submitted two proposals for funding to American sources that were well reviewed but ultimately not selected for funding. As a result, these components of the proposed research program for this cruise did not proceed. Peter Lawton, DFO, and Lewis Incze, GoMA, Personal communication, July 2006.

[477] For example, since 9/11 Canadian participants in the St. Croix Estuary Project no longer collect regular monitoring samples on the US side of the estuary due to security arrangements in the area.

This section outlines the scientific collaborative research initiatives of intergovernmental organizations at the international, federal and provincial/state level; non-governmental science programs and centres; non-governmental organizations; and community groups. Other collaborative scientific research programs in the Gulf of Maine region are also discussed elsewhere in this report, in particular the discussion under Species at Risk (page 22) outlining conservation measures for sea turtles, the North Atlantic right whale, Atlantic salmon and marine birds.

The St. Croix River and estuary offer unique opportunities to conduct transboundary collaborative research in the Gulf of Maine region. The collaborative science programs of three entities focused on the St. Croix River and estuary are examined in more detail below. Management of the St. Croix River and its ecosystems can be examined at three levels: a formal joint commission at the federal level, a provincial/state commission focusing on natural and heritage aspects of the river, and a community initiative promoting wise environmental management of the St. Croix Estuary and western Passamaquoddy Bay area. Flowing 185 km from its headwaters into the tidewaters of Passamaquoddy Bay, the St. Croix River forms a natural boundary between Canada and the United States. The river basin covers an area of about 4,230 sq km (1,630 sq miles) in New Brunswick and Maine. The St. Croix River watershed is characterized by long-standing industrial uses (primarily forestry and pulp and paper), hydroelectric generation, tourism and recreational uses. A long-standing dispute in the watershed concerns the reintroduction of the alewife, traditionally an abundant anadromous species in the river.

5.2 Intergovernmental Programs

Collaborative research programs conducted under the auspices of intergovernmental organizations are also discussed elsewhere in this report. The scientific program of the North Atlantic Salmon Conservation Organization, *i.e.* the International Atlantic Salmon Research Board, is described on page 79. The scientific program in support of the Transboundary Guidance Management Committee, *i.e.* the Transboundary Resource Assessment Committee, is described on page 58. Collaborative monitoring and research programs related to waterfowl, shorebirds and waterbirds are described on page 46.

Other large multi-disciplinary multi-year oceanographic research projects such as the US GLOBEC Georges Bank Program[478] and the more recently initiated BASIN project[479] have benefited from transboundary collaboration.

5.2.1 Gulf of Maine Council on the Marine Environment

In support of its mission of maintaining and enhancing environmental quality in the Gulf of Maine and ensuring sustainable resource use, the Gulf of Maine Council on the Marine Environment (GOMC) supports directly and indirectly programs and activities that are science-based. These programs and activities include:

- Ecosystem Indicator Partnership (ESIP), a new science-based initiative of the Gulf of Maine Council and its partners, to leverage existing monitoring datasets into a comprehensive reporting system for regional decision-makers (refer to Section 6.4 on page 114).

[478] The US GLOBEC Georges Bank Program has focused on increasing understanding of the population dynamics of key species on the Bank – cod, haddock, and two species of zooplankton (*Calanus finmarchicus* and *Pseudocalanus*) – in terms of their coupling to the physical environment and in terms of their predators and prey. The ultimate goal is to be able to predict changes in the distribution and abundance of these species as a result of changes in their physical and biotic environment as well as to anticipate how their populations might respond to climate change. Canadian scientists were formally involved in the early phases of the research program. The Program is now at the synthesis stage and there is no formal involvement of Canadians although individual scientists will be invited to participate. For further information on this research program, see http://globec.whoi.edu.

[479] Synthesis of Gulf of Maine information will also be a component of the Basin-scale Analysis, Synthesis, and INtegration (BASIN) Project. BASIN will focus on oceanographic and climate-related processes and the dynamics of plankton and fish populations in the North Atlantic Ocean. With partners in Europe, the United States, Canada, BASIN has already secured funding for participation of European Union and American scientists. The specific goals of BASIN include integration and synthesis of existing basin-wide data sets; advancement of the current state of the art in bio-physical modeling; development of hindcast modeling studies to understand the observed historical variability of the North Atlantic ecosystem; construction of scenarios of possible ecosystem changes in response to future climate variability; identification of data gaps that limit process understanding and contribute to uncertainty in model results; and specification of new data that will be needed to assess the performance of forecasts and assist management decisions. Achievement of these goals will contribute to an integrated management approach for marine ecosystems and their services. Although the project deals with the North Atlantic basin as a whole, it will be relevant locally in the Gulf of Maine. For further information on this project, contact Peter Wiebe, MS #23 WHOI, Woods Hole, MA 02543 (email: pwiebe@whoi.edu). The Canadian representative on the Executive Committee is Brad deYoung, Department of Physics and Physical Oceanography, Memorial University of Newfoundland, St. John's, NF A1B 3X7 (email: bdeyoung@physics.mun.ca). For information on the initial workshop for the project, see: http://globec.whoi.edu/basin/.

- Gulf of Maine Science Translation Project, to facilitate the transfer of scientific findings and techniques to resource managers, planners, policy makers, and other coastal decision-makers in the region.

- Gulf of Maine Mapping Initiative (GOMMI), a Canadian-US partnership to conduct comprehensive seafloor imaging, mapping, and biological and geological surveys (refer to Section 6.2 on page 111).

- Gulfwatch Monitoring Program, a binational program to assess the fate and impacts of toxic contaminants in the Gulf of Maine by measuring contaminant concentrations in blue mussels (refer to Section 6.3 on page 113).

- Action Plan Grants Program, a competitive grant process for citizen groups and community organizations to pursue projects that support GOMC's priority goals. The Council awards grants of up to $10,000 US ($15,800 Canadian) annually.

In addition, task forces and panels address marine scientific issues:
- Northeast Aquatic Nuisance Species Panel (refer to Section 5.2.4 on page 95)
- Climate change
- Nutrients
- Science Translation
- Sewage Management
- Aquaculture.

The Environmental Quality Monitoring Committee assesses human and environmental health issues and implements contaminant-monitoring efforts in the Gulf of Maine, in particular the Gulfwatch Program. The Habitat Committee, comprised of four subcommittees, is focused on marine habitat restoration plans and pursuing land protection initiatives, undertaking habitat monitoring initiatives, creating a regional strategy for marine habitat conservation, and developing and implementing a Gulf-wide seafloor mapping program (GOMMI).

Contact information for individual GOMC Task Forces, Panels and Committees is available online at http://www.gulfofmaine.org/council/committees/.

5.2.2 Marine Invertebrate Diversity Initiative

The Marine Invertebrate Diversity Initiative (MIDI) dataset contains the marine invertebrate species that can be found in the waters of the MIDI study area, the Scotian Shelf, Bay of Fundy, Bras d'Or Lakes and the Gulf of Maine. The MIDI Database includes links to access more information about marine invertebrate species, marine habitats, locations or references. An ongoing project, the goal of MIDI is to provide information about marine invertebrates (animals without backbones) and to engage the ocean researchers and users in learning, discovering and respecting the biodiversity of the oceans.

5.2.3 Discovery Corridor

The Gulf of Maine Biodiversity Discovery Corridor is a recent initiative by regional marine researchers to advance research and communication on marine biodiversity.[480] The concept of discovery corridors was first advanced at a Canadian national workshop convened to develop a national strategy for assessing status and risks to marine biodiversity in Canada.[481] The corridor concept includes the important element of outreach and education within a general scientific program to work on the structure and function of marine systems from a biodiversity perspective. Biodiversity in this context includes community, population, and genetic components.

A follow-up regional workshop early in 2004 led to the establishment of the Gulf of Maine Biodiversity Discovery Corridor Initiative.[482] A steering committee was formed, currently led by Dr. Peter Lawton, Fisheries and Oceans Canada, Biological Station, Saint Andrews, NB, and has both Canadian and US representation.

During 2004 a series of planning meetings was held with Canadian and US researchers leading to the geographical designation of a corridor which starts in southwestern NB/downeast Maine, across approx. 90 km of coastline, then extending 800 km out across the northern Gulf of Maine, ultimately to depths of 6000 m, off Georges Bank. The outermost area, beyond the 200 nautical mile limit, includes several seamounts of the New England Seamount Chain. Within the Gulf of Maine system the corridor includes portions of several major basins (Jordan, Crowell, Georges) and banks (German, Browns, Georges) and also encompasses the NE Channel. The corridor extends on both sides of the Canada/US border. There are several existing conservation areas within the corridor, in particular the NE Channel Coral Conservation Area, which has been the subject of recent research survey activity. Background information on the development of the corridor initiative is available on the website of the Centre for Marine Biodiversity (http://www.marinebiodiversity.ca).

The corridor initiative does not yet have a significant ongoing core funding element, although it has attracted significant funding in 2005 and 2006 on the Canadian side to mount preliminary offshore research cruises. The program is acknowledged as a foundation project for the Gulf of Maine Area Program of the Census of Marine Life (refer to page 119), and the Steering Committee includes membership from that CoML program.

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480 The authors are indebted to Peter Lawton, DFO, for contributing this up-to-date description of the Discovery Corridor Initiative. Email message to S. Rolston, 4 August 2006.

481 *Three Oceans of Biodiversity, A Canadian National Plan: 2004-2009*, Based upon deliberations arising from the White Point CoML-DFO sponsored workshop, February 2002 (Centre for Marine Biodiversity, Dartmouth, NS), online at http://www.marinebiodiversity.ca/en/pdfs/Three_Oceans_of_Biodiversity_National_Plan_final_ed.pdf.

482 A report on the workshop is online at http://www.marinebiodiversity.ca/en/corridor_work.html.

In 2005 DFO mounted the first Discovery Cruise, a one week cruise on the CCGS *Hudson* which used survey methodology available from the Bedford Institute of Oceanography to sample pelagic and benthic systems in Jordan Basin, Georges Basin, and the NE Channel. The benthic survey systems collected video, still photographs, and grab samples to depths of 500 m. Significant results from this initial cruise include the discovery of high diversity bottom communities on pinnacle rock features in Jordan Basin, as well as new area coverage of coral distribution and status inside and outside the Coral Conservation Area.

Based on the success of this initial cruise and to foster a joint Canada/US program in the offshore, a series of discussions took place in 2005 leading to the submission of complementary research proposals to Canadian and US funding agencies. On the US side, two research proposals, one on benthic ecology, one on microbial ecology were submitted to the Ocean Explore Program, but unfortunately neither proposal was funded.

On the Canadian side, Drs Anna Metaxas (Dalhousie University) and Paul Snelgrove (Memorial University) partnered with DFO researchers Drs Peter Lawton and Ellen Kenchington to request the use of the Canadian deepwater research vehicle ROPOS (Remotely Operated Platform for Ocean Science) on the east coast to support an expanded benthic research program in the discovery corridor. This vehicle, operated by the Canadian Scientific Submersible Facility, Sydney, BC, is a national research asset available to the Canadian academic research community. Through funding from the Natural Sciences and Engineering Research Council (for ROPOS mobilization and support) and DFO (for CCGS Hudson, plus professional and technical support for mission) a two week research cruise was mounted in July 2006.

This recently completed mission[483] greatly extended the bathymetric distribution of in situ observations of benthic community structure in the offshore portion of the corridor with a series of dives in the 500 – 1000 m, 1500 m, 2000 m, and 2500 m depth range in the NE Channel/NE fan area. Using the sophisticated sampling technologies on the ROPOS vehicle over 200 benthic organisms were collected for taxonomic identification, and a total of 107 hours of benthic video observations were obtained which will be

[483] On both the 2005 and 2006 Canadian research cruises berths were made available to several volunteers, educators and artists in order for them to gain an appreciation for this type of marine research, and for the scientists on the cruises to get a better understanding of how to communicate marine biodiversity issues to non-scientists. Two high school teachers (from St Andrews, NB, and Pubnico, NS) have now been exposed to discovery corridor research, and also two Nova Scotia-based artists through direct participation. Also on each cruise a significant number (3-5) graduate students were exposed to large offshore research cruise activity which will be significant in their career development.

