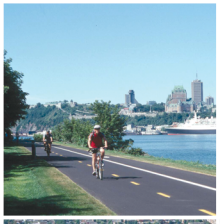
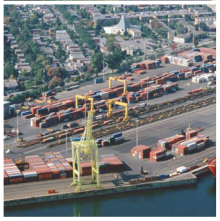
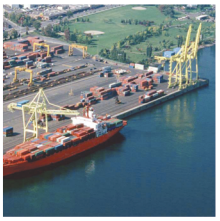
Saint-Laurent Vision 2000

Sustainable Navigation Strategy

FOR THE ST. LAWRENCE







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Foreword

An initiative associated with the St. Lawrence Action Plan Phase III, the Sustainable Navigation Strategy is intended as a contribution to the development of navigation, in its multiple aspects, in compliance with the environmental conditions of the St. Lawrence. Based on sustainable development principles, the strategy has been drawn up by the Navigation Consensus Building Committee (NCBC) of the St. Lawrence Action Plan. It represents a first systematic attempt to orient the management of all navigation activities, taking into account their economic, environmental and social impacts.

The strategy is intended to complete the existing policies (transportation, environment, water, etc.) and the private initiatives that are often formulated for more specific purposes. In this perspective, the Committee solicited the participation, in public consultations, of various navigation stakeholders representing four sectors of activity: the shipping industry, recreational boating, the federal and provincial governments, the riverside communities and environmental groups.

This document is the product of these consultations and the consensus building efforts of all members who served on the Committee since its founding. All the members participated in formulating the strategy through their critical analysis and review. This experience in consensus building is the result of a long process. However, through dialogue and harmonization of the different interests, consensus building contributes to the achievement of sustainable development by exerting a constructive influence on the decision-makers and the community.

We are very pleased to table this summary version of the Sustainable Navigation Strategy and believe that it will contribute to improving the condition of the St. Lawrence and to the quality of life of its riverside communities.

We wish to thank all the members of the Navigation Consensus Building Committee and the other colleagues who contributed directly or indirectly to formulating the Strategy and count on their participation for its implementation.

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Introduction

This document is a summary of the Sustainable Navigation Strategy and contains solely its main elements, namely the vision (definition, guiding principles and principles of application) and an overview of the action plan. It is intended for the stakeholders directly concerned by the implementation of this strategy, decision-makers, managers and project managers, but it is also offered to everyone with a special interest in issues related to commercial and pleasure navigation. The main purpose of this summary is to facilitate the application of the strategy's principles in day-to-day operations.

The objective of the Sustainable Navigation Strategy is to adapt the management practices of commercial and pleasure navigation stakeholders so that their day-to-day and long-term decisions consider the imperatives of sustainability, whether environmental (impact reduction), economic (promotion of maritime transportation) or social (harmonization of uses). It seeks to establish a certain balance between navigation practices and other uses of the St. Lawrence and proposes to reconcile the different interests through consensus building.

The bases of the strategy, the definition and principles, propose a frame of reference and an orientation for current navigation activities on the St. Lawrence and those in development. A brief description of the targeted issues for the first action plan completes this summary. The issues initially retained are: consensus building, dredging, adaptation to water level fluctuations, shoreline erosion, sewage and ballast water management, risks of hazardous product spills and development of maritime transportation in terms of its environmental advantages. In the complete version of the Strategy, each issue has been the object of thorough documentation that is as technically and scientifically up-to-date as possible. This makes it possible to identify the sectors where efforts will have to be oriented over the next few years to mitigate the impacts associated with certain navigation practices.

