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GULF OF ST. LAWRENCE INTEGRATED MANAGEMENT PLAN

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Executive Summary

The Gulf of St. Lawrence, including the Upper (east of Île d'Orléans up to the Saguenay) and Lower (up to Pointe-des-Monts) estuaries of the St. Lawrence River, is one of five Large Ocean Management Areas established under the Oceans Act. Undertaking an integrated management planning approach within the Gulf of St. Lawrence is a responsibility of Fisheries and Oceans Canada, with the lead role for planning and coordinating federal policies related to Canada's oceans falling to the Minister of Fisheries and Oceans. This Large Ocean Management Area, which comprises the geographical scope of this Plan, will be referred to in this document as the Gulf of St. Lawrence Integrated Management area.

Human activities, including those carried out in the entire watershed that encompasses the St. Lawrence River and the Great Lakes Basin, have the potential to affect the ecosystem of the Estuary and Gulf of St. Lawrence. For example, marine transportation, oil and gas exploration, fisheries and aquaculture are ocean activities that may directly influence ecosystem health. Moreover, land-based activities that increase the input of nutrients, contaminants and sediment into the Gulf of St. Lawrence Integrated Management area can also directly or indirectly affect the marine ecosystem. The socio-cultural and economic well-being of communities located along the coast in the Gulf of St. Lawrence Integrated Management area is heavily dependent on the goods and services provided by this ecosystem.

The Gulf of St. Lawrence Integrated Management Plan uses a risk-based management approach designed to identify and prioritize key management themes stemming from a review of interactions between ecosystem components and related human activities.

The desired outcome of this Plan is to establish the ecosystem basis for integrated management of activities in the Gulf of St. Lawrence, as well as a framework and practical approach that enables:

1. Determine key management themes leading to the identification of priority issues and management actions;
2. Establish formal agreements on the actions to be implemented by all implicated federal and provincial regulatory authorities in a coordinated manner, utilizing existing governance structures;
3. Engage targeted stakeholders, including Aboriginal groups, industry associations, environmental and community groups and municipal governments to participate in the process of planning and implementing management measures identified jointly with implicated federal and provincial regulatory authorities; and
4. Implement management actions through the regulatory bodies with the authority to effect changes and at scales that are appropriate to the specific nature of the concern being addressed.

This integrated management plan provides a framework for inter-jurisdictional collaborative engagement of the regulatory authorities relevant to different management issues. Such collaboration gives rise to a process for effectively addressing different management issues within the Gulf of St. Lawrence Integrated Management area, when and where they arise.

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1 Introduction

Under the authority of the *Oceans Act* (Canada 1996), Fisheries and Oceans Canada is responsible for establishing an integrated management approach to realize the sustainable development of Canada's aquatic resources. Integrated oceans management involves adopting a spatially-based planning and management approach, based on ecosystem-scale management objectives that guide all regulatory authorities with oceans-related obligations. The associated governance structures provide a forum for bringing together ocean users and stakeholders—namely various federal departments and agencies, the provinces and territories, Aboriginal groups, the industry and coastal communities—to plan activities in Canada's oceans. The development of plans involving environmental, social, cultural and economic objectives is a fundamental principle of effective integrated oceans management that aims to improve existing management efforts, which are often fragmented. Without a strategic management framework, the potential for working at cross purposes is considerable (DFO 1997). *Canada's Ocean Strategy* and the *Policy and Operational Framework for Integrated Management of Estuarine, Coastal and Marine Environments in Canada* (DFO 2002) form the basis of such a strategic framework, which dictates the use of Large Ocean Management Areas (LOMAs), at the ecosystem level, and Coastal Management Areas (CMAs), at the regional level. The *Oceans Action Plan* (DFO 2005) provides further direction on the way in which this framework will be implemented in Canada. In 2005, Fisheries and Oceans Canada identified five priority LOMAs (Figure 1) as pilot projects for integrated management planning. These projects aim to ensure the long-term economic prosperity of individuals whose livelihoods depend on aquatic ecosystems, while continuing to protect and conserve healthy ecosystems that support these resources. Integrated management plans have been or are being developed for each of the five priority LOMAs identified in the *Oceans Action Plan* (DFO 2005), including the Gulf of St. Lawrence LOMA.

Figure 1: Large ocean management areas in Canada

Gulf of St. Lawrence Integrated Management (GOSLIM) Initiative

The Gulf of St. Lawrence LOMA includes the Gulf of St. Lawrence and the Upper (east of Île d'Orléans up to the Saguenay) and Lower (up to Pointe-des-Monts) estuaries of the St. Lawrence River. This LOMA, which comprises the geographical scope of this Plan, will be referred to in this document as the Gulf of St. Lawrence Integrated Management (GOSLIM) area (Figure 2).

Various federal departments and agencies, namely Agriculture and Agri-Food Canada, Environment Canada, Fisheries and Oceans Canada, Natural Resources Canada, Transport Canada, the Parks Canada Agency and the Canadian Environmental Assessment Agency, have the power to regulate activities within the marine environment and each have different administrative divisions in this area. The Gulf is bordered by five provinces (New Brunswick, Nova Scotia, Prince Edward Island, Quebec, and Newfoundland and Labrador) and home to a number of First Nations groups. Consequently, management of the Estuary and Gulf of St. Lawrence is complex given the number of regulatory authorities involved and the number of Aboriginal groups with historic treaties and traditional rights. The planning process, led by the Minister of Fisheries and Oceans, therefore requires that all groups and organizations involved collaborate and coordinate extensively in order to plan and implement management activities.

Figure 2: Gulf of St. Lawrence Integrated Management area

Many commercial, industrial, recreational and subsistence activities take place year round throughout the GOSLIM area. These activities may have potentially adverse effects on both aquatic species and their habitat in the short, medium or long term.

To protect the environment, the GOSLIM Plan applied a risk-based management approach designed to identify key management themes stemming from a review of interactions between ecosystem components and related human activities. This approach also seeks to identify and align management measures put in place to achieve the effective mitigation of environmental effects caused by human activities that threaten the prosperity and sustainability of specific areas in the GOSLIM area.

Planning Context

The context surrounding Fisheries and Oceans Canada's role to facilitate coordination of integrated management of the GOSLIM area is established in the *Oceans Act* (Canada 1996; sections 31 and 32):

Integrated Management Plans

31. *The Minister, in collaboration with other ministers, boards and agencies of the Government of Canada, with provincial and territorial governments and with affected aboriginal organizations, coastal communities and other persons and bodies, including those bodies established under land claims agreements, shall lead and facilitate the development and implementation of plans for the integrated management of all activities or measures in or affecting estuaries, coastal waters and marine waters that form part of Canada or in which Canada has sovereign rights under international law.*

Implementation of Integrated Management Plans

32. *For the purpose of the implementation of integrated management plans, the Minister*

(a) shall develop and implement policies and programs with respect to matters assigned by law to the Minister;

(b) shall coordinate with other ministers, boards and agencies of the Government of Canada the implementation of policies and programs of the Government with respect to all activities or measures in or affecting coastal waters and marine waters;

(c) may, on his or her own or jointly with another person or body or with another minister, board or agency of the Government of Canada, and taking into consideration the views of other ministers, boards and agencies of the Government of Canada, provincial and territorial governments and affected aboriginal organizations, coastal communities and other persons and bodies, including those bodies established under land claims agreements,

(i) establish advisory or management bodies and appoint or designate, as appropriate, members of those bodies, and

(ii) recognize established advisory or management bodies; and

(d) may, in consultation with other ministers, boards and agencies of the Government of Canada, with provincial and territorial governments and with affected aboriginal organizations, coastal communities and other persons and bodies, including those bodies established under land claims agreements, establish marine environmental quality guidelines, objectives and criteria respecting estuaries, coastal waters and marine waters.