On the return of the 2006 Discovery Cruise there has been substantial regional and national media coverage (radio, TV, newspaper) due to the novel nature of the research program itself, and preliminary indication of new species records for the region, and potentially new species to science. Follow-up media releases will be planned after the survey material is thoroughly analysed.

analyzed for a variety of benthic diversity criteria. Some specific research objectives related to coral conservation were also met with the collection of small physical samples from multiple colonies of two coral species for genetic analysis, and the installation of benthic settlement collectors to evaluate recruitment.

During fall/winter 2006 initial results from the corridor project will be discussed at two regional scientific workshops. Renewed discussion on how best to engage joint Canada-US research project activity within the corridor will be a significant feature of these meetings and upcoming strategic planning by the steering committee for the corridor project.

URL http://www.marinebiodiversity.ca/en/corridor_back.html

5.2.4 Northeast Aquatic Nuisance Species Panel

The Northeast Aquatic Nuisance Species (NEANS) Panel was established in 2001, the fourth regional panel to be established under the auspices of the US federal Aquatic Nuisance Species Task Force. The NEANS Panel addresses issues and concerns relative to the freshwater and marine resources of the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, and New York, as well as the provinces of Quebec, New Brunswick, and Nova Scotia. Federal, state and provincial government representatives, as well as other relevant stakeholders participate in the Panel.

The goals of the NEANS Panel are to:

- Prevent the introduction, establishment and dispersal of invasive aquatic nuisance species in the Northeast.
- Control the spread of invasive aquatic nuisance species already introduced into the Northeast.
- Mitigate the harmful ecological, economic, social and public health impacts associated with the introduction, establishment, or spread of invasive aquatic nuisance species in the Northeast.

The Panel has four working committees: Ballast Water and Shipping; Communications, Education, and Outreach; Policy and Legislation; and Science and Technology.

The Ballast Water and Shipping Committee addresses the issue of ballast water as a vector for aquatic and marine invasive plant and animal species. The Committee will be conducting a risk assessment for waters in the North Atlantic and drafting a management plan to eliminate or reduce release of invasive plants and animals through this vector.

The Science and Technology Committee advances the research, development, and implementation of scientific methods and new technologies for aquatic nuisance species prevention and control. The Committee is currently focusing its efforts on assisting the member states and provinces in developing early detection and rapid response plans. Current projects include development of web-based identification resources and

distributional data for invasive species in the region and sponsoring a regional workshop on marine invasive species monitoring.

URL http://www.northeastans.org

5.2.5 International Joint Commission International St. Croix River Board

Canada and the United States established the International Joint Commission (IJC) in 1909 as a binational institution to prevent and resolve disputes concerning lake and river systems along the border.[484] In particular, the IJC and its boards have addressed water level and flow issues, as well as encouraging industry, municipalities and state/provincial authorities to address water quality and other environmental issues related to transboundary watersheds.

Pursuant to the Boundary Waters Treaty, the Commission issued several orders with respect to the St. Croix River Basin (Maine and New Brunswick). Originally, two separate Boards were established by IJC: the "International St. Croix River Board of Control" and the "Advisory Board on Pollution Control". In September 2000, the two Boards were combined as the International St. Croix River Board (ISCRB), the first step in implementing the IJC Watershed Initiative.[485]

The ISCRB is comprised of ten members, five each from the Canadian Section and the US Section. Each Section of the Board appoints a chair of that Section who serve as co-chairs of the Board. These individuals are the liaison with the Commission. Board members' expertise is diverse and each member participates in a personal and professional capacity.

The ISCRB oversees compliance with the IJC's Orders of Approval for flows and levels at structures in the St. Croix River and monitors transboundary issues relating to the ecological health of the St. Croix River aquatic ecosystem.[486]

The IJC has introduced an International Watersheds Initiative that is based on the premise that local people, with appropriate assistance, are best positioned to resolve local transboundary issues. By working at the local watershed level, the IJC seeks to

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[484] *Treaty Between the United States and Great Britain Relating to Boundary Waters, and Questions Arising Between the United States and Canada*, 11 January 1909, Treaty Series No. 23, 1910.

[485] International St. Croix River Board (ISCRB) website at http://www.ijc.org/conseil_board/st_croix_river/en/stcroix_home_accueil.htm.

[486] Directive to the International St. Croix River Board, point 3, ISCRB website at http://www.ijc.org/conseil_board/st_croix_river/en/stcroix_mandate_mandat.htm.

prevent, reduce and perhaps eliminate the need to directly involve either national government or the IJC in a formal reference[487] to resolve a specific watershed issue.

Programs to build watershed capacity include:

- transboundary digital watershed mapping
- watershed directory (developed under contract by the St. Croix International Waterway Commission)
- comprehensive "state of the watershed" report
- coupled atmosphere-hydrology model.

Alewife, *Alosa pseudoharengus,* access to spawning habitat in the international waterway became a transboundary issue in May 1995 when the Maine State legislature passed a bill to prevent alewife migration. Fishways at Woodland and Grand Falls have since been operated to prevent alewife passage upstream on the river. Traditionally the St. Croix River has supported large runs of anadromous species. With the construction of dams throughout the system, the loss of anadromous species was significant and impacts on the ecosystem were noted. The Board has commissioned two reports, a literature review and an analysis of scientific information on the ecological roles of anadromous alewife populations to resolve this fisheries management dispute.[488]

The St. Croix River Basin Cooperative Hydrologic Network, a joint ISCRB, Environment Canada, US Geological Survey and Domtar project, provides data on water levels and flows along the St. Croix River. Domtar, a pulp and paper manufacturer, owns and operates the dams on the river.

URL http://www.ijc.org/conseil_board/st_croix_river/en/stcroix_home_accueil.htm

5.2.6 St. Croix International Commission

The St. Croix International Waterway Commission is an independent, international body established by the Maine and New Brunswick legislatures to plan for and facilitate delivery of a heritage management plan for the St. Croix boundary corridor.

The Commission was established through a 1986 Memorandum of Understanding and 1987 Legislative Acts by the State of Maine and the Province of New Brunswick. The Waterway extends the full length of the St. Croix boundary waters, from their origin at the source to their confluence in Passamaquoddy Bay, and includes a 250ft/75m corridor of adjacent shorelands in both countries.

The transboundary management plan developed for the Waterway establishes twenty-two international policies for the long-term management of the St. Croix's

[487] References are formal requests from the governments to the IJC to examine and provide advice on an issue. The IJC also receives applications, which are requests for approval to build structures affecting transboundary water levels or flows.

[488] International Joint Commission, International St. Croix River Board, Board Discussion Paper on Alewife in the St. Croix River, October 2005.

natural, historical and cultural resources. These policies stress heritage recognition, fair resource sharing, local partnerships, proactive planning, resource protection and compatible development within an integrated, ongoing management process. Since 1990, government and local interests have taken voluntary action to implement this management plan (refer to ACAP St. Croix on page 109).

URL http://www.stcroix.org

5.3 Non-governmental Science Programs and Centres

Collaborative scientific research in the Gulf of Maine is supported by non-governmental entities. The Gulf of Maine Area Program of the Census of Marine Life is an example of a scientific research program, funded by a foundation, that collaborates with Canadian institutions and scientists in executing its regional mandate.

Several non-governmental science centres conduct marine research and education activities in the Gulf of Maine region. As not-for-profit charitable institutions, these science centres share a commitment to the advancement of marine science through basic and applied science and to the delivery of education programs and experiences from public school through university. They often cooperate with industry and government on the development of applied science and technology. The research and education programs of these centres focus on increased understanding of the complex interactions between the Gulf of Maine ecosystem and the human communities that depend on it.

Although there are, to date, no formal cooperative agreements between the centres, there is substantial collaboration within this community of scientists as they pursue research projects with universities, governments, industry, community groups and other NGOs throughout the Gulf of Maine region. Scientists from institutions throughout the region have access to lab, boat and other facilities for the conduct of research, either as individuals or as part of a larger research team.

The research programs and collaborative programs of two such centres are outlined below.

5.3.1 Census of Marine Life – Gulf of Maine Area Program

The Census of Marine Life (CoML) is a ten-year research initiative (from 2000 – 2010) to assess and document the diversity, distribution and abundance of marine life over time, for the earth's oceans. CoML involves a global network of researchers in more than 70 nations. The Gulf of Maine Area Program is one of seven initial field projects of the international Census of Marine Life. It is the Census's only ecosystem-based field project.

The goal of the Gulf of Maine Area Program (GoMA) of CoML is to explore and describe the region's biodiversity and to explain the processes controlling the patterns of distribution and abundance to enable ecosystem-based management[489] of the Gulf of Maine. Advances in knowledge will relate to both biodiversity and ecological processes, and over a range of trophic levels and types of habitat. The Gulf of Maine area is defined for this program as all of the Gulf of Maine, including Georges Bank, Browns Bank, the Bay of Fundy and the bordering continental slope and overlying sea.

The GoMA is based at the University of Southern Maine and is directed by two lead scientists, Evan Richert, Program Director, and Lewis Incze, Chief Scientist. A Scientific Steering Committee includes Canadian representation (Michael Sinclair, BIO).

Interdisciplinary working groups (plankton, fish, marine mammals and birds, and shallow and deep benthos) form the basis of the scientific program. The working groups also provide a forum for the presentation and evaluation of new data. Additional partners provide input on research questions as required. These partners include GoMOOS, GLOBEC, RARGOM and the Discovery Corridor.

GoMA Collaborative Projects

GoMA is the primary body to achieve CoML's aims in the Gulf of Maine region. As noted above, Canadian private and government research institutes serve in an advisory capacity to GoMA[490] and contribute to specific collaborative research projects. Formal agreements are entered into with Canadian institutions for specific activities, *e.g.*, with Huntsman Marine Science Centre and DFO for the Gulf of Maine Register of Marine Species (see below).

The primary output of GoMA is information. Several tangible outputs are already available online.[491] Information will also be disseminated through papers and reports focusing on biodiversity, ecosystem and habitat management, and the ecosystem-based approach to the Gulf of Maine.

The Gulf of Maine Dynamic Atlas[492] provides the data and mapping portal for the Gulf of Maine Biogeographic Information System (GMBIS) (refer to Section 6.8.1 on page 119). In conjunction with the Huntsman Marine Science Centre (refer to Section 5.3.2 on page 100), GoMA has prepared the searchable Maine "Gulf of Maine Register of Marine

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489 See http://www.usm.maine.edu/gulfofmaine-census/Docs/Applications/EBM.htm.

490 GoMA website, "Scientific and Steering Advisory Committees", online at http://www.usm.maine.edu/gulfofmaine-census/Docs/Participants/SSC.htm.

491 GoMA website at http://www.usm.maine.edu/gulfofmaine-census/. See, for example, Evan Richert and Lewis Incze, eds, *Prototype Biophysical Maps of the Gulf of Maine*, (October 2003) prepared by the Island Institute, online at http://www.usm.maine.edu/gulfofmaine-census/Docs/Prototype_Biophysical_Maps.pdf.

492 Dynamic Atlas of the Gulf of Maine, online at http://gmbis.iris.usm.maine.edu/.

Species." [493] The register involved assembling databases and scientific papers on species known to be in the Gulf of Maine.

For further information on CoML: http://www.comlsecretariat.org.

For further information on GoMA: http://www.usm.maine.edu/gulfofmaine-census/index.htm.