Vision

FROM SUSTAINABLE DEVELOPMENT TO SUSTAINABLE NAVIGATION

In the 1960s, population growth, ever more intensive land use, accelerated harvesting of raw materials and the impacts generated by these activities on the environment (air-soil-water) led various international stakeholders to begin reflection on the social, economic and environmental sustainability of this development. This reflection, and particularly the concerns that accompany it, then intensified, culminating in 1987 with the report of the World Commission on Environment and Development (Brundtland Report, *Our Common Future*). A simple but inclusive expression of sustainable development was finally proposed and accepted by the international community. Sustainable development is thus understood as:

> *Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

This definition served as a frame of reference for different sectors that adapted it to their respective needs. Thus, in the transportation sector, the OECD has proposed a definition of sustainable transportation that makes no distinction between the different modes:

> *Transportation that does not endanger public health or ecosystems and meets mobility needs, while being consistent with:*
>
> *a) use of renewable resources at rates below their own regeneration; and*
>
> *b) use of non-renewable resources at rates below the development of renewable substitutes.*
>
> *(Taken from the translation by Environment Canada and Transport Canada, 1997)*

These multiple efforts have made it possible to establish the orientation of sustainable development. It must consider the following three main poles – the economy, the environment and society – and tend to an equilibrium among them.

By applying these concepts to the various navigation activities, it becomes possible to define what could be a sustainable navigation for the St. Lawrence:

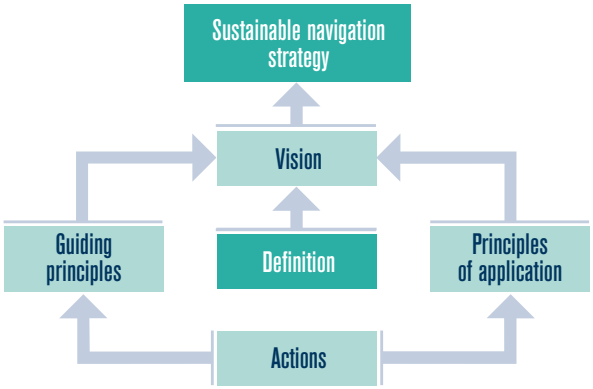
> *Management of commercial and recreational navigation and quayside ship operations, integrating the objectives of economic, environmental and social sustainability and assuring, in the short term and for future generations, adequate protection of ecosystems, quality of life, and human health and safety, while permitting the development of navigation.*
>
> (Navigation concensus building committee, 2003)

This definition focuses on the importance of subscribing to the imperatives of sustainability in the management of navigation activities. By basing the achievement of sustainable navigation on management practices, the precepts of sustainability will be integrated into the everyday activities of the stakeholders and managers concerned. Moreover, sustainable navigation adheres to the balance sought by sustainable development, namely prevention, mitigation or elimination of the negative impacts of commercial and recreational navigation on the St. Lawrence ecosystems and uses. Parallel to this and still seeking this balance, it emphasizes the environmental, social and economic benefits of navigation.

In support of this definition, guiding principles and principles of application have been formulated to serve as a reference framework for stakeholders and decision-makers who have to act directly or indirectly on issues concerning commercial and recreational navigation activities. In accordance with the definition, the principles constitute a sort of ideal, a vision of the St. Lawrence to preserve by proposing some guidelines for navigation activities. The appropriation of this vision by the decision-makers and stakeholders will foster its fulfillment.

GUIDING PRINCIPLES AND PRINCIPLES OF APPLICATION

The organization chart below schematically shows how the strategy functions. The guiding principles and principles of application will provide a framework for the different actions related to navigation so that they can meet the requirements of sustainable navigation.



Guiding principles

Protection of ecosystems and water resources

Assure the sustainability of the St. Lawrence ecosystems, their productivity and the essential roles they play and not disrupt the quality and quantity of water available.

Safety of persons and ships

Follow the recognized safety principles and measures for crews, users, cargo and ships.

Development of commercial navigation activities

Observe the requirements of economic development of navigation activities and assure their harmonization with environmental and social imperatives; maintain the port accesses supporting these activities and optimize reliance on navigation in situations where this mode of transportation offers comparatively more environmental gains.