2 Vision, Strategic Objective and Guiding Principles

Vision for the Integrated Management of the Gulf of St. Lawrence

The Plan provides the context and a common basis for future commitments and actions for the sustainable use of aquatic resources in the Estuary and Gulf of St. Lawrence. It is based on the following vision:

> *A practical and functional approach to transparent management for ocean areas and activities that require co-operation of ocean users and Canadians by providing planning, risk management and clear and equitable decision making.*

Strategic Objective – Healthy, Sustainable and Productive Aquatic Ecosystems

Canada has placed a priority on strong economic growth, a clean and healthy environment, and safe and secure communities. In this regard, economically prosperous maritime sectors and fisheries, sustainable aquatic ecosystems, and safe and secure waters are priority areas with respect to federal mandates for oceans and coastal resources. Fulfilling Canada's priorities for prosperous sustainable development however, depends upon ensuring the continuity of healthy and productive aquatic ecosystems that provide the ecosystem goods and services on which our maritime and marine economies depend.

This strategic objective will be achieved through effective management of the risk of environmental effects stemming from the various human activities and stressors that affect significant ecosystem components in the Gulf of St. Lawrence ecosystem. The Gulf of St. Lawrence ecosystem is particularly susceptible to potential environmental effects due to its relatively enclosed nature, which provides a strong influence from land-based activities in addition to marine activities.

Multiple activities, whose zones of influence overlap, either within a single economic sector or from different sectors, can result in environmental effects despite conformance with the legal requirements of sector focused management.

Experience to date with fragmented approaches to management reveals that an integrated approach to management is required to effectively mitigate the impacts on ecosystems associated with environmental effects. Thus to achieve the above stated strategic objective requires collaboration of regulatory authorities and affected users, integration and alignment of stated objectives and desired outcomes coupled with agreement to monitor management actions for results based on mutually agreed upon criteria.

Guiding Principles

The development of the GOSLIM Plan is guided by three key principles set out in the *Oceans Act* (Canada 1996) as follows:

a) **sustainable development**: long-term balanced, cohesive and viable development of environmental, social and cultural aspects that meets the needs of the present without compromising the ability of future generations to meet their own needs;

b) **integrated management**: cooperative process comprising all partners involved in the planning and management of activities in estuaries and coastal and marine waters that form part of Canada (or in which Canada has sovereign rights under international law), with balanced consideration being given to biological, economic and social objectives;

c) **precautionary approach**: erring on the side of caution. In the presence of a known risk, preventive, mitigating and/or corrective actions must be taken. Where there are threats of

serious or irreversible damage, a lack of scientific certainty shall not be used as a reason for postponing effective measures to prevent ecosystem degradation.

The following principles also guide implementation of the GOSLIM Plan:

- **Compliance with existing regulatory authorities**: various jurisdictions have purviews and mandates that can contribute to the GOSLIM initiative. The planning process requires compliance and collaboration with all existing regulatory authorities.
- **Compliance with existing agreements and mandates arising from them**: federal–provincial agreements and other ecosystem conservation agreements will continue to be considered and implemented.
- **Respect for First Nations**: the federal and provincial governments have special relationships with Aboriginal peoples, who will be involved in the GOSLIM process.
- **Integration**: the range of stakeholder interests will be included in GOSLIM initiatives in a meaningful way, be it during the development of action plans, during the identification of management measures or during their implementation.
- **Consensus**: participants in the GOSLIM planning process will attempt to make recommendations by consensus.
- **Use of the best available information**: recommendations will be based on the best available knowledge and will include scientific considerations, traditional knowledge and available local information.
- **Transparency**: recommendations will be made openly, sharing information and results with all participants.
- **Effectiveness**: any issues raised will be addressed at the earliest possible time based on the priority assigned to them.
- **Adaptive management**: projects will be monitored and assessed so that their implementation can be adapted as new information becomes available.
- **Accessibility**: measures will be taken to provide information to relevant stakeholders so that they may determine their preferred form of engagement.

3 Gulf of St. Lawrence Integrated Management Planning Approach

To realize the vision specified for the GOSLIM area, this Plan provides a common scientific basis which supports the decision-making process and sets out the next steps in developing action plans for the future management of priority issues that will be established jointly with our partners.

The GOSLIM planning process (Figures 3) seeks to:

- Establish an ecosystem-based approach for GOSLIM;
- Provide a practical, risk-based management approach designed to identify key management themes and to manage potential adverse effects on the environment; and
- Provide a framework aimed at identifying priority management issues and action planning.

The desired outcomes of the Gulf of St. Lawrence Integrated Management Plan are:

- Determine key management themes leading to the identification of priority issues and management actions;
- Establish formal agreements on the actions to be implemented by all implicated federal and provincial regulatory authorities in a coordinated manner, utilizing existing governance structures;
- Engage targeted stakeholders, including Aboriginal groups, industry associations, environmental and community groups and municipal governments to participate in the process of planning and implementing management measures identified jointly with implicated federal and provincial regulatory authorities; and
- Implement management actions through the regulatory bodies with the authority to effect changes and at scales that are appropriate to the specific nature of the concern being addressed.