5.3.2 Huntsman Marine Science Centre

The Huntsman Marine Science Centre (HMSC) has a number of marine research programs. The Atlantic Reference Centre (ARC) focuses on the identification and classification of cold water fishes and other marine organisms and development of biogeographic information systems. The International Aquatic Innovation Centre (IAIC), an industrial-based, pre-commercial testing facility, investigates sustainability and productivity issues in the aquaculture sector.

In conjunction with the Gulf of Maine Program of the Census of Marine Life (GoMA), Huntsman developed the "Gulf of Maine Register of Marine Species." This register is a list of species inhabiting Gulf of Maine waters, including those over Georges Bank and the adjacent continental slope. The species span diatoms to marine mammals. Data includes scientific and common names, synonyms, and generally follow the standardized classification and provide the Taxonomic Serial Number of the Integrated Taxonomic Information System. The Gulf of Maine Register is a component of the North Atlantic Register of Marine Species, a project of ARC. The North Atlantic Register covers the northwest Atlantic from the Arctic to Cape Hatteras, North Carolina.

URL http://www.huntsmanmarine.ca

5.3.3 Gulf of Maine Research Institute

The Gulf of Maine Research Institute (GMRI) is a marine research and education institution, guided by a three-part mission:

> Convene the interested public to discuss, debate, and resolve aquatic resource conflicts;
> Facilitate and conduct collaborative research in the Gulf of Maine and its watershed; and
> Educate Maine residents and visitors about Maine's fresh and saltwater resources.

[493] The Register is online at http://www.huntsmanmarine.ca/narms.shtml. For a description of the project, see Lori Valigra, "Surprising Species Diversity Revealed," *Gulf of Maine Times*, Vol. 10 # 1 Spring 2006, online at http://www.gulfofmaine.org/times/spring2006/species2.html.

Scientific Programs

GMRI involves fishermen and scientists in collaborative fisheries research. Drawing on the fishing community's knowledge of marine ecosystems and vessel operations and the scientific community's methodology and experience, GMRI research projects focus on the relationships between predator and prey species in the Gulf of Maine and how these species use essential habitats. GMRI uses an integrated approach to data analysis with a view to improving the effectiveness of fisheries management in the Gulf of Maine. GMRI has collaborated with Fisheries and Oceans Canada in a Northeast Regional Cod Tagging Program and in using acoustics to study herring stocks.

Northeast Cod Tagging Program

In an effort to understand the steady decline in Atlantic cod total stock biomass estimates and the implications for the distribution and movement of cod in the Gulf of Maine and Georges Bank region and management of commercial cod fisheries, both Canada and the United States have undertaken tagging projects. The Northeast Regional Cod Tagging Program (NRCTP), initiated in late 2002, represents the largest cod tagging program initiated to date along the eastern seaboard. GMRI coordinates the Program. The Program is funded by NOAA Fisheries, Northeast Regional Office and is funded until June 2006.

This collaborative research program involved commercial fishermen and research organizations from Canada and the US to Cape Cod. The following organizations participated in the tagging in American waters of the Gulf of Maine and Georges Bank: School for Marine Sciences and Technology, UMASS, Dartmouth, Cape Cod Commercial Hook Fishermen's Association, Maine Department of Marine Resources and Island Institute. In Canada, Fisheries and Oceans Canada tagged cod on Browns Bank and in the Bay of Fundy.

Tagging took place between March 2003 and July 2005 using a standardized tagging technique. The program is using the tag returns data to:

monitor and identify migration patterns
identify the extent of mixing between populations
obtain growth information
investigate the roles of temperature, depth and reproductive condition on the migration and growth evidenced.

Over 114,000 Atlantic cod were tagged and released throughout the Gulf of Maine, on Browns Bank, in the Bay of Fundy, on George's Bank and in waters around Cape Cod. Recapture information from over 5,600 tagged cod has been received with the overall tag return rate currently at ~4.9%. Results have been compiled into a database and analysis is underway. The data is compiled by region and a website will be created to geographically display the information.

URL http://www.gma.org/research/cod_tagging.asp

Herring Acoustic Survey

The ongoing acoustic survey projects are conducted by Fisheries and Oceans Canada, the Northeast Fisheries Science Center (NEFSC) and the Gulf of Maine Aquarium, working with commercial herring vessels to collect information on herring stocks in the Gulf of Maine. These projects provide fishermen a way to turn otherwise anecdotal information on how many herring they are seeing into data useful to the scientific and regulatory communities. Data is collected by incorporating acoustic data collection devices on herring boats. This system provides a "hands-free" approach to herring research that is relatively inexpensive and minimizes the disturbance to normal fishing activities. The Gulf of Maine Aquarium project focuses on developing an automated acoustic survey capability to monitor and assess spawning herring stocks in US waters of the Gulf of Maine. NEFSC's acoustic research efforts focus on improving fisheries-independent population estimates of Atlantic herring in the Georges Bank and Gulf of Maine regions for more cost-effective and timely fisheries management. Field experiments have been conducted to evaluate survey designs, improve variance estimators, and define species-specific individual target strength measurements. Results from these three independent surveys are integrated to provide an overview of herring stocks in the Gulf of Maine.

URL http://www.gma.org/herring/research/acoustics/default.asp

5.4 Non-governmental Programs

Non-governmental organizations play an important role in the facilitation and coordination of science research and dissemination of scientific information. Their collegial structure encourages networking between scientists, academia, government and community organizations. Two such organizations with a particular focus on the Bay of Fundy and Gulf of Maine region are described below, the Regional Association for Research on the Gulf of Maine and the Bay of Fundy Ecosystem Partnership. Other regional non-governmental organizations undertake collaborative research projects. The transboundary research activities of the Atlantic Salmon Federation and the Northwest Atlantic Marine Alliance are set out below. The final example in this section outlines the collaborative research opportunities provided by a regional affiliation of an international non-governmental organization, the North Atlantic Chapter of the Society of Environmental Toxicology and Chemistry.

5.4.1 Regional Association for Research on the Gulf of Maine

The Regional Association for Research on the Gulf of Maine (RARGOM) is an association of institutions which have active research interests in the Gulf of Maine and its watershed. RARGOM has a two-tiered membership and dues structure (full and associate members). Full members include major universities, research laboratories, federal and state research and management units from Maine, Massachusetts, New

Hampshire, Rhode Island, and Connecticut, as well as Nova Scotia and New Brunswick, with significant marine research and education programs in the Gulf of Maine region. Founded in 1991, RARGOM is presently housed at the University of New Hampshire.

RARGOM's mission is to facilitate a coherent program of regional research; to promote scientific quality; and to provide a communication vehicle among researchers and environmental decision-makers at its member institutions and in the broader Gulf of Maine community. RARGOM serves as an advocate for regional scientific research in the Gulf of Maine and as a bridge between the research and management communities. Its members share a commitment to stewardship of the Gulf of Maine.

Activities and Programs

RARGOM has identified four primary activities:

> Regular meetings of RARGOM representatives for networking and planning[494]
> Sponsorship of Theme Sessions, 'regional conversations' on current subjects of regional significance for scientific research and environmental management
> Development of the RARGOM website as a tool for fostering communication among the Gulf of Maine scientific community (http://www.rargom.org)
> Fostering coordination and scientific quality in regional research activities and their applications

In 2004, RARGOM sponsored three one-day theme sessions (*Integrative Modeling*, *Tidal Wetland Restoration*, and *Research Priorities for Habitat and Land Use Management*). In 2005, RARGOM hosted a two-day workshop on *Modeling Needs Related to the Regional Observing System in the Gulf of Maine*.[495] The 2005 report proposed development of a regional modeling centre to coordinate and advance regional physical and cross-disciplinary models for the Gulf of Maine, particularly in support of management needs. While it remains to be seen how the ideas arising from the workshop will be implemented (although RARGOM remains involved with follow-up activities, see below), this development illustrates the research and infrastructure catalyst role that RARGOM plays in the region. RARGOM played a similar role in its 1998 report on the Gulf of Maine Observing System, which ultimately led to the formation of GoMOOS (refer to Section 6.5 on page 115).

Four upcoming theme sessions have been identified: 1) Gulfwatch Contaminants Monitoring Program (September 2006), which will form part of RARGOM's current contract with the Gulf of Maine Council to evaluate the Program[496] (In 1997, RARGOM conducted a review of the first five years of the Gulfwatch Program.); 2) modeling needs

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[494] To date, all meetings have been held in the United States. However, RARGOM is looking at ways to increase Canadian participation at the meetings.

[495] Reports of both meetings are online on the RARGOM website at http://www.rargom.org.

[496] RARGOM will oversee external scientific review and prepare a report synthesizing review comments with recommendations for the future direction of the program.

follow-up session (Fall 2006) to advance the development of coordinated regional modeling activities in the Gulf of Maine and to draft an interagency plan of action to implement a coordinated regional approach; 3) linkage between nearshore and coastal ocean systems (Spring 2007), addressing questions about change in nearshore habitats and connections to offshore Gulf of Maine ecosystems by exploring the impact of coastal human activity on the greater Gulf; and 4) ecosystem metrics and indicators for the Gulf of Maine (TBA).

RARGOM is represented by five members on the advisory committee of the Northeastern Regional Association of Coastal Ocean Observing Systems. The Regional Association, based at the University of Southern Maine, has received funding from IOOS (Integrated Ocean Observing System) to establish infrastructure for the Coastal Ocean Observing System in the Gulf of Maine region. The advisory committee is comprised of representatives of regional management, research and industry interests It will direct this initiative for coordinated regional observing and interpretation of environment change for management applications. RARGOM sees a role for itself in promoting regional coordination between this and observing programs supported by other agencies (*e.g.*, EPA and the National Science Foundation).

URL http://www.rargom.org

5.4.2 Bay of Fundy Ecosystem Partnership

The Bay of Fundy Ecosystem Partnership (BoFEP) is a non-profit organization which focuses on the Bay of Fundy drainage area landward, and includes the full bay seaward as an integral part of the Gulf of Maine. Established as a "virtual institute", BoFEP's objective is to foster wise conservation and management of the Bay's natural resources and habitats, by encouraging cooperative research, conservation and other activities on issues facing the Bay, monitoring the state of the ecosystem and monitoring marine environmental quality indicators, and facilitating scientific information exchange and dissemination. Founded in 1997, BoFEP's membership includes individuals and representatives of community groups, businesses, government agencies and academic institutions from Nova Scotia and New Brunswick, as well as other regions of Canada and the United States.

BoFEP has several Working Groups comprised of members from both Canada and United States. Working Group terms of references vary but include information exchange, identification and facilitation of research project, and promotion of collaborative research, conservation and educational projects.

The following Working Groups are active within BoFEP:

1. Biosphere Reserve
2. Corophium and Mudflat Ecology
3. Eelgrass
4. Fundy Informatics Group (FIG)
5. Integrated Coastal Zone Management
6. Marine Energy

7. Minas Basin
8. Salt Marsh and Restricted Tidal Systems (SMaRTS)
9. Stress and Cumulative Effects
10. Sublittoral Ecology and Habitat Conservation
11. Toxic Chemicals and Marine Environmental Quality.

BoFEP hosts the biennial Bay of Fundy Science Workshop (the 7th will be held in St. Andrews, NB in October 2006) that draws participants from around the Bay of Fundy and the Gulf of Maine. Scientific papers and posters cover a diverse range of topics including contaminants, biology, ecology, coastal habitat protection/restoration, ecosystem tools and techniques, monitoring, mapping and information management, fisheries and aquaculture, and sustainable use and management of the Bay of Fundy, as well as the Gulf of Maine.