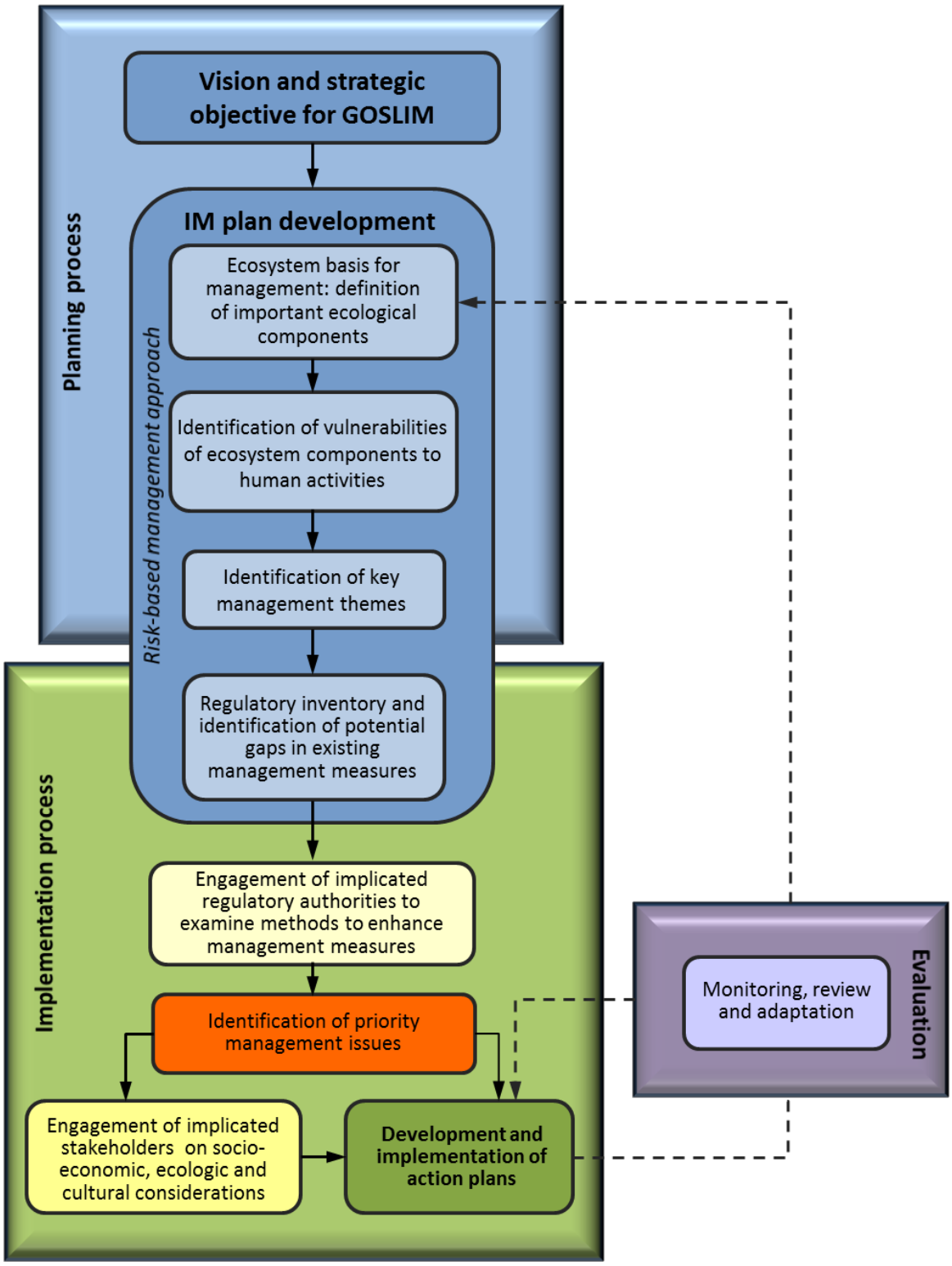

Figure 3: Planning and implementation of integrated management in the Gulf of St. Lawrence Integrated Management area

4 Profile of the Gulf of St. Lawrence

Biophysical Profile

The Gulf of St. Lawrence is a partially semi-enclosed sea covering an area of about 240,000 km². It is bordered by five Canadian provinces: Quebec, Newfoundland and Labrador, New Brunswick, Nova Scotia and Prince Edward Island. Anticosti Island and the Magdalen Islands are located offshore (Figure 4). The Gulf of St. Lawrence opens into the Atlantic Ocean through the Cabot Strait (104 km wide and 480 m deep) and the Strait of Belle Isle (16 km wide and 60 m deep). The Estuary of the St. Lawrence River joins the Gulf by way of two straits on either side of Anticosti Island: the Jacques-Cartier Strait to the north and the Honguedo Strait to the south. The Gulf of St. Lawrence watershed covers large areas of the Canadian Shield, the St. Lawrence River system and the highly industrialized Great Lakes basin, which is international in scope.

Figure 4: Gulf of St. Lawrence and its physical features (dark blue: depth greater than 200 m)

This unique placement creates conditions favourable to the development of highly diverse and productive biological communities and food webs.

A comprehensive overview of the ecosystem within the Gulf of St. Lawrence is given in the "Estuary and Gulf of St. Lawrence Marine Ecosystem Overview and Assessment Report" (Dufour and Ouellet 2007). The "State-of-the-Ocean Report for the Gulf of St. Lawrence Integrated Management (GOSLIM) Area" (Benoît 2012) summarizes the most recent scientific information relevant to key

environmental issues (e.g., hypoxia in the Estuary and Gulf of St. Lawrence, ocean acidification, etc.) that have been identified to have a considerable impact on ecosystems in the GOSLIM area.

Ecologically Significant Components

Peer-reviewed scientific data was essential in establishing an ecosystem basis for management under the GOSLIM initiative.

The Canadian Science Advisory Secretariat (CSAS) has produced a number of science advisory reports to identify areas and species of significance to the ecosystem in order to facilitate the provision of a greater-than-usual degree of risk aversion in managing human activities that can affect them. Since 2003, Fisheries and Oceans Canada has devoted considerable effort to the characterization of ecologically significant components of the Estuary and Gulf of St. Lawrence.

Ten ecologically and biologically significant areas (EBSAs) covering approximately 30 % of the GOSLIM area have been identified (DFO 2004, 2006, 2007) (Figure 5). The significance of each area was determined on the basis of 1) its uniqueness, 2) the concentration of a given biological component in this area, and 3) the function of the area in question for this biological component (DFO 2007).

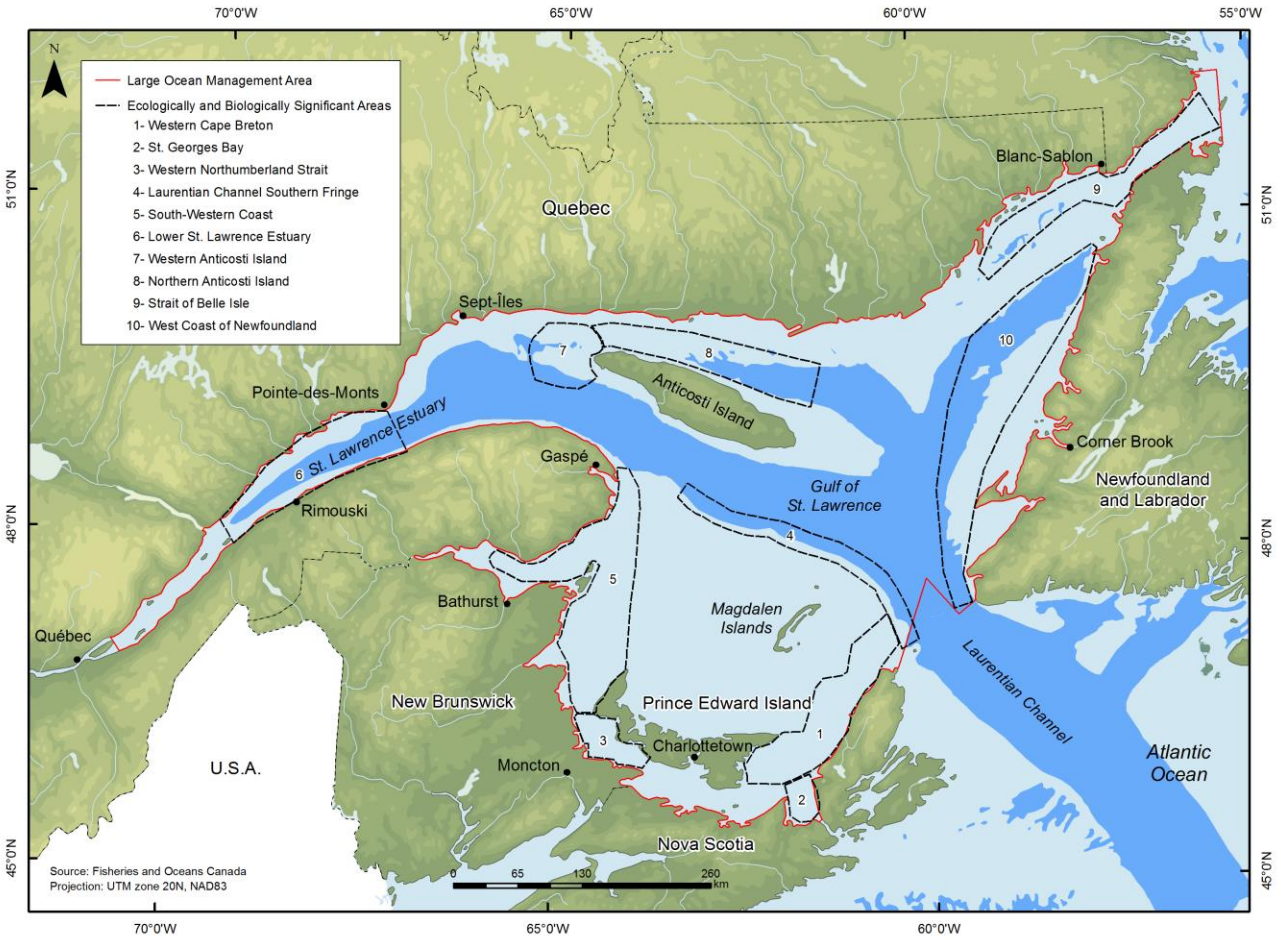

Figure 5: Ecologically and biologically significant areas identified in the GOSLIM area

The identification of an EBSA draws attention to the exceptionally high significance of an ecological or biological area in order to guarantee an above-normal degree of risk aversion in the management of activities that might take place there (DFO 2004) The EBSA does not provide for specific man-

agement measures. Decisions concerning management needs must be in carried out through the integrated planning process described in this document, whereas the implementation of management measures that arise from it requires collaboration not only from the regulatory partners, but also from the users and other partners in order to limit the incidence of environmental impacts.