A contribution agreement between BoFEP and the Gulf of Maine Council on the Marine Environment has established a formal linkage between these two organizations in support of their common interest in the wise management of the Gulf of Maine/Bay of Fundy. BoFEP receives an annual contribution of US$10,000 from GOMC to undertake project initiatives of mutual interest that relate to activities outlined in the Gulf of Maine Council Action Plan.[497]

URL http://www.bofep.org

5.4.3 Atlantic Salmon Federation

The Atlantic Salmon Federation (ASF) is an international non-profit organization. Established in 1948, it is composed of seven councils and 140 affiliated organizations. ASF is funded by individuals, corporations and foundations and "promotes the conservation and wise management of the wild Atlantic salmon and its environment."[498]

An umbrella organization, the main component organizations of ASF are the seven regional councils. The affiliated organizations are members of the councils. Two councils represent the American eastern seaboard, Maine and Western New England, and the other five councils represent Canadian provinces (Nova Scotia, New Brunswick, Newfoundland, Prince Edward Island and Quebec). Only a portion of the Nova Scotia and New Brunswick councils' work is relevant in the Gulf of Maine.

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[497] Projects funded during 2005-2006 dealt with assessment and integration of historical aerial photography on the salt marshes in the Southern Bight of the Minas Basin into a comprehensive digital geodatabase, identification of candidate salt marsh restoration sites in the Annapolis Valley, and evaluation of vegetation distribution and production in relation to the altered hydrology documented in recovering marshes in the Cumberland Basin and Saints Rest Marsh near Saint John. Projects funded for 2006-2007 deal with mapping persistent features, factors and processes in Southwest New Brunswick for use in habitat and biodiversity conservation and developing an information and knowledge repository for the Bay of Fundy.

[498] The Atlantic Salmon Federation website at http://www.asf.ca/Overall/whoisASF.htm.

ASF acts as a forum for communication and information sharing and dissemination. It draws information on the Atlantic salmon from many sources and provides guidance to smaller groups on their projects. ASF has published the *Atlantic Salmon Journal* on a quarterly basis since 1952, a journal for anglers and scientists alike.[499]

ASF's recently released biennial report, *Atlantic Salmon at the Balancing Point,*[500] outlines the status of North American wild Atlantic salmon in 2006. The report discusses ASF's initiatives to protect the Atlantic salmon, in particular their support of its listing as an endangered species[501] and the closing the Atlantic fishery. It also discusses current and future issues. The main focus is mortality at sea. The report is based on advice from the International Council for the Exploration of the Sea (ICES). It draws attention to the failure of Gulf of Maine and Bay of Fundy Atlantic salmon to rebound and to their continued decline. This is contrasted with other areas which have, at least, had a mix of successes and failures at restoration.[502] As noted earlier, ASF has pledged its support to coordinate its research activities on salmon migration with the Salmon at Sea Program (SALSEA) of NASCO (refer to Section 4.6 on page 77).

The report also summarizes one of ASF's main projects, the tracking of Atlantic salmon through sonic transmitter technology.[503] ASF specializes in transmitter technology and salmon tracking, and released 80 aquaculture salmon in the Bay of Fundy in 2004.[504] ASF is also concerned with the impacts of acid rain on salmon rivers, the effects of fish farming in the Bay of Fundy and Gulf of Maine, and the impact of agricultural runoff on wild salmon stocks. Many of ASF's research projects focus on particular rivers. ASF has been active in efforts to restore Atlantic salmon to the St. Croix River.

URL http://www.asf.ca

5.4.4 Northwest Atlantic Marine Alliance

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499 ASF Website, *Atlantic Salmon Journal* page, online at http://www.asf.ca/Journal/journal.html.

500 The Atlantic Salmon Federation, *Atlantic Salmon at the Balancing Point: An Urgency to Understand Mortality at Sea*, Status of North American Wild Atlantic Salmon in 2006, online at http://www.asf.ca/Communications/2006/06/sop/ASFstate.pdf.

501 COSEWIC listed the Inner Bay of Fundy Atlantic salmon as an endangered species in 2001. See Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Atlantic Salmon, Inner Bay of Fundy Populations, online at http://www.cosewic.gc.ca/eng/sct1/searchdetail_e.cfm?id=672&StartRow=1&boxStatus=All&boxTaxonomic=All&location=All&change=All&board=All&commonName=atlantic%20salmon&scienceName=&returnFlag=0&Page=1.

502 Fewer than 200 Atlantic Salmon are returning in the entire Bay of Fundy and there is a continued population decline in the outer Bay of Fundy and northeastern United States. Most returning salmon are in just two rivers, the Saint John and Penobscot. Annual Report 2004, at 1 and 3.

503 *Ibid*., at 4.

504 Annual Report 2004, Atlantic Salmon Federation, p.18, online at http://www.asf.ca/annualreports/ASF_Annual2004.pdf.

The Northwest Atlantic Marine Alliance (NAMA) is committed to restoring and enhancing an enduring northwest Atlantic marine system, which supports a healthy diversity and abundance of marine life and human uses. NAMA is a community-based, self-organizing and self-governing institution. NAMA collaborates with fishermen, conservation organizations, researchers, management entities, businesses, and community members throughout the Gulf of Maine region.

In terms of scientific research, NAMA focuses on encouraging collaborative fisheries research and sharing research results with a view to encouraging community-based marine resource management in the northwest Atlantic Ocean. For example, in partnership with the University of New Hampshire Center for Excellence in Coastal Ocean Observing and Analysis (COOA) and the Gulf of Maine Ocean Observing System (GoMOOS), NAMA convened a series of meetings between researchers and fishermen to discuss complex ecosystem relationships. The resulting food web diagrams and graphics illustrating migration patterns will be published.

NAMA publishes a monthly report on collaborative fisheries research projects in the Gulf of Maine and Georges Bank (http://www.namanet.org/Collaborations.php). The Annual Projects Guide provides a cumulative list of research projects between American fishermen and scientists and their partners. Although there are few projects with Canadian partners (primarily testing of modified trawl gear at the Marine Institute at Memorial University), some projects' data has been used in the TRAC process (refer to Section 4.3.2 on page 58).

URL http://www.namanet.org

5.4.5 Society of Environmental Toxicology and Chemistry, North Atlantic Chapter

The Society of Environmental Toxicology and Chemistry (SETAC) promotes the advancement and application of scientific research related to contaminants and other stressors in the environment, education in the environmental sciences, and the use of science in environmental policy and decision-making. SETAC is an international non-profit organization with chapters and branches throughout the world.

The North Atlantic Chapter (NAC/SETAC) encompasses the entire North Atlantic region from New Jersey to Newfoundland. Its membership includes individuals from industry, academia and government. NAC/SETAC general and board membership is transboundary. The chapter sponsors short courses, hosts networking events, and a range of other activities. Its annual meeting includes reports and panel on scientific research in the Gulf of Maine.

URL http://www.nacsetac.org

5.5 Community Programs

Providing biologists and resource managers with a mountain of data, citizen scientists and community organizations make a valuable contribution to monitoring programs. Volunteer researchers allow scientists to track a particular species or habitat over time and begin to address more long-term conservation issues. In addition, community groups are active in remedial environmental programs in their communities. Through community networks they share their experiences with others throughout the Gulf of Maine region. The role of non-governmental organizations and community groups is explored further in Section 7 of this report on page 121. The role of one community-based program, the Atlantic Coastal Action Program, is examined below, with a particular focus on the science program of the one organization with a transboundary mandate, the St. Croix Estuary Project.

5.5.1 Atlantic Coastal Action Program

The Atlantic Coastal Action Program (ACAP) is a community-based program, which mobilizes citizens in local areas to address their own environmental and developmental challenges. Initiated by Environment Canada in 1991 in an effort to restore damaged coastal environments, ACAP involves fourteen non-profit organizations from communities across the Atlantic Provinces. The Gulf of Maine and Bay of Fundy region hosts four ACAP programs: the Clean Annapolis River Project (Nova Scotia), Eastern Charlotte Waterways (New Brunswick), ACAP Saint John (New Brunswick) and the St. Croix Estuary Project (New Brunswick). Only one ACAP organization has a historic transboundary program in the Gulf of Maine region, the St. Croix Estuary Project. The St. Croix River Estuary is located at the northwest corner of Passamaquoddy Bay at the western mouth of the Bay of Fundy in Charlotte County, New Brunswick. However, the other ACAP projects identified here have conducted projects that impact the marine environment of the Gulf of Maine and Bay of Fundy.

General Organization

Each ACAP site has formed an incorporated, non-profit organization with its own Board of Directors, and maintains a full-time paid Coordinator and an office. While Environment Canada contributes to project funding, community stakeholders contribute most of the resources through volunteer labour, in-kind contributions, and financial support. Currently in its third phase (2003-2008), Environment Canada's ACAP is continuing to support the existing organizations through knowledge generation, capacity building, collaborative science and action, with an emphasis on environmental results. ACAP is planning to establish additional sites, as capacity allows, into other coastal areas where appropriate (*e.g.*, integrating with DFO's coastal and ocean agenda). ACAP also works with multi-stakeholder coalitions organized around larger regional ecosystems (*e.g.*, Bay of Fundy Ecosystem Partnership, Southern Gulf of St. Lawrence Coalition on Sustainability, and the Gulf of Maine Council).

Each ACAP organization identifies critical issues in their local communities and develops management plans for the sustainable use of their resources. The Science Linkages Initiative supports investment in science at the community level. Each

organization is eligible to apply for funds[505] for peer reviewed scientific projects done cooperatively with Environment Canada scientists, engineers and economists. Projects are reviewed for scientific value and local relevance, and results are disseminated in both community and professional fora.

Science Programs

Ecological monitoring is a significant activity in many ACAP organizations.[506] For example, the St. Croix Estuary ACAP began 14 years ago with a collaborative monitoring program of clams and river quality with officials and community groups in the State of Maine. Although formal transboundary monitoring is no longer feasible since 9/11, independent monitoring programs continue on each side of the border and data sharing is possible. The Clean Annapolis River Project maintains a volunteer water quality monitoring program called the Annapolis River Guardians that has, over the years, led to improved municipal and private wastewater treatment. Eastern Charlotte Waterways' Bacterial Monitoring Program measures and tracks bacteria levels with a focus on soft-shell clam harvesting areas. Many sites monitor the same parameters, and often participate in national monitoring programs. For example, CARP monitors aquatic macro-invertebrates utilizing the CABIN (Canadian Aquatic Biomonitoring and Inventory Network) protocols and terrestrial biodiversity monitoring plots using protocols developed by EMAN (Ecological Monitoring and Assessment Network). Use of standard parameters and protocols allows for regional analysis of some ACAP monitoring data.

ACAP organizations also undertake specific projects that while local in focus, have implications for the marine environment of the Gulf of Maine. For example, Saint John ACAP has projects focusing on marine water quality in Saint John Harbour. In 2004, the St. Croix Estuary Project completed a 400 hundred year review of the environmental health of the St. Croix Estuary. In addition to a comprehensive literature review, diving and transect surveys were conducted along both coasts of the estuary. This two-year project documents the current health of the St. Croix Estuary and ecological trends in the estuary.[507] The St. Croix Estuary Project has also begun preliminary work on establishing an international marine protected area encompassing the estuary, West Isles, Passamaquoddy Bay, Head Harbour, and Cobscook Bay.

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[505] Up to $18,000 per annum is available to each ACAP organization, which must raise matching funds at particular level. In ten years, over 75 scientists have worked with ACAP organizations on a wide range of projects. Personal communication, Larry Hildebrand, 24 July 2006.

[506] See a recent survey of ecological monitoring activities within ACAP, *Ecological Monitoring and Reporting: A Survey of the Atlantic Coastal Action Program*, Report prepared for Environment Canada, Sustainable Communities and Ecosystems Division, by Denise Sullivan and Megan Beveridge, Clean Annapolis River Project (March 2005).

[507] Arthur MacKay, Jennifer Cameron, Mark Bader, *The St. Croix Estuary 1604 – 2004: The Environmental Health of the St. Croix Estuary after 400 Years*, Volume 2 of 2, Field Studies, St. Croix Estuary Project, Inc., Occasional Report No. 03/2, March 2003, online at http://www.scep.org/Publications/EstuaryHealth/EstuaryHealth2.pdf.

Effective in both data collection and dissemination and in engaging in a two-way dialogue with decision-makers, ACAP groups have effected positive change in their community through remedial action. Although formal transboundary collaboration is limited, the scientific information collected by ACAP organizations and information on community projects is shared with others in the Gulf of Maine region through informal means.

For information on the ACAP see Environment Canada's website at http://atlantic-web1.ns.ec.gc.ca/community/acap/ or contact individual ACAP organizations

SECTION 6

Informatics and Geomatics

Authors: Michael Butler, ACZISC Secretariat and IOI-Canada and Claudette LeBlanc, ACZISC Secretariat

6.1 Introduction

Maps have long been an important means to present information about the Bay of Fundy/Gulf of Maine. The ability to integrate geospatial data from various organizations into collective maps and targeted user applications is essential for resource management.

Most stakeholders in the region that collect information about the Gulf generate geospatial datasets that are ultimately incorporated into maps. In the past, the data collected was maintained in closed environments that made meaningful data interaction cumbersome or impossible. However, this situation, to a large extent, is being addressed from a transboundary perspective in the Bay of Fundy/Gulf of Maine region.

The Gulf of Maine Council on the Marine Environment has initiated, or been a partner in, a number of significant informatic/geomatic programs.

6.2 Gulf of Maine Mapping Initiative

The Gulf of Maine Mapping Initiative (GOMMI) is a Canadian-US partnership of government and non-government organizations. The program developed out of discussions held at the October 2001 *Marine Habitat Characterization and Mapping Workshop*, co-sponsored by the Gulf of Maine Council and the National Oceanic and Atmospheric Administration (NOAA) in Maine. The purpose of the workshop was to develop a means for coordinating the various mapping projects already underway in the Gulf of Maine in order to make the information obtained accessible to a wider audience.[508]

GOMMI's goal is to map the entire Gulf of Maine basin by facilitating communication and collaboration within the mapping community, coordinating ongoing mapping efforts, building support for mapping projects in priority areas, and making maps and data widely available to users and stakeholders.[509] The GOMMI Strategic Plan, prepared in

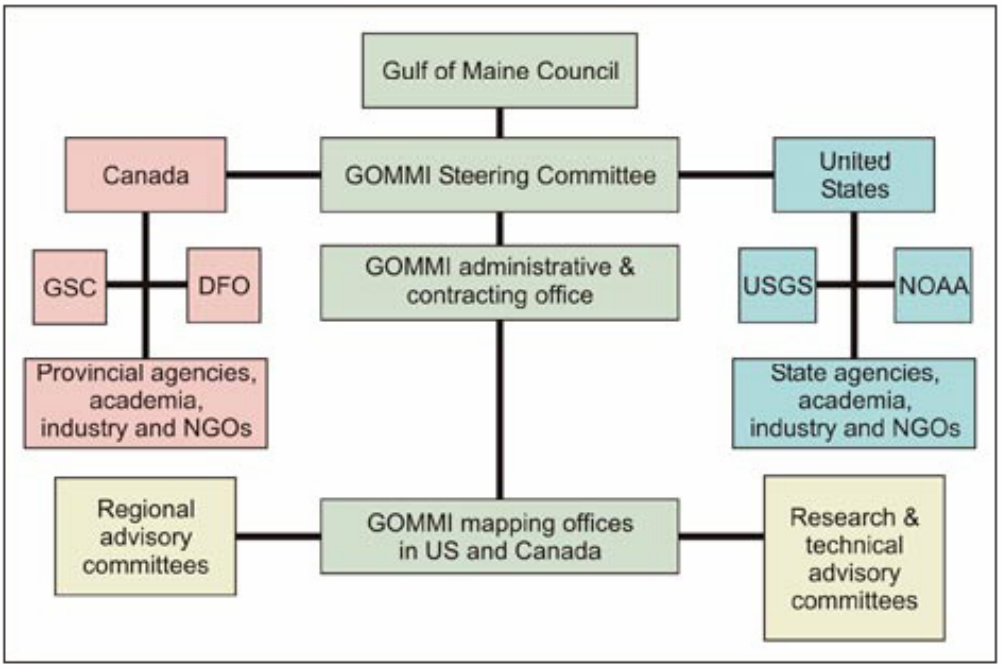
[508] Gulf of Maine Council on the Marine Environment, *Gulf of Maine Times*, Winter 2001, online at http://www.gulfofmaine.org/times/winter2001/gulf_log.html.

[509] Gulf of Maine Council on the Marine Environment, *GOMMI Newsletter July 2006*, online at http://www.gulfofmaine.org/gommi/newsletter/issue1_july2006.php.

2004, provides an overview of recommended survey activities, data management, and program coordination for detailed mapping of the Gulf of Maine sea floor.[510]

The inaugural edition of the GOMMI newsletter (July 2006) is designed to keep readers up to date on GOMMI's progress and to provide a forum for news on seafloor mapping in the Gulf of Maine region. The semi-annual newsletter is archived on the GOMMI website.[511]

The GOMMI Steering Committee is a subcommittee of the Gulf of Maine Council's Habitat Committee. Although the Council played a formative role in the development of GOMMI, the program has now grown such that the Council is but one regional partner in the initiative.[512]



GOMMI ORGANIZATIONAL CHART

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[510] Gulf of Maine Council on the Marine Environment, *Gulf of Maine Mapping Initiative: A Framework for Ocean Management* (GOMMI) Strategic Plan) 2004, online at http://www.gulfofmaine.org/council/publications/gommistrategicplan_entire.pdf.

[511] *Supra* note 509.

[512] Gulf of Maine Council on the Marine Environment, *Working Group Action Plan Session and Business Meeting, Halifax, NS, January 10-11, 2006*, Briefing Packet, Version 1, December 29, 2005, at 34.

6.3 Gulfwatch

Gulfwatch is a chemical-contaminants monitoring program organized and administered by the Gulf of Maine Council on the Marine Environment. Gulfwatch is coordinated and conducted by scientists and managers from agencies and universities around the Gulf of Maine. The program operates under the guidance of the Council's Environmental Quality Monitoring Committee (EQMC) and is supported with funding from the Gulf of Maine Council on the Marine Environment and the US Environmental Protection Agency.

The Gulf of Maine Ocean Observing System (GoMOOS), in cooperation with the EQMC, has developed a series of interactive web-based tools to make Gulfwatch data available to a wider audience.[513]

Interactive Mapping Tool

Users can create maps showing the geographic distribution of eleven different contaminants at 38 sites around the Gulf of Maine.[514] The interactive mapping tool can also be used to display changes in contaminant levels over time from 1993 to 2001 for different areas of the Gulf.[515] The application allows the information to be displayed in graph format according to selected years and contaminant types. Gulfwatch data from recent years will be added as it becomes available.[516] The mapping application was developed as a demonstration project for the Gulf of Maine Mapping Portal (GoMMaP), funded by the US Federal Geographic Data Committee and GeoConnections Canada, and allows users to add data from other organisations' databases linked via the Mapping Portal.[517] In this way, information such as watershed boundaries and land uses can be added or removed to the Gulfwatch data map layers.

Gulfwatch Database

Gulfwatch data can also be downloaded in table format. The information is currently catalogued according to contaminant type and sampling year in tables for each of the five Gulf States and Provinces.[518] The database is currently being revised and is due to be re-posted in a format similar to that used by the NOAA National Status and Trends Program Mussel Watch Project in the near future.[519]

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[513] Gulf of Maine Council on the Marine Environment, *Council Meeting, June 23-24, 2004, Wolfville, NS*, Briefing Packet, Final Version, June 15, 2004, at 11.

[514] Gulf of Maine Council on the Marine Environment, Gulfwatch Contaminants Monitoring Program - Mapping Tool website at http://www.gomoos.org/chameleon/gulfwatch/.

[515] *Ibid*.

[516] Gulf of Maine Council on the Marine Environment, Gulfwatch Contaminants Monitoring Program - Interactive map website at http://www.gulfofmaine.org/gulfwatch/map.asp.

[517] *Ibid.*

[518] Gulf of Maine Council on the Marine Environment, Gulfwatch Contaminants Monitoring Program - Findings website at http://www.gulfofmaine.org/gulfwatch/results.asp.

[519] *Ibid.*

Inventory of Gulfwatch Sites

The Gulfwatch website contains an inventory of Gulfwatch sampling sites around the Gulf of Maine.[520] The list includes the sites' names, latitude and longitude, the years in which the sites were sampled, and the substrate type and tidal range present at each site.

Monitoring Inventory

In an effort to promote networking and information sharing among Gulf of Maine monitoring organizations, the EQMC created an inventory of marine environmental quality monitoring programs for the Gulf region.[521] The first inventory was published in print format in 1989.[522] In 2001, this inventory was updated and made available both in print and online through the Gulf of Maine website.[523] This comprehensive list of programs and activities included active and ongoing federal, state, local, volunteer and private programs. The entries provided information on the causes, movement and effects marine environmental contaminants. The Inventory was later converted into a searchable database accessible through the Council's website.[524] Information on monitoring programs can be searched according to jurisdiction, the resource being monitored, or the parameters of study. The EQMC is currently in the process of transferring the inventory data to NASA's Global Change Master Directory (GMCD).[525]

6.4 Gulf of Maine Ecosystem Indicator Partnership

The Gulf of Maine Ecosystem Indicator Partnership (ESIP) is a regional ecosystem indicators and reporting program for the Bay of Fundy/Gulf of Maine. ESIP has been under development since the Gulf of Maine Summit in 2004. While many indicator and reporting efforts exist within and encompass the Gulf of Maine, a gulf-wide program is currently lacking. ESIP, a new program of the Gulf of Maine Council on the Marine Environment (GoMC) and its partners, is a science-based initiative to leverage existing monitoring datasets into a comprehensive reporting system for regional decision-makers. Datasets that are CGDI-compliant represent a best first-cut of indicator data sources.

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520 *Ibid.*

521 Gulf of Maine Council on the Marine Environment, *Gulf of Maine Times*, Spring 2004, online at http://www.gulfofmaine.org/times/spring2004/.

522 Maine State Planning Office. 1989. *Marine Environmental Quality Monitoring Programs in the Gulf of Maine: An Inventory*. Gulf of Maine Council on the Marine Environment.

523 Heather Chandler. 2001. *Marine Monitoring Programs in the Gulf of Maine: An Inventory*. Gulf of Maine Council on the Marine Environment, online at http://www.gulfofmaine.org/library/pdf/mon_inventory.pdf

524 Gulf of Maine Council on the Marine Environment, Environmental Monitoring Program Locator - Search website at http://gomc.sr.unh.edu/index.jsp.

525 Gulf of Maine Council on the Marine Environment, *Council Meeting, Forum, and Awards Reception, June 5-7, 2006, Portland, ME*, Briefing Packet, Version 1, May 30, 2006, at 15.

ESIP has a dedicated program manager and is driven by a Steering Committee representing Canadian and US marine-environmental interests. Programmatically, ESIP will facilitate efforts by the six focus area working groups to identify and report on regional indicators. An initial transboundary project funded by GeoConnections in 2006 will target regional nutrient and contamination monitoring results. This project will support the development of geospatial contaminant tools that coastal and ocean managers in the Gulf of Maine have said they need to improve the integrated management of this transboundary area.

ESIP is now a formal committee of the GoMC Working Group. The ESIP Steering Committee has 5 federal agency co-chairs (EPA, USGS and NOAA in the US, and EC and DFO in Canada), a Technical Advisory Panel, and indicator focus groups working to develop indicators in six theme areas: aquatic habitats, climate change, contaminants, coastal development, eutrophication, and fisheries.