A general conservation objective for the Ecologically and Biologically Significant Areas in the Gulf of St. Lawrence was also developed by DFO Science through a scientific peer review process (DFO 2007a, 2009a):

> *"Ensure that the features of the EBSA related to its uniqueness, which make the area appropriate for aggregation and/or that ensure the reproduction and survival of the dependant species in that area (…), are not altered by human activities."*

Ecologically significant species are those that influence the structure and/or function of the ecosystem or that play a leading role in biodiversity and/or productivity.

To date, one ecologically significant species (ESS) (eelgrass) has been reported by Fisheries and Oceans Canada in the GOSLIM area (2009b). Another 22 candidate ecologically significant species and communities (CESS) have been identified, but will need to undergo scientific examination to confirm their significance. Due to the limited knowledge of ecological processes that affect aquatic species, other areas and species of significance may be identified in the future (DFO 2006a), if they are deemed to meet the established scientific criteria.

Various other aquatic and bird species are being considered as species of interest due to their contribution to the habitat structure in coastal, estuarine and marine areas or to a stage of the life cycle of other species, to their known or imminent precarious status or their usefulness as an indicator for monitoring the state of the ecosystem (keystone species). Corals and sponges are one group of species that have been added to this list by Fisheries and Oceans Canada, following a science advisory process. Other federal and provincial government agencies have also contributed to the list (Table 1).

Table 1: Species of interest and ecologically significant species reported in the GOSLIM area

	Species of interest	Species status (COSEWIC[5])
ESS[1]	• Eelgrass (*Zostera marina*)	-
CESS[2]	• American Plaice (*Hippoglossoides platessoides*)	Threatened
	• Atlantic Cod (*Gadus morhua*)	Endangered
	• Greenland Halibut (*Reinhardtius hippoglossoides*)	Not at risk
	• Winter Flounder (*Pseudopleuronectes americanus*)	-
	• Thorny Skate (*Amblyraja radiata*)	Special concern
	• White Hake (*Urophycis tenuis*)	-
	• Redfish (*Sebastes mentella*)	Threatened
	• Capelin (*Mallotus villosus*)	-
	• Atlantic Herring (*Clupea harengus*)	-
	• Atlantic Mackerel (*Scomber scombrus*)	-
	• American Lobster (*Homarus americanus*)	-

	Species of interest	Species status (COSEWIC[5])
	• Atlantic Rock Crab (*Cancer irroratus*)	-
	• Snow Crab (*Chionoecetes opilio*)	-
	• Northern Shrimp (*Pandalus borealis*)	-
	• Krill (*Meganyctyphanes norvegica,Thysanoessa raschii*)	-
	• Atlantic White-sided Dolphin (*Lagenorhynchus acutus*)	Not at risk
	• Fin Whale (*Balenoptera physalus*)	-
	• Minke Whale (*Balaenoptera acutorostrata*)	Special concern
	• Humpback Whale (*Megaptera novaeangliae*)	Not at risk
	• Grey Seal (*Halichoerus grypus*)	-
	• Harp Seal (*Pagophilus groenlandicus*)	Not at risk
	• Harbour Porpoise (*Phocoena phocoena*)	Special concern
SA[3]	• Corals and sponges	Various statuses depending on species considered
SIP[4]	• Atlantic Salmon (a number of populations in the GOSLIM area)	Special concern, endangered, threatened
	• American Eel (*Anguilla rostrata*)	Threatened
	• Rainbow Smelt (*Osmerus mordax*)	Threatened (NB)
	• Atlantic Sturgeon (*Acipenser oxyrinchus*)	Threatened
	• American Shad (*Alosa sapidissima*)	-
	• Striped Bass (*Morone saxatilis*) (two populations in GOSLIM area)	Endangered, special concern
	• Northern Wolffish and Spotted Wolffish (*Anarhichas denticulatus, A. minor*)	Threatened
	• Atlantic Wolffish *(Anarhichas lupus)*	Special concern
	• Common Eider (*Somateria mollissima*)	-
	• Northern Gannet (*Morus bassanus*)	-
	• Yellow Rail (*Coturnicops noveboracensis*)	Special concern
	• Piping Plover (*Charadrius melodus*)	Endangered
	• Harlequin Duck (*Histrionicus histrionicus*)	Special concern
	• Roseate Tern (*Sterna dougallii*)	Endangered
	• Barrow's Goldeneye (*Bucephala islandica*)	Special concern

ESS[1]: ecologically significant species
CESS[2]: candidate ecologically significant species and communities
SA[3]: species designated by Fisheries and Oceans Canada following a science advisory process
SIP[4]: species of interest designated by Fisheries and Oceans Canada partners
COSEWIC[5]: Committee on the Status of Endangered Wildlife in Canada

Profile of the Human Environment

Ecosystems and their components provide many goods and services of vital importance for the socio-cultural and economic well-being of communities (Figure 6). These goods and services are defined to include supporting, provisioning, regulating and cultural services (Fischlin et al. 2007).