6.5 Gulf of Maine Ocean Observing System

The Gulf of Maine Ocean Observing System (GoMOOS) is a national pilot program designed to bring hourly oceanographic data from the Gulf of Maine to all those who need it.[526] GoMOOS is a non-profit membership organization.

GoMOOS, funded primarily by NOAA, has a total of 20 buoys: ten are on the water from Massachusetts to Nova Scotia and the other ten are ashore being repaired or upgraded at any given time. The buoys are placed up to 15 miles offshore, or where the water is about 100 metres deep.[527]

The GoMOOS website provides hourly information, including wind, wave, visibility, air temperature, water temperatures at various depths, salinity and more. It also includes satellite and other data such as information from the Coastal Ocean Dynamics Application Radar (CODAR) land-based stations that use radio waves to produce maps of ocean currents throughout the Gulf.

GoMOOS develops and tests various computer models, including:

Wave models to predict wave height and period (the time between waves). This information can help commercial fishermen plan trips, pilots guide ships into port, and search and rescue teams plan life saving efforts.

Circulation models to predict ocean currents, temperature, and a variety of other quantities. The many applications include: more accurate search and rescue efforts, rapid response strategies for environmental disasters (such as oil spills), estimating environmental impacts on fisheries abundance, and predicting climate change.[528]

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526 GoMOOS website at http://www.gomoos.org.

527 Gulf of Maine Council on the Marine Environment, *Gulf of Maine Times*, Fall 2005, online at http://www.gulfofmaine.org/times/fall2005/technology.html.

528 *Supra* note 526.

GoMOOS staff work with the various users to help design the information products that are available on the GoMOOS website. Additionally, they help to coordinate activities for the Gulf of Maine Ocean Data Partnership (refer to Section 6.6 below) and coordinate the development of the Northeast Regional Association for Ocean Observing.

The first edition of the GoMOOS Report published in the fall of 2005 [529] documented the latest news and updates on coastal and ocean observations, information products and activities.

6.6 Gulf of Maine Ocean Data Partnership

The Gulf of Maine Ocean Data Partnership (GoMODP) is comprised of 21 organizations that collect and manage environmental data within the Gulf of Maine and its watershed. Members include federal, state, provincial, university and research organizations in the US and Canada. Most of the data collected by the partners has a geospatial component that could eventually be used within a GIS framework to support resource management activities.[530]

The goal of the partnership is to make each partner's long term datasets discoverable, accessible, and eventually interoperable through tools available on the internet. The partnership intends to use standards and protocols already in use by the various disciplines represented wherever possible.[531]

Development of this evolving infrastructure is based on the international standards of the Open GeoSpatial Consortium that have been endorsed by the Canadian Geospatial Data Infrastructure (CGDI) and the US National Spatial Data Infrastructure (NSDI).

Metadata training and assistance are being provided to partners to aid in establishing a common set of practices in the design and publishing of metadata and to make data discoverable through the American Geospatial One Stop, The Global Change Master Directory (GCMD) and/or the Canadian GeoConnections Discovery portals on behalf of the data partnership and the individual organizations.[532]

Each year a workplan is established with clear goals and a governing board and technical committee ensure that the goals are accomplished during the year. The partnership continues to add members and hold annual meetings. Current priorities are

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[529] GoMOOS, First edition of the GoMOOS Report, online at http://www.gomoos.org/aboutgomoos/fall_newsletter.html.

[530] BIO Metadata Symposium, online at http://www.marinebiodiversity.ca/metadata/readme.htm.

[531] Gulf of Maine Ocean Data Partnership website at http://www.gomodp.org.

[532] *Supra* note 530.

a discovery metadata editorial function via GCMD and service oriented architecture based data services such as SOAP (Simple Object Access Protocol)[533].

For administrative purposes, GoMODP is a program of the Gulf of Maine Ocean Observing System (GoMOOS). It is understood that the Partnership is consistent with and will help promote the purposes of GoMOOS.

6.7 Gulf of Maine Mapping Portal

The Gulf of Maine Mapping Portal (GoMMaP) is designed as a single point of access to Bay of Fundy/Gulf of Maine maps and a resource for organizations that would like to contribute geographic data to the portal or add mapping content to a website.

The Gulf of Maine Mapping Portal was designed and built by GoMOOS in partnership with DM Solutions. GoMMaP resulted in a connectivity infrastructure that allowed all community stakeholders to share and leverage their data assets. Through support of accepted standards, real-time and historical data from many providers and in many formats was made available in a seamless, accessible way. The resulting data services were easily integrated into online maps. Once created, maps were included in unique web-mapping applications hosted (with no additional cost) on various stakeholders' servers. All necessary technologies and services were made available from the GoMMaP portal's one, centralized location.[534]

Features of GoMMaP include:

- Mapping Tools: Provides users with easy access to theme maps about the Bay of Fundy/Gulf of Maine
- Map Builder: Online tool that allows users to create custom maps by choosing from the 100s of maps and layers provided by the project partners
- Data Publishing Resources: "How to" documents for organizations that are interested in making their geographic data accessible through GoMMaP
- Web Mapping Capabilities: "How to" documents that that provide guidance for adding mapping content to a website
- Open Standards: Internationally accepted open standards are used to connect users with geographic data from many data providers
- International Partnership: GoMMaP represents a Canadian/US partnership of federal and state agencies, universities, NGOs, and private companies collaborating to integrate and provide access to geographical data.[535]

The GoMMaP portal and underlying infrastructure has improved communication amongst members of the Gulf of Maine Ocean Data Partnership, and improved community awareness and excitement about the power of data interactivity. Awareness

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[533] Gulf of Maine Ocean Data Partnership, 2006 GoMODP Work Plan at http://www.gomoos.org/coml/pub/Main/WebHome/ODP2006DraftWorkPlan091205.pdf.
[534] DM Solutions Group website at http://www.dmsolutions.ca/solutions/gommap.html.
[535] GoMMaP website at http://www.gommap.org.

of the group and its data assets has increased among funding organizations, the media, and the general public.

6.8 Ocean Biogeographic Information System

The Ocean Biogeographic Information System (OBIS) is the information component of the Census of Marine Life (CoML), a growing network of more than 1000 researchers in 73 nations engaged in a 10-year initiative to assess and explain the diversity, distribution, and abundance of life in the oceans - past, present, and future. Refer to Section 5.3.1 on page 98.

OBIS is an international federation of marine data providers working together to make their species distribution data available and interoperable through a singe web portal.[536] At present, OBIS is serving over 9 million data points from over 100 datasets internationally, as well as connecting data to mapping and range prediction tools.[537]

OBIS provides a central data cache of standardized data from a wide variety of species level databases on regional (*e.g.*, OBIS Canada) and thematic nodes (OBIS SEAMAP - Spatial Ecological Analysis of Megavertebrate Populations) and provides a variety of spatial query tools. 'OBIS Canada', operated by the Bedford Institute of Oceanography, is a Regional OBIS Node (RON) and contains extensive data for the Gulf of Maine such as research trawl surveys and continuous plankton recorder observations. OBIS-SEAMAP, operated by Duke University, is a thematic node focused on the movements of marine mammals, seabirds and sea turtles.[538] An OBIS node for the University of Southern Maine's Gulf of Maine's Census of Marine Life project, known as the Gulf of Maine Biogeographic Information System, is under development.

The OBIS Portal accesses data content, information infrastructure, and informatics tools - maps, visualizations, and models – to provide a dynamic, global facility in four dimensions (the three dimensions of space plus time). Potential uses are to reveal new spatial/temporal patterns; to generate new hypotheses about the global marine ecosystem; and to guide future field expeditions. The scope of OBIS offers new challenges in data management, scientific cooperation and organization, and innovative approaches to data analysis. Maintaining the principle of open access, the digital atlas developed by OBIS is expected to provide a fundamental basis for societal and governmental decisions on how to harvest and conserve marine life.

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[536] OBIS website at http://www.iobis.org.
[537] *Supra* note 530.
[538] OBIS SEAMAP website at http://seamap.env.duke.edu.

6.8.1 Gulf of Maine Biogeographic Information System Dynamic Atlas

The Gulf of Maine Dynamic Atlas is the data and mapping portal for the Gulf of Maine Biogeographic Information System (GMBIS), which is part of the Gulf of Maine Area Program of the Census of Marine Life. The Gulf of Maine Area Program is one of seven initial field projects of the international Census of Marine Life. It is the Census's only ecosystem-based field project.

The goal of the Atlas is to enhance understanding of biological patterns in the Gulf of Maine, across space and time. The study area includes all of the Gulf of Maine and Bay of Fundy, Georges Bank, the southern half of the Scotian Shelf, the adjacent Slope Sea and the New England Seamounts.

The Atlas enables users to explore, download and map biological and biogeographical data from multiple sources - many of whom are members of the Gulf of Maine Ocean Data Partnership. This Atlas, using GIS and Internet technologies, will improve access to existing time series of data to facilitate and broaden their use. The program will develop both a historical reconstruction and predictive tools through support of two funded projects: the History of Marine Animals Populations (HMAP) and the Future of Marine Animal Populations (FMAP) in the Gulf of Maine.

The data in GMBIS are intended to complement the oceanographic data of the Gulf of Maine Ocean Observing System (GoMOOS). GMBIS will consist of an "aggregation server" that provides access, rapid visualization and data download capabilities. The server will rely on a combination of archived (local access) data as well as dynamic access to remote data providers. The data providers have come together in the Gulf of Maine Ocean Data Partnership in order to be able to share their data with each other and the general public.

SECTION 7

Non-governmental Organizations

Authors: Susan Rolston, Seawinds Consulting Services and Patrick Canning, Law Student, Dalhousie Law School, Dalhousie University

7.1 Introduction

Non-governmental organizations, or NGOs, are generally accepted to be organizations which have not been established by governments or agreements among governments. Community-based organizations are local groups of individuals who have come together to take action on particular issues of concern to them. Community-based organizations may be a NGO, but many are not. In the Gulf of Maine region, whether international, national, regional or local in their origin, NGOs and community groups play an active role in the marine resource management, scientific research, conservation and stewardship. The Gulf of Maine Council NGO database includes 600 such organizations with an interest in the Gulf of Maine and its watershed.

The strength of many community-based organizations and NGOs is their collaborative nature. They partner with federal and provincial/state government agencies, municipalities, other like groups, foundations, and individuals with a strong interest and commitment to their mandate. Individual members have a direct interest in enhancing their knowledge of their environment and participating in activities to protect and enhance it. Communities and individuals around the Gulf of Maine are well aware of changes occurring in the marine ecosystem and are undertaking activities to protect and improve it. Recognizing the interdependent nature of the marine environment and resources, community groups and NGOs are often very interested in seeking common ground with others with similar interests and concerns.

Several examples of the contribution of NGOs and community-based organizations to collaborative marine science in the Gulf of Maine have already been provided. The following examples highlight the contribution of community-based organizations (Saltwater Network and Community Marine Resource Centres) to collaboration within their local communities as well as throughout the broader Gulf of Maine region. Two examples of NGOs (World Wildlife Fund and Ducks Unlimited) undertaking collaborative work in the Gulf of Maine are also provided.

7.2 Community-based Organizations

7.2.1 Saltwater Network

Saltwater Network was created by and for community-based organizations around the Gulf of Maine to support community-based marine management around the Gulf. Created in 2001, Saltwater Network is based on the principle that the health of coastal communities and the health of marine ecosystems are intrinsically interconnected. It is cross-border in its operations and organizational structure. Focusing on community-based marine management and conservation work around the Gulf of Maine, Saltwater Network provides funding support, facilitates collaboration between diverse groups and communities, and establishes communication links that foster mutual learning and support.