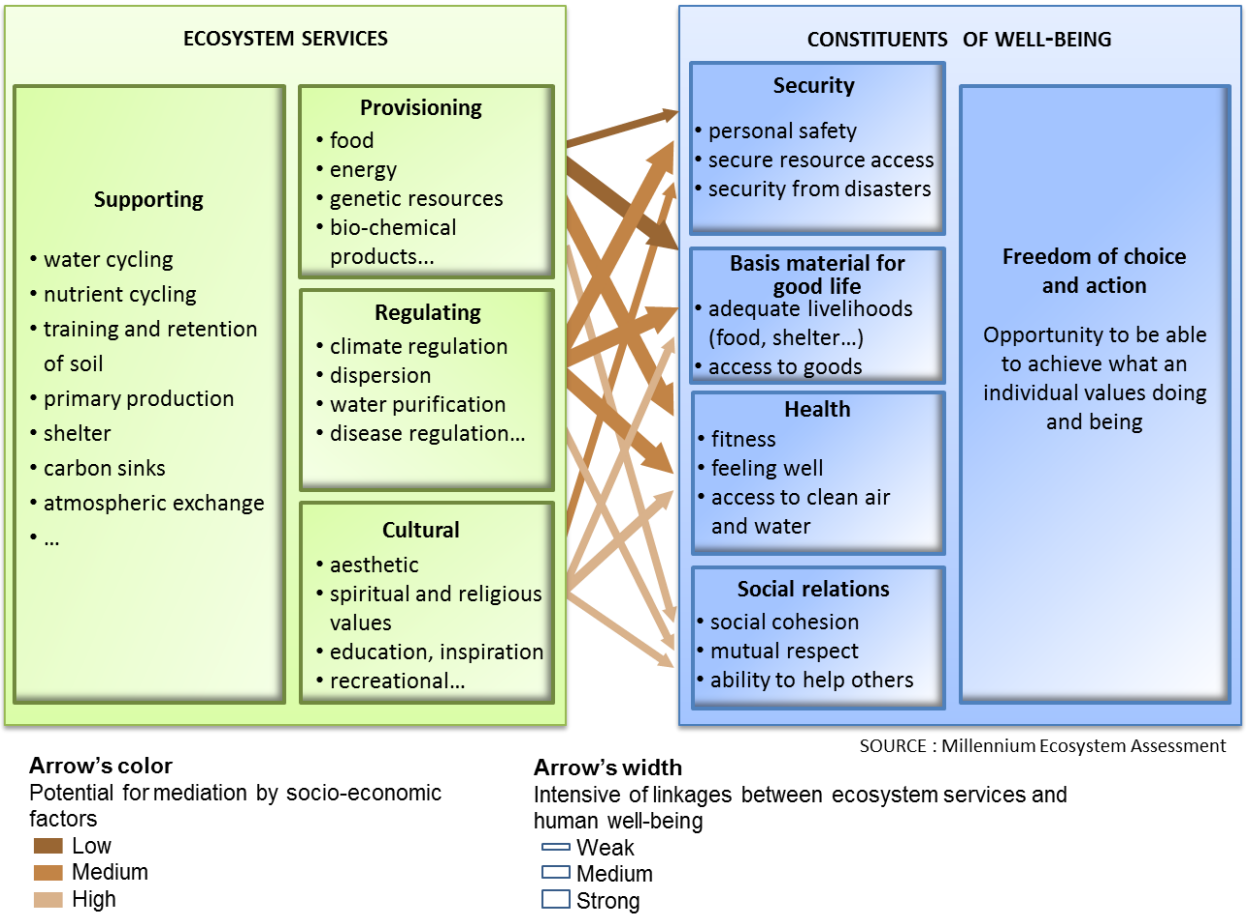

Figure 6: Linkages between services provided by the ecosystem and human well-being

The ecosystem is influenced directly (e.g., overexploitation, introduction of invasive species, etc.) and indirectly (e.g., demography, climate change, etc.) by human activities that have the potential to impact or reduce the effectiveness of its functions. It is therefore essential to manage adverse effects on the environment by reducing or mitigating the impacts of human activities.

Of the many human activities taking place in the GOSLIM area (Alexander et al. 2010), some have a greater potential to impact or interact with the ecological components of the marine environment:

- **Commercial fisheries:** This sector includes groundfish, pelagic fish, molluscan and crustacean fisheries as well as marine plant and seal harvesting. In GOSLIM area, more than 50 species are harvested (DFO 2011).

The impacts that commercial fisheries have on the ecosystem include biomass removal (both of targeted species and by-catch of fish, marine invertebrates and birds, sometimes threatened or vulnerable) and alteration of the seabed (longlines, trawl nets, scallop drags, etc.), which, if not properly managed, may lead to the overexploitation of resources, changes in species life cycles, noise pollution, ghost fishing or increased risks of hydrocarbon spills.

- **Marine aquaculture:** There are approximately 1800 aquaculture sites in the GOSLIM area. Of this, 96 % are concentrated along the shores of Prince Edward Island, Nova Scotia and New Brunswick.

  Aquaculture operations generate organic waste and use chemical products (pesticides, medication, antifouling agents) that may degrade water and benthic habitat quality. Moreover, diseases or parasites may contaminate the natural ecosystem and genetic crossing can sometimes occur.

- **Oil and gas activities:** For the time being, these activities are mainly exploratory in the GOSLIM area, with 60,000 km of offshore seismic survey data acquired since the 1960s, and offshore drilling limited to less than a dozen wells (none have reached production). Newfoundland & Labrador and Nova Scotia have reached accords with the federal government to create offshore petroleum boards with the authority to permit oil and gas exploration and production. In March 2011, Canada and Quebec signed an agreement for the joint management of petroleum resources located within the Quebec portion of the Gulf. New Brunswick and Prince Edward Island have yet to reach such agreements with the federal government.

  The potential impacts of oil and gas exploration include disturbances due to noise during seismic surveys, however there is little knowledge about actual impacts. During the operation of a site, the risk of leaks or major spills, in addition to noise, could pose a problem.

- **Tourism and recreation in coastal and marine areas:** This industry has been growing throughout the Estuary and Gulf of St. Lawrence with an increase in cruise ship activity, offshore excursions (whale and bird watching and sightseeing) and recreational boating as well as higher visitor traffic in protected areas (wildlife reserves, national parks, migratory bird sanctuaries, etc.) and cottage and golf course development on the coast.

  The noise and overcrowding caused by tour boats are the main disturbances to wildlife associated with this type of activity, as is the risk of collisions, particularly with marine mammals.

- **Marine transportation:** Approximately 6400 commercial vessels transit the Cabot Strait and the Strait of Belle Isle annually to transport petroleum, mining, forestry, agriculture and fisheries products up to the Great Lakes. Over 40 major ports can accommodate these vessels. Emerging oil and gas activities and development in local economies is expected to lead to higher vessel traffic, potentially to areas with little historic or current vessel traffic.

  Merchant vessels generate underwater noise that can disturb certain animal species, sometimes causing them to change their migration route or preventing them from finding mating partners. Collisions, particularly with marine mammals, give rise to risks of injuries that are sometimes fatal. Ballast water transported by ocean vessels is a point of entry for invasive species into Canadian water, though the law is increasingly strict in this regard, diminishing the risks. Moreover, oil spills or spills of other toxic products have impacts on the ecosystem when such accidents happen, especially in the St. Lawrence Estuary.

- **Dredging:** In the past ten years, Fisheries and Oceans Canada has received over 1300 dredging requests for the entire Gulf of St. Lawrence. Projects involving dredging and the disposal at sea of dredge spoils may alter benthic habitat, resuspend sediments, disperse particles and contaminants and cover benthic communities thus modifying the diversity and abundance of marine organisms.

- **Land-based activities:** These activities may affect marine areas through the direct or indirect release of biological and chemical contaminants. Contaminants may originate from distant watersheds, even the highly industrialized Great Lakes Basin, which does not fall within the scope of this Plan. Activities which occur along the coast are most likely to have the greatest impact. These activities primarily include the disposal of municipal wastewater, pulp and paper plants, mines and mineral processing plants, fish processing plants, the regulation of freshwater flows (dams and watercourse alterations) and forestry and agriculture operations. Approximately 1.2 million hectares of agricultural land borders the Estuary and Gulf of St. Lawrence.

- **Other activities:** Many other activities, such as disposal at sea, installation of underwater cables and pipelines, recreational and Aboriginal fishing activities, migratory bird hunting and oil storage facilities are also carried out within or adjacent to the Estuary and Gulf of St. Lawrence.

To attain a healthy, sustainable maritime economy in the Estuary and Gulf of St. Lawrence, a balance must be struck between the conservation of ecological capital and our use of the goods and services provided by the ecosystem (DFO 2011).

5 Governance and Jurisdictional Structures

Partners and Stakeholders

The Gulf of St. Lawrence is comprised of a complex multi-jurisdictional setting made up of the Government of Canada, five provincial governments (Newfoundland and Labrador, Nova Scotia, New Brunswick, Prince Edward Island and Quebec) and many municipal governments.

Regulations governing ocean-related activities carried out in the GOSLIM area are provided by a number of federal departments and agencies, including Fisheries and Oceans Canada, Transport Canada, Environment Canada and the Parks Canada Agency, as well as by five provincial governments. Federally, there are close to 30 acts and 100 regulations in addition to the numerous policies, operational statements, guidelines, best management practices and management measures to regulate ocean-related activities. Provincially, there are more than 150 regulatory and non-regulatory documents on the management of ocean-related activities.

These regulations are not necessarily coordinated between the federal and provincial agencies. The collaborative coordination of regulations is necessary for the successful implementation of integrated management in the GOSLIM area.

Municipally, bylaws and zoning regulations govern the coastal activities of more than 400 communities bordering the Estuary and Gulf of St. Lawrence. Municipal governments therefore have the potential to contribute considerably to the management of coastal and marine areas through responsible coastline and infrastructure planning.

As rights holders, the First Nations and other Aboriginal groups also share a common interest in the management of coastal and marine activities and resources. The *Constitution Act* (Canada 1982) and the *Oceans Act* (Canada 1996) respect the Aboriginal and treaty rights of the First Nations and other Aboriginal groups. The importance of the traditional knowledge of Aboriginal peoples in understanding marine ecosystems is explicitly acknowledged in recent legislation, particularly the *Oceans Act* (Canada 1996) and the *Species at Risk Act* (Canada 2002).

Non-government organizations, such as industry associations, stewardship groups, environmental groups and economic development boards, as well as individual ocean users also contribute to the sustainability of ocean resources in the Estuary and Gulf of St. Lawrence by establishing general and ethical use policies.

Current Governance Model within the Gulf of St. Lawrence Integrated Management Area

To meet the needs of this complex governance model, Fisheries and Oceans Canada has created an integrated management planning framework for the GOSLIM area and will contribute to its implementation. Generally, there is only one regional integrated management implementation committee within a LOMA (DFO 2005). However, within the GOSLIM area, three oversight bodies (Figure 7) take part in implementing integrated management, one for each of the three Fisheries and Oceans Canada regions covered by the GOSLIM initiative (Gulf, Quebec, and Newfoundland and Labrador). This approach is reflective of the diversity of GOSLIM's multi-jurisdictional setting and complexity.

Figure 7: Current intergovernmental governance in the GOSLIM area

In Quebec, the **St. Lawrence Action Plan Steering Committee** (Canada – Quebec Agreement on the St. Lawrence 2011–2026, 2011) oversees administration of the Agreement and reports regularly on progress made on the directions and objectives agreed upon therein. In addition to the Steering Committee, the management structure of the St. Lawrence Action Plan comprises the following:

- an Executive Committee that implements the decisions made by the Steering Committee and follows up on the actions to be taken;
- an Agreement Secretariat that coordinates, provides logistical support, liaises and continuously monitors actions between the various committees and working or consultation groups; and
- three committees that are responsible for monitoring progress of the actions, reporting on the achievement of set objectives and identifying obstacles to project completion and opportunities for developing new projects.

In addition to this Canada-Quebec administrative structure, local stakeholders (Aboriginal, industry groups, etc.) collaborate through mechanisms developed and implemented under the Agreement, notably through the Forum on the St. Lawrence, regional round tables and coordination committees put in place under the joint action program pertaining to issues specific to the Quebec portion of the St. Lawrence.

The **Regional Committee on Coastal and Oceans Management (RCCOM)** is the senior executive forum for the federal and provincial governments of New-Brunswick, Prince Edward Island, and Nova Scotia that:

- oversees, monitors and assesses the performance of integrated ocean and coastal planning and management processes;
- participates in and provides support for the coordination, direction, and endorsement relative to the development and implementation of ocean and coastal integrated management plans;
- coordinates intergovernmental and interdepartmental decision-making regarding ocean and coastal management issues; and
- provides strategic oversight of management and regulatory issues as part of ocean management and planning processes within the Maritimes Provinces.

Newfoundland and Labrador's **Regional Oversight Committee on Oceans Management (ROCOM)** is the oversight body for ocean-related programs in this Region. Federal and provincial departments, ministries, agencies and organizations that make up this committee recognize and respect everyone's roles and responsibilities, including the existing processes aimed at facilitating interdepartmental and intergovernmental cooperation on oceans management in the province. The role of the ROCOM is to:

- oversee, monitor and assess ocean and coastal planning and integrated management;

- ensure government participation at the executive level, provide the coordination, direction and support necessary for the development and implementation of ocean and coastal integrated management plans, and coordinate related planning processes;
- assist in intergovernmental and interdepartmental decision-making on ocean and coastal management issues; and
- support the strategic monitoring of management and regulation issues for the integrated oceans management and various planning processes.

The Canada – Newfoundland and Labrador Committee on Oceans Management, which operates under the direction of the ROCOM, is an intergovernmental forum focused on the coordination of policies, management, operations and regulation. This forum facilitates the exchange of information between governments and all departments and ministries, strengthens existing processes and prevents duplication of efforts.

Proposed Approach for the Integrated Management of the Gulf of St. Lawrence

The proposed approach seeks to identify priorities, foster alignment of associated management tools, identify gaps and develop, with implicated partners and groups, the most appropriate management measures to fill these gaps. This approach involves regulatory authorities and partners already engaged in management processes relating to the Estuary and Gulf of St. Lawrence. Fisheries and Oceans Canada will play a liaison role between the various existing structures in order to examine each of their concerns and put them in the general context of the GOSLIM area. Envisioning the issues in a broader sense will help to analyze them as a whole and to make decisions at the appropriate scale, be it Gulf-wide, regional or local. Fisheries and Oceans Canada will therefore play an integrative role and will rely on the three existing regional governance bodies (St. Lawrence Action Plan, RCCOM and ROCOM) to work together to deal with specific management issues. Collaboration with partners already involved in the round tables, forums or advisory committees will be essential in order to address significant environmental issues of those identified in the GOSLIM area.

The ultimate purpose of the GOSLIM Plan is to identify practices that will facilitate cohesive decision-making at the appropriate scale by gathering knowledge and expertise, as well as to improving the understanding of the ecosystem and the communication between the various stakeholders working in the interest of the GOSLIM area.

6 Management Themes Selected for the Gulf of St. Lawrence Integrated Management Area

Risk-Based Management Approach

The context for planning in an Integrated Management approach requires that our view of the environment be broad, encompassing not just physical processes and biota but a perspective that incorporates human activities and values in tandem with bio-physical processes.

Risks to the ecosystem or to particular values may arise from individual activities (often conducted intensively) or from the cumulative effects of multiple activities over space and time. The connections and interactions between the ecosystem goods and services, stressors from human activities (many land-based) as well as the resulting changes to the ecosystem, are not fully understood. Moreover, application of an ecosystem-based approach to management requires scientific assessments and advice. Ecosystem-based scientific advice was developed for the purposes of Gulf of St. Lawrence Integrated Management (cf. DFO 2004, 2006, 2007 for EBSA etc.).

Risk management seeks to identify and implement the best management option to reduce or eliminate the likelihood of hazards occurring to ecosystem goods and services. Given the specific nature of the GOSLIM LOMA (a diverse ecosystem with complex governance sustaining many activities) a more targeted and issue-based management approach is required. The approach needed for integrated management of the Gulf of St. Lawrence must be strategic, feasible, responsive and results-oriented.

A risk-based management approach for the Gulf of St. Lawrence integrated management has been designed to identify key management themes that can arise from the environmental effects of higher-risks human activities on key ecosystem components.

Method for Determining Management Themes: Vulnerability Analysis

Numerous human activities in the Gulf of St. Lawrence can induce effects on species and their habitats (see section 4 and Alexander et al. 2010). Vulnerability analysis aims to identify, as part of the integrated planning process, human activities that are perceived as posing significant risk for important ecosystem components.

Vulnerability refers to an inherent susceptibility of ecosystem components to the effects of a hazard that can have adverse consequences. Vulnerability takes into account both the effect of exposure on an ecosystem component to an activity and its associated impact and the likelihood of exposure.