Saltwater Network works closely with a network of regional marine resource centres that provide organizational, educational, research and technical support to local community-based marine management and conservation groups (see below).

URL http://www.saltwaternetwork.org

7.2.2 Community Marine Resource Centres

A network of six marine resource centres throughout the Gulf of Maine region facilitate and support local groups engaged in community-based marine management and stewardship activities:

- Bay of Fund Marine Resource Centre, Cornwallis, Nova Scotia - http://www.bfmrc.ns.ca
- Le Centre de la Baie/St. Mary's Bay Resource Centre, Clare, Nova Scotia
- Upper Bay of Fundy Marine Resource Centre, Canning, Nova Scotia
- Coastal Livelihoods Trust, St. Andrews, New Brunswick
- Cobscook Bay Resource Centre, Eastport, Maine - http://www.cobscook.org
- Penobscot East Resource Centre, Stonington, Maine - http://www.penobscoteast.org

As independent non-profit organizations, each centre works on capacity building, networking and participatory research projects in their local community and region. Linking communities to schools, universities, research organizations, and funders, the centres work to facilitate responsible community-based marine management, collaborative marine science and sustainable economic development. The centres work with First Nations and all levels of government. Fishermen-based stewardship of the marine environment is the catalyst for many of the centres. The centres encompass fisheries and marine resource, conservation, coastal stewardship, and economic development initiatives based on the principles and practice of community-based management.

The centres provide a wide range of services to their communities, including:

- marine resource education and public awareness
- community-based research
- information exchange
- technical assistance
- monitoring programs
- public policy advocacy
- support services for other community groups.

Saltwater Network supports their activities and provides opportunities for networking and collaboration between the centres.

7.3 Non-governmental Organizations

7.3.1 World Wildlife Fund

The World Wildlife Fund (WWF) is an established international environmental NGO focused on conserving biodiversity, the sustainable use of renewable natural resources and the reduction of pollution and wasteful consumption. They work through advocacy, lobbying and finding better solutions to current problems. WWF has offices throughout Canada and the United States, with offices in each country receiving direction from their national head office. WWF Canada's Marine Program, Protecting Our Oceans, includes initiatives in the Northwest Atlantic Ecoregion which encompasses the marine waters of the Gulf of Maine littoral provinces and states.[539]

WWF Canada has been active in efforts to end the practice of dumping bilge oil, [540] which culminated in the adoption of Bill C-15.[541] It has also been active in establishing recovery plans and efforts to reduce North Atlantic right whale deaths from ship collisions, lobbying the Canadian Government to change the shipping lanes in the Bay of Fundy to avoid right whale habitat.[542] WWF also participated in efforts that led to the

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[539] See http://www.wwf.ca/AboutWWF/WhereWeWork/Canada/Oceans/Atlantic.asp.

[540] WWF Canada, "Groups Praise Government and Opposition Parties as Seabird Protection Bill is Passed," News, 19 May 2005, online at http://www.wwf.ca/NewsAndFacts/NewsRoom/default.asp?section=archive&page=display&ID=1385&lang=EN.

[541] Bill C-15 – *An Act to Amend the Migratory Birds Convention Act and the Canadian Environmental Protection Act*, S.C. 2005, c. 23.

[542] In late 2002 Canada submitted a proposal to the International Maritime Organization, which was adopted in 2003, changing the lanes. WWF Canada, "Shipping Lanes Moved to Protect Endangered Right Whales" News, 23 June 2003, online at http://www.wwf.ca/NewsAndFacts/NewsRoom/default.asp?section=archive&page=display&ID=1309&lang=EN.

establishment of "The Gully" as the first Atlantic Canadian marine protected in 2003[543] and in the campaign to establish a marine protected area in the Musquash Estuary.

Cross-Border Initiatives

WWF and the Conservation Law Foundation (CLF)[544] will release a report on the Gulf of Maine and surrounding areas shortly. This report entitled *Marine Ecosystem Conservation for New England and Maritime Canada: A Science-Based Approach to the Identification of Priority Areas for Conservation* [545] is a technical mapping project that highlights areas that would be appropriate candidates for an MPA network. A collaborative effort with other organizations including the Census of Marine Life (CoML) Gulf of Maine Area Program (GoMA), the report is a first step in WWF's campaign to establish a network of marine protected areas (MPAs) in the North Atlantic, particularly the Gulf of Maine and Bay of Fundy area. This report is the work of WWF Canada's Halifax office.[546] A framework document will be released with the *Marine Ecosystem Conservation for New England and Maritime Canada* report. While the former report is very technical and science-based, the framework document will be a policy document focusing on the establishment of MPA networks in Canada.

URL http://www.wwf.ca

7.3.2 Ducks Unlimited

Ducks Unlimited Canada (DUC) is a non-profit NGO whose aim is to conserve wetland habitat for North American wildfowl. DUC was founded in 1937, as was the American branch, and has relied on hunters, farmers and the public for financial support. Funding is also directed from the United States to Canada because of the presence of so much crucial habitat and breeding ground.[547]

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[543] WWF Canada, "Gully to Become Canada's First marine Protected Area" News, 8 Dec. 2003, online at http://www.wwf.ca/NewsAndFacts/NewsRoom/default.asp?section=archive&page=display&ID=1326&lang=EN.

[544] An environmental advocacy organization with offices in each of the New England states, the Conservation Law Foundation has along history of action in the Gulf of Maine Region. For information on its current Ocean Conservation program see http://www.clf.org/programs/index.asp?id=64.

[545] See an introductory report; Conservation Law Foundation and World Wildlife Fund, Marine Ecosystem Conservation for New England and Maritime Canada: A Science-Based Approach to the Identification of Priority Areas for Conservation, online at http://www.wwf.ca/marinepriorityareas.

[546] WWF Canada's Marine Conservation Program, online at http://www.wwf.ca/AboutWWF/WhatWeDo/ConservationPrograms/Marine/HowWeWork.asp.

[547] Ducks Unlimited Canada, "Conservation Partnerships", online at http://www.ducks.ca/province/ns/partners/index.html.

DUC and Ramsar

DUC and the Bureau of the Convention on Wetlands (Ramsar) have a Memorandum of Cooperation.[548] DUC has worked on two Ramsar sites in the Inner Bay of Fundy, Mary's Point and Chignecto, although both sites were established well before the memorandum was signed.

Mary's Point, on the New Brunswick shore of the Inner Bay of Fundy, is a component of the Shepody National Wildlife Area. The site is a "peninsula of various terrestrial habitats bordered by gravel beaches and extensive intertidal mudflats" and supports substantial crustacean and shorebird populations and is a crucial staging ground for shorebird fall migration.[549] Ducks Unlimited constructed a 20 hectare impoundment here in 1979, which may be modified in the future with tidal flooding to control vegetation. The Point was also declared a Hemispheric Shorebird Reserve under the Western Hemisphere Shorebird Reserve Network in 1987.[550]

At the Chignecto Ramsar site, DUC provides development assistance to the managing authority, the Canadian Wildlife Service, Environment Canada and the Province of Nova Scotia.[551] The site consists of salt marshes and freshwater wetlands and is an important staging ground for geese.[552] The Amherst Point section is an official migratory bird sanctuary, and Environment Canada's Chignecto National Wildlife Area Management Plan (1984) has been fully implemented.[553]

Collaborative Conservation Partnerships

DUC collaborates with the North American Waterfowl Management Plan (NAWMP) (refer to Section 2.4.1 on page 31), which further enables resources to flow from the United States to Canada for waterfowl habitat protection. Ducks Unlimited in the United States (DU) and US State funds are matched 1:1 by US federal funds, which are then used to secure habitat in Canada.[554]

DUC has established many protected areas throughout the Gulf of Maine and Bay of Fundy area. They have also restored many sites that were former dykeland or degraded

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548 Memorandum of Cooperation between the Bureau of the Convention on Wetlands (Ramsar, Iran, 1971) and Ducks Unlimited, 21 July 2001, online at http://www.ramsar.org/moc/key_du_moc.htm.

549 Ramsar, "The Annotated Ramsar List: Canada", online at http://www.ramsar.org/profile/profiles_canada.htm.

550 Environment Canada, Atlantic Region, "Mary's Point", online at http://www.ns.ec.gc.ca/wildlife/ramsar/marys.html.

551 Environment Canada, Atlantic Region, "Chignecto National Wildlife Area", online at http://www.atl.ec.gc.ca/wildlife/ramsar/chignect.html.

552 *Ibid*.

553 Wetlands International, "Ramsar Sites Information Service," Chignecto site (Site No. 4CA017), online at http://www.wetlands.org/RSDB/Default.htm.

554 Ducks Unlimited Canada, "Conservation Partnerships", online at http://www.ducks.ca/province/ns/partners/index.html.

habitat.[555] With funding from DU, increasing amounts of coastal wetlands have been acquired.[556] In conjunction with the Government of Nova Scotia, DUC has created the Unknown Owners Program, whereby they protect coastal habitat where land title has been lost.[557] DUC also works through Eastern Habitat Joint Venture (EHJV), with Environment Canada, the Provinces, Wildlife Habitat Canada, federal and provincial agriculture departments and the Nature Conservancy of Canada to protect habitat for waterfowl and all migratory birds on the Atlantic Flyway.[558]

URL http://www.ducks.ca

[555] Nova Scotia Department of Environment and Labour, "Gulf of Maine Council Award Recipients", online at http://www.gov.ns.ca/enla/airlandwater/gulfawardsrecipients.asp.
[556] Ducks Unlimited Canada, "Conservation Partnerships," *supra* note 554.
[557] *Ibid*.
[558] *Ibid*.

SECTION 8

Shipping and Security

Author: David Henley, Stewart McKelvey

8.1 Introduction

In light of developments in the United States and abroad, security is an evolving matter. The post 9/11 atmosphere and increased level of terrorist threat has required a general heightening of threat awareness. As a large percentage of goods are still shipped by sea, this aspect of transportation has drawn substantial attention, particularly in the area of containerized cargo. Shipping by its nature is international and the need to maintain commerce has necessitated cooperation and collaboration in the area of security. There is no organization or agreement which specifically governs shipping or security in the Gulf of Maine. Instead there are organizations and instruments which govern shipping and security generally in waters or regions that would include the Gulf of Maine. In order to understand the agencies involved and the basis for their involvement, it is necessary to understand the legislative framework relating to security.

8.2 Canadian Legislation

In Canada, shipping is governed by the *Canada Shipping Act,*[559] which is administered by Transport Canada. The Act deals with, among other things, safety, salvage and the environment, all of which have some bearing on security. Similarly, legislation such as the *Navigable Waters Protection Act,*[560] the *Canada Marine Act,*[561] the *Fisheries Act,*[562] the *Safe Containers Convention Act*[563] and the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*[564] all have collateral bearing on aspects of security in Canadian waters. However, the primary Canadian legislation on maritime security is the *Marine Transportation Security Act*[565] and its associated regulations.[566]

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[559] R.S.C. 1985, c.S-9. This legislation will be replaced by the *Canada Shipping Act, 2001*, S.C. 2001, c.26, when it comes into force.

[560] R.S.C. 1985, c.N-22.

[561] S.C. 1998, c.10.

[562] R.S.C. 1985, c.F-14. For example, through its coastal aerial surveillance program.

[563] R.S.C. 1985, c.S-1.

[564] S.C. 1988, c.28.

[565] S.C. 1994, c.40.

[566] Note that Canada's Ocean Strategy also speaks to security. See p.17 of *Canada's Ocean Strategy* at http://www.cos-soc.gc.ca/doc/pdf/COS_e.pdf: "In the international context, Canada's Oceans Strategy supports and promotes effective governance and regulation, including the exercise of national sovereignty and security."