Key ecosystem components selected for vulnerability analysis were derived from the descriptions of previous Fisheries and Oceans Canada scientific advisory processes for ecologically and biologically significant areas (EBSA) and candidate Ecologically Significant Species (CESS) (including one Ecologically Significant Species – eelgrass). A total of 52 EBSA components were derived from the EBSA DFO CSAS Science Advisory Report (DFO 2009a). The list of 23 CESS components was provided by DFO Science (see Table 1). A risk-based management approach was employed by Fisheries and Oceans Canada to analyze qualitatively vulnerabilities of those key ecosystem components to human activities (Hardy et al. 2012). This approach involved consideration of the likelihood of interaction between key ecosystem components and human activities, as well as an appreciation of the consequences that could occur when those interactions take place.

The categories of adverse environmental effects that were taken into account for the vulnerability analysis include:

- **Biota alteration** – Changes in the ecological structure, diversity or abundance of species that may affect ecosystem functions beyond the range of natural variability.
- **Contamination** – Introduction of substances, waste or pathogens which are deleterious to a species or to human consumption of the species.
- **Habitat alteration** – Physical alteration of the structure of a habitat that may compromise its integrity and its ability to support species during their life cycle.
- **Habitat fragmentation or disturbance** – Disturbance of habitat which renders it less suitable for use such that the species can be effectively excluded from an area.
- **Nutrient or sediment regime alteration** – Changes in the physical and chemical nature of habitat beyond the range of natural variability. Nutrient or sediment regime alteration can induce trophic consequences or adversely affect water quality.

Four perceived vulnerabilities have been identified based on the highest frequency of interactions between key ecosystem components and activities/stressors (Table 2).

Proposed Management Themes Identified by Fisheries and Oceans Canada

In addition to the four key management themes selected in the vulnerability analysis (Table 2, themes 1 to 4), a fifth was added following the 2010 national science advisory meeting, which highlighted the ecological significance and vulnerability of corals and sponges in Canadian waters (DFO 2010a).

Table 2: Main management themes identified by Fisheries and Oceans Canada

1. Vulnerability of groundfish and benthic invertebrates to biomass removal (e.g., fishing) and physical alteration of habitats (e.g., consequences of fishing gear)
2. Vulnerability of pelagic fish to biomass removal (e.g., fishing)
3. Vulnerability of marine mammals to noise, entanglement, ship-strikes and contaminants (e.g., marine transportation)
4. Vulnerability of marine plants (i.e., Eelgrass) to habitat alteration caused by invasive species, contaminants and nutrient input (e.g., coastal and land-based activities)
5. Vulnerability of corals and sponges to biomass removal (e.g., fishing activities affecting the seafloor)

Management Themes Identified by Other Federal and Provincial Departments

Other federal and provincial departments and agencies have identified the following management themes and concerns:

- ***Vulnerability of marine and colonial birds***

Marine and colonial migratory birds, whether designated as species at risk or not, are vulnerable in their feeding, rearing, breeding, moulting, staging and wintering areas (Environment Canada, 2013 and in preparation). These birds are specifically vulnerable due to:

- potential disturbances caused by recreational boating, ecotourism and bird watching in general;

- incidental catches of marine birds by fishing gear;
- oil spills (marine or port accidents); and
- destruction, contamination and alteration of coastal, marine and pelagic habitats.

- ***Vulnerability of marine and coastal environments with high levels of nutrients and sediment***

Many wetlands and/or coastal environments are drained, dredged or filled every year for agricultural, urbanization or industrial expansion purposes. Areas that are not destroyed become vulnerable as a result of increased sediment and nutrient inputs from human activities, which expose them to the risk of eutrophication. These environments are made vulnerable by:

- alterations in the specific composition of vegetation;
- changes in salinity (e.g., saltmarshes);
- modification of the sediment dispersal pattern;
- erosion;
- leaching of occasionally toxic contaminants (chlorine, cyanide, heavy metals, etc.);
- discharges of leachate, municipal waste water and industrial effluents;
- the risk of proliferation of invasive species, loss of biodiversity and changes in the food web;
- the induction of hypoxic conditions;
- the risk of toxicity from algae that grow in eutrophic environments;
- habitat loss for species that depend on it (e.g., benthic organisms, fish and birds); and
- the risk of contamination for species that use these environments (e.g., molluscs, fish, birds and marine mammals).

- ***Vulnerability of species at risk***

The vulnerability of species at risk are due to:

- incidental catches of such species by commercial fisher harvesters is a worrisome phenomenon for population recovery;
- commercial fishing of certain declining species could lead to their disappearance;
- destruction, contamination or alteration of habitat critical to one of the life cycle stages of species at risk puts them at a very high risk of extinction.

7 Implementation of the Integrated Management Plan

This Plan provides a general framework for the implementation of integrated management in the GOSLIM area. It outlines the process used by Fisheries and Oceans Canada to conduct a qualitative analysis of a number of ecosystem components and their perceived vulnerabilities to environmental stressors caused by human activities (first two phases) as well as the next steps leading to the development and implementation of action plans (Figure 3).

This Integrated Management Plan was submitted for review in December 2012 to regulatory authorities in the GOSLIM area and to First Nations communities and Aboriginal organizations, which share a common interest, as rights holders, in the management of coastal and marine activities and resources. Now, federal and provincial authorities as well as the First Nations and Aboriginal organizations will be invited to confirm their engagement or participation in implementation of actions through existing regional governance bodies.

The subsequent phases include:

- targeted engagement of partners on the management needs that must be met to resolve a given issue;
- design and implementation of the required management actions;
- assessment of the effectiveness of management actions; and
- if necessary, modification (over time) of management measures to achieve the set conservation objectives.

Regulatory Gap Analysis

Policy fragmentation (i.e. the lack of integration) is a key impediment to effective integrated management. The diversity of responsible authorities and jurisdictions can confound the roles and accountability in the activities and may result in issues management gaps, ineffectiveness or absence of mitigation measures, or duplication of efforts.

The regulatory gap analysis is seen as a first step to allow for discussions between regulatory authorities to determine which regulatory instruments and management measures are collectively in place. The regulatory gap analysis approach has been adapted from work on governance fragmentation. It will serve to identify potential areas for enhancement and/or for determining that existing measures are considered adequate to deal with the previously identified vulnerabilities and environmental effects.

The intent of the analysis is to identify areas where management measures may not be present, enforced or effective in managing human activities and their related environmental effects. This analysis requires an extensive review of legislation, policy, management practices, standard operating procedures and environmental quality guidelines and thresholds. Furthermore, best management practices and standards could be reviewed in partnership with industries.

An awareness of existing management measures (i.e. non-gaps.) is equally important in being able to demonstrate to stakeholders the extent of federal – provincial activities and coordination in managing coastal and oceans related issues.

Implicated regulatory authorities are engaged through existing federal/provincial governance structures as previously identified in Figure 7 (e.g. SLAP, ROCOM or RCCOM committees).

Engagement of Regulatory Authorities

Engagement of implicated regulatory authorities will be conducted to examine the existing management measures in place to mitigate environmental effects associated with human activities, to identify gaps and to jointly identify, examine and prioritize areas of enhancement to inform future potential management actions.

This step will seek endorsement from regulatory authorities on the priority areas for enhancement in terms of policy, regulations and best management practices. Each identified priority shall be the objective of common action plans, which could be supported by partners and would address the perceived risks.

Development and Implementation of Action Plans

Action Plans will be developed to address each previously identified priority management issue. This will be conducted through committees developed under existing governance bodies and will be based on common priorities, respecting the jurisdictional authorities of each of the partners. Action plans will incorporate data from consultations with stakeholders involved in the particular management issue.

Among the many requirements for effective implementation of Integrated Management is the need for baseline information on a wide range of social, economic, and cultural features as well as human activities. These considerations will be taken into account in the action plans. Implementation of the Action Plans will be driven by the partners with the regulatory authority to address the risks associated with the management of the issue of concern.