A large number of federal departments and agencies have security related roles which impact on maritime matters. These include the Department of National Defence, Transport Canada, Fisheries and Oceans Canada, the Royal Canadian Mounted Police, the Canadian Security Intelligence Service and the Office of Critical Infrastructure and Emergency Preparedness. The National Security Policy established Marine Security Operations Centres staffed from the Canadian Forces, Canadian Border Services Agency, Transport Canada, RCMP and the Canadian Coast Guard.[567]

8.3 The United States

The relatively new Department of Homeland Security has the primary role for security matters, though there is clearly similar overlap with various departments and agencies.[568] The United States has a *National Security Act,*[569] as well as National Security Strategy.[570] Specific to maritime matters is the National Strategy for Maritime Security,[571] implemented pursuant to Presidential Directive.[572] This Directive establishes a Maritime Security Policy Coordinating Committee to coordinate interagency maritime security policy efforts. The National Strategy for Maritime Security outlines how the United States Government will "effectively and efficiently enhance the security of the maritime domain while preserving the freedom of the domain for legitimate pursuits."[573]

8.4 SOLAS and the ISPS Code

In December 2002 the International Maritime Organization (IMO) adopted the International Ship and Port Facility Security Code (ISPS Code) and amendments to the International Convention for the Safety of Life at Sea, 1974 (SOLAS Convention). These instruments provide an international framework for the deterrence, prevention and detection of acts that threaten security in the marine transportation sector. As contracting states to the IMO, Canada and the United States were required to implement in their national laws the ISPS Code by July 1, 2004. Canada implemented the ISPS Code through the *Marine Transportation Security Regulations*.[574] Canada will also implement an on-board Automatic Identification System (AIS) required by the December 2002 SOLAS amendments though this is not expected to be in place until

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567 Gary Sidock, "The Canadian Coast Guard – Building a Maritime Security Capacity" at page 9, as presented at the International Conference on Security of Ships, Ports and Coasts, Halifax, September 22-23, 2006.

568 For a summary of the activities of the Department of Homeland Security in respect of port security see Press Release Fact Sheet at http://www.dhs.gov/dhspublic/display?content=5437.

569 National Security Act of July 26, 1947.

570 The National Security Strategy of the United States of America, March 2006, online at http://www.whitehouse.gov/nsc/nss/2006/.

571 National Strategy for Maritime Security, September 2005.

572 National Security Presidential Directive NSPD-41, December 21, 2004.

573 National Strategy for Maritime Security, *supra* note 571 at page 8.

574 SOR/2004-144, enacted pursuant to the *Marine Transportation Security Act*, *supra* note 565.

2008.[575] The United States has similar legislation with the *Maritime Transportation Security Act*[576] which implements ISPS in substantially the same manner with additional requirements.

8.5 Joint Agreements

8.5.1 Canada-United States Security Cooperation Agreement

Canada and the United States held bi-national discussions in 2002 with respect to defence and security in North America.[577] This resulted in an agreement to reaffirm cooperation through the North American Aerospace Command (NORAD) and to pursue a variety of security initiatives. This agreement includes the formation of a bi-national planning group in NORAD Headquarters whose focus includes both maritime and land based threats. The mandate of the planning group included planning, surveillance and support to civil authorities by acting to prevent and mitigate threats or attacks through:

- Maintaining awareness of emerging situations through maritime surveillance activities;
- Sharing maritime intelligence and operational information in accordance with national laws, policies and directives; and
- Assessing maritime threats, incidents and emergencies in order to advise and/or warn governments.[578]

8.5.2 Security and Prosperity Partnership of North America

Canada, the United States and Mexico are parties to the Security and Prosperity Partnership of North America which was signed on March 23, 2005 in Waco, Texas. This agreement provides a framework for collaboration in a number of areas including security. Its security agenda includes the following maritime related priorities:

- Develop and implement a North American traveler security strategy, to include consistent outcomes with compatible processes, for screening prior to departure from a foreign port and at the first port of entry to North America.
- Develop and implement a North American cargo security strategy to ensure compatible screening methods for goods and cargo prior to departure from a foreign port and at the first point of entry to North America.
- Develop and implement a strategy to enhance North American maritime transportation and port security.[579]

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[575] http://www.ccg-gcc.gc.ca/mcts-sctm/docs/misc/projects_e.htm.

[576] *Maritime Transportation Security Act of 2002*, (Public Law 107- 295) November 25, 2002. The act requires vessels and port facilities to conduct vulnerability assessments and develop security plans.

[577] See text of the Canada-US Security Cooperation Agreement, online at http://geo.international.gc.ca/can-am/main/defence/security_coop-en.asp.

[578] *Ibid*. The Agreement was entered into on December 2002 with a two-year initial term which was extended until May 2006. The current status of the agreement is uncertain.

[579] http://www.spp.gov/security_agenda/index.asp?dName=security_agenda.

A variety of initiatives relating to maritime security have been undertaken in the name of this agreement.[580]

For example, Canada is working with the United States in the Gulf of Maine through the Gulf of Maine Council as part of the broader oceans commitments in the Security and Prosperity Partnership of North America.[581] Similarly, the Conference of New England Governors and Eastern Canadian Premiers recently passed Resolution 30-3 which gave a mandate to its Standing Committee on Trade Cooperation to complete the document entitled "Regional Action Plan on the Security and Prosperity Partnership of North America" and report back to the next meeting of the Conference.[582]

8.5.3 Canada-United States Cargo Security Project

The Canada-United States Cargo Security Project is a public-private initiative comprising federal, provincial, state, and local United States and Canadian members operating in northeastern North America. Its purpose is:

> *…to provide a rapidly assembled prototype test-bed for elements of cargo container supply chain security. Since early 2002, it has had as its strategic goal the production of demonstration models for the international container shipping system that maintain open borders and facilitate commerce while improving security practices by using point-of-origin security, in-transit tracking and monitoring and data query capability designed to validate and facilitate the movement of containerized cargo.*[583]

Originally known as Operation Safe Commerce-Northeast, this organization works with the various levels of government on issues of cargo security.

8.5.4 Coast Guard/Transport Canada Agreements

The Canadian and United States Coast Guards have entered into a variety of memoranda of understanding, many of which bear on both shipping and security issues.[584] The US Coast Guard published its Maritime Security Rules in 2003 which have been coordinated with Transport Canada. In June of 2004, a bilateral agreement was signed between Transport Canada and the United States Coast Guard for

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580 For a list of recent achievements, see http://www.spp.gov/factsheet.asp?dName=fact_sheets.

581 http://www.dfo-mpo.gc.ca/canwaters-eauxcan/oap-pao/phase_e.asp.

582 Resolution 30-3: Resolution Concerning Trade Cooperation and Regional Action Plan of the Security and Prosperity Partnership of North America, adopted at the 30th Annual Conference of New England Governors and Eastern Canadian Premiers, Newport, Rhode Island, May 13, 2006, online at http://www.releases.gov.nl.ca/releases/2006/exec/0515n05.htm.

583 http://www.ni2cie.org/cuscsp/about.asp.

584 For a list of such memoranda, see http://www.ccg-gcc.gc.ca/ia-ai/canada_usa_e.htm.

enhanced marine security through an exchange of letters.[585] The essence of the agreement is that each country will recognize and accept the other's approved vessel security plans as evidence of compliance with the vessel security plan requirements found in the Canadian *Marine Transportation Security Regulations* and United States Coast Guard regulations.[586] The agreements are not specific to the Gulf of Maine but would apply in the same manner as in other waters shared between the United States and Canada.

8.5.5 Canada-United States Joint Marine Pollution Contingency Plan

The Canada-United States Joint Marine Pollution Contingency Plan was initially established for the Great Lakes in 1974.[587] In 1983 four annexes were added covering additional regions, including the Atlantic region.[588] In 1986 an exchange of notes led to an amendment of the Plan to extend its application further into the Gulf of Maine.[589] The Joint Marine Pollution Contingency Plan creates a framework for joint action in response to marine pollution incidents, including those from ships. The purpose of the plan is to provide "a coordinated system for planning, preparedness and responding to harmful substance incidents in the contiguous waters."[590] A joint exercise is carried out every two years between the Coast Guards of Canada and the United States. The plan is intended to complement the national, state, provincial, regional and local plans of Canada and the United States. It provides for a variety of response related activities, many of which would have an impact on shipping traffic in the affected areas.[591]

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585 Transport Canada's *Departmental Performance Report* for the period ending March 31, 2004 at http://www.tbs-sct.gc.ca/rma/dpr/03-04/TC-TC/TC-TCd3401_e.asp. For copies of the letters see http://www.tc.gc.ca/MarineSecurity/relationships/usa/menu.htm.

586 Bilateral arrangement of June 25, 2004 represented in a letter from T. C. Collins, Commandant of the US Coast Guard to Louis Ranger, Deputy Minister of Transport, as found at http://www.tc.gc.ca/MarineSecurity/relationships/usa/bilateral.htm#Collins%20to%20Ranger. Some clarifications with respect to specific issues are found in further letters online at the same website.

587 Exchange of Notes Between the Government of Canada and the Government of The United States of America Concerning a Joint Marine Pollution Contingency Plan, June 16, 1974.

588 A copy of the Atlantic Geographic Annex can be found at http://www.uscg.mil/d1/response/jrt/plans.html.

589 The following section was added to Annex II (Atlantic): "A 100.1 This Annex applies to the waters under national jurisdiction of each Party in the Gulf of Maine area seaward to 40 degrees, 27 minutes, 5 seconds north latitude, 65 degrees, 41 minutes, 59 seconds west longitude." Exchange of notes between the government of Canada and the government of the United States of America amending annex II to the Canada/USA marine pollution contingency plan, Washington, April 18, 1986.

590 Section 103.1 of the plan. The full text of the plan can be found at http://www.uscg.mil/d1/response/jrt/plans.html.

591 http://stinet.dtic.mil/oai/oai?&verb=getRecord&metadataPrefix=html&identifier=AD0782895.

8.5.6 The North Atlantic Right Whale and Shipping in the Gulf of Maine

As noted above in Section 2.3.2 on page 25, the Gulf of Maine represents the primary foraging ground for the North Atlantic right whale. The presence of shipping lanes in the Gulf of Maine creates a significant danger of collision with these whales. These collisions result in many injuries and death of the whales. In order to reduce such "ship strikes" a number of efforts have been made by agencies both in Canada and the United States.

In the United States, the National Oceanic and Atmospheric Administration, together with the United States Coast Guard have implemented a Mandatory Ship Reporting System, which has been endorsed by the International Maritime Organization. When ships greater than 300 gross tons enter the primary right whale habitats, including the Gulf of Maine, they must report to a shore-based station where they receive information about the right whales, including the locations of recent sightings.[592] Similarly, there are regulations in the United States which prevent a ship from approaching the whale closer than 500 yards.[593]

Canada has a Recovery Plan for the North Atlantic right whale which includes assessments of the Fundy shipping lanes and sightings reporting. On July 1, 2003, through efforts of Transport Canada with the International Maritime Organization, certain shipping within the Bay of Fundy was moved to reduce the chances of ship strikes. [594]

Collaborative efforts to date have focussed on conservation measures, though clearly the efforts of the two countries with respect to shipping will affect all mariners in the Gulf of Maine. Organisations such as the North Atlantic Right Whale Consortium, which includes as members both governmental and non-governmental organizations from both countries, have as a mandate matters which will ultimately bear on shipping.[595]

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592 http://www.nmfs.noaa.gov/pr/shipstrike/msr. The regulation can be found at US Federal Register 64 FR 29229, 1 July 1999.

593 US Federal Register 62 FR 41116, 13 February 1997.

594 http://www.mar.dfo-mpo.gc.ca/communications/maritimes/news03e/NR-MAR-03-19E.html.

595 http://www.rightwhaleweb.org.