In addition to the design and implementation of action plans targeted to the management of specific priority management issues, commitment to a national Marine Protected Areas network (DFO 2010) represents one example of a planning initiative that would fall under the auspices of regional authorities for implementation.

Action Plan Monitoring: Review and Evaluation

Successful implementation of the action plans requires an effective program for performance evaluation and reporting. This will involve two main steps: assessment of the Action Plans' outcomes and evaluation of the action planning process itself. The review and evaluation process will be identified in each Action Plan. The Action Plans' performance evaluation and reporting program may also include data gaps identification and a review of the scientific data (ecosystem basis) used for Integrated Management (Figure 3).

8 Conclusion

The Gulf of St. Lawrence Integrated Management Plan includes: 1) the ecosystem basis for Gulf of St. Lawrence integrated management; 2) a practical approach, based on risk, that was developed to identify key management themes and to manage potentially adverse environmental effects; 3) the results of Fisheries and Oceans Canada analysis based on this approach, including the identification of key management themes for the marine environment; 4) key management themes identified by the Fisheries and Oceans Canada partners consulted; and 5) a framework aimed at identifying priority management issues and action planning with partners.

The risk-based management approach for the GOSLIM area will ensure that activities are managed in such a way that environmental pressures arising from human activities do not threaten the ecosystem and are maintained at a sustainable level. Managing activities in this context requires cooperation between regulatory authorities.

This is one reason why this Plan recognizes the vital role of the three different federal-provincial governances already in place in the GOSLIM area. The Plan's next steps will require building on a comprehensive set of expertise and mandates of the implicated regulatory authorities, as cross-sectoral assessments of existing regulatory measures and gaps will help to target the most appropriate action(s) for a given theme.

As new activities emerge, the framework described in this document may be used as a tool to inform future challenges that may arise in the GOSLIM area.

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10 Glossary

Adverse Environmental Effects	Any change in the environment caused by human activities which through their actions can result in the alteration, disruption or destruction of species, habitats, functions or attributes. This can include: Contamination, Pathogen Introduction, Sedimentation, Habitat Fragmentation, Habitat Alteration, Biota Alterations, Invasive Species Introduction, Nutrient Regime Alterations, Hydrological Regime Alterations, Riparian Zone Alterations.
Candidate ecologically significant species	A species whose characteristics are the subject of scientific analysis by Fisheries and Oceans Canada in order to determine whether it meets all the criteria for designation as an ecologically significant species.
Consequence	Outcome of an event that will have an effect on objectives. There can be a range of consequences from one event. A consequence may be certain or uncertain and can have positive or negative effects on objectives. Consequences are to be understood as they relate to the organization's objectives. (ISO 2006)
Cumulative Environmental Effects	The environmental effects which are likely to result from activities in combination with the environmental effects of other past, existing and future activities. (CEAA 2006) Changes to the environment that are caused by an action in combination with other past, present and future human actions.
Ecologically and biologically significant area (EBSA)	Ocean areas that are biologically or ecologically significant due to the functions they perform in the ecosystem (e.g., feeding or spawning area specific to a given species). Five criteria are used to evaluate the ecological and biological significance of specific areas: uniqueness, concentration, consequences on fitness, resilience and naturalness.
Ecologically significant species (ESS)	A species that has particularly high ecological significance to facilitate provision of a greater-than-usual degree of risk aversion in management of human activities that may affect such species (DFO 2006a).
Ecosystem	As defined in the Canadian Environmental Protection Act, 1999,"ecosystem" means a dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit. (CEAA 2006)
Ecosystem Component	Fundamental element of the biological, physical, or chemical environment, which represents an explicit and tangible (i.e. measurable or observable) species, habitat, function or attribute.
Environment	As defined in the Act, "environment" means the components of the Earth, and includes: (a) land, water and air, including all layers of the atmosphere, (b) all organic and inorganic matter and living organisms, and (c) the interacting natural systems that include components referred to in paragraphs (a) and (b). (CEAA 2006)
Environmental effect	Adapted from Section 2 of CEAA defines "environmental effect" as including: "any change in the environment, including any effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the

	current use of lands and resources for traditional purposes by aboriginal persons, or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, and any change to the project that may be caused by the environment, whether any such change occurs within or outside Canada."
*Hazard**	Used to express types of agents, processes, procedures or sites which are a potential source of harm, damage or adverse cumulative effect or which can potentially affect ecosystem components (i.e. attributes, species, habitats) based on the current best available knowledge. In this document, this refers particularly to aquatic ecosystem hazards. A biological, chemical or physical agent in, or condition, with the potential to cause an adverse health effect. (FAO-WHO 2001) The likelihood that a substance will cause an injury or adverse effect under specified conditions. (Frantzen 2002) *Often considered a synonym of “Stressor” or “Pressure”: Any physical, chemical, or biological entity that can induce an adverse response. (Frantzen 2002)
Impact	There may be a range of possible impacts associated with an event. The impact of an event can be positive or negative relative to the organization's objectives. A change in a condition or state. (Frantzen 2002)
Incidence	A more or less direct effect (consequence) of an activity on its surroundings. The incidence of an event can be either positive or negative.
Mitigation	In respect to a source of hazards, the elimination, reduction or control of the adverse environmental effects of the activity, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means. (CEAA 2006) Any action taken to minimize, at the optimal costs, losses which strike the organization, and limitation of any negative consequence of a particular event. (ISO 2006)
Perceived Risk	Importance and significance of a hazard and its cause of harm, as defined by individuals, the community, and society.
Risk	Defined in the document “Integrated risk management framework” (TBS 2001) by the Privy Council Office of Canada and the Treasury Board as “the expression of the likelihood and impact of an event with potential to influence the achievement of an organization’s objective”; in the background to the definition the authors are careful to note that “Although this definition of risk refers to the negative impact of the issue, the report acknowledges that there are also positive opportunities arising from responsible risk-taking and that innovation and risk co-exist frequently”. A function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard(s). (FAO-WHO 2001) The probability of a substance (chemical, physical or biological) to produce harm under specific conditions. (Frantzen 2002)
Social, Cultural and Economic Com-	The tangible elements of an ecosystem which provide goods and services to an area, such as aesthetics, recreation, navigation, fish resources, etc. These are ecosystem components upon which society derives benefits (i.e.

ponents	economic or well-being) from their presence.
Species at risk	An extirpated, endangered or threatened species or a species of special concern (Canada 2002).
Stressor	Any physical, chemical, or biological entity that can induce an adverse response. (Frantzen 2002) *Considered a synonym of “Pressure” in this document.
Susceptibility	Susceptibility is the extent to which an organism or ecological community would suffer from a hazard, threatening process or factor if exposed, without regard to the likelihood of exposure.
Sustainable Development	Means development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.
Vulnerability	Refers to an inherent susceptibility of an ecosystem component in relation to the potential effects of a hazard which can cause adverse consequences. Vulnerability takes into account both the effect of exposure and the likelihood of exposure.

11 Acronyms

CEAA	Canadian Environmental Assessment Act
CESS	Candidate Ecologically and Biologically Significant Species and Communities
CMA	Coastal Management Area
CSAS	Canadian Science Advisory Secretariat
DFO	Department of Fisheries and Oceans
EBSA	Ecologically and Biologically Significant Areas
ESS	Ecologically Significant Species
GOSLIM	Golf of St. Lawrence Integrated Management
IM	Integrated Management
LOMA	Large Ocean Management Area
RCCOM	Regional Committee for Coastal and Oceans Management
ROCOM	Regional Oversight Committee on Oceans Management
SLAP	St. Lawrence Action Plan

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