Development of recreational and recreational boating activities

Promote the development and practice of these activities and ensure their harmonization with environmental and social imperatives.

Harmonization of uses and involvement of riverside communities

Meet the needs of the different users of the St. Lawrence, particularly in matters of accessibility, and ensure the participation of the riverside communities in the decision-making processes.

Principles of application

Broadened consensus building among navigation stakeholders

Develop and maintain consensus building among public stakeholders, users and riverside communities, and promote participation in the decision-making process based on various conditions that may range from exchange of information to consultation and, as the case may be, takeover of specific projects.

Consolidation of best practices and innovation in environmental management measures

Support and consolidate existing best practices and initiatives and develop new ones in relation to the development of knowledge, technology and environmental conditions.

Acquisition and sharing of knowledge, and training

Promote, through research and development, the acquisition and sharing of environmental, technical and economic knowledge related to navigation, by assuring the transfer, through training, to the commercial and recreational users.

Dissemination of information, awareness and involvement

Disseminate information concerning the impacts and advantages of navigation to change the perceptions and behaviour of stakeholders in the navigation field, riverside communities and users, and to promote the development of targeted strategic actions.

Environmental assessment of actions

Assure systematic and regular monitoring of the environmental effectiveness of the measures implemented, and institute remedial measures as needed.

These principles are primarily based on environmental and social values such as maintenance and development of activities with less impact on the environment, cooperation and consensus building among the various stakeholders, but also a marine economy based on increased efficiency of navigation activities. The following section presents a set of issues in which efforts must be invested on a priority basis over the next few years to mitigate the impacts associated with certain practices.

INTRODUCTION

The environmental issues requiring remedial measures were determined based on discussions within the Navigation Consensus Building Committee, and sectorial consultations held with stakeholders closely related to the navigation field (shipping industry, recreational boating, riverside communities and environmental organizations, and government representatives at the federal, provincial and municipal levels). These issues are the basis of a first intervention plan, implementation of which will be spread over the next five years. Other issues will be added later to this nucleus, depending on changing environmental and socioeconomic concerns. The expression of current regional, national and international preoccupations has served to prioritize the issues. This priority is consistent with a will to optimize and rationalize the interventions so as to achieve the results within the designated period.

Implementation will involve the federal and provincial departments present on the Committee which, particularly in the course of their regular activities, will take charge of the issues that concern them and see to the implementation of the corresponding objectives. The representatives of the shipping industry, recreational boating and the riverside communities will also participate on an ad hoc basis in the development of certain projects, and will remain very present and active concerning orientations and planning.

This section sets out the main points of the eight issues retained, i.e. consensus building, dredging, adaptation to water level fluctuations, shoreline erosion, sewage and ballast water management, and the risks of hazardous product spills. It ends with a presentation of the eighth issue, the development of marine transportation in relation to its environmental and social advantages. The consensus building issue is completed by awareness and involvement issues. This triad is recognized by the Committee as the main priority supporting the implementation of the whole strategy.

The other issues relating to technical aspects (fleet evolution), economic aspects (economic incentives like the green ships initiative), social aspects (training of marine personnel) or legal aspects (future regulation) are the focus of work by the authorities concerned in many cases. The strategy will assure monitoring of their development and will incorporate the results of this work as it becomes available.

CONSENSUS BUILDING – A PREREQUISITE

Consensus building is a formula that allows the application of sustainable development precepts. It achieves it by bringing together, around the same theme, the main constituents of sustainable development, namely environmental, economic and social stakeholders. In this regard, it is a prerequisite to the justification of decisions that have a collective and public impact. Consensus building is one of the challenges currently adopted by public administrations (DFO, 2001; MENV, 2002; MTQ, 2001; EC, 2001). It assumes better coordination between policies and private initiatives, as well as participation by riverside municipalities and other community stakeholders. This approach seeks to introduce a cost-effectiveness ratio of actions that is superior to the traditional command and control approach and that henceforth puts cooperation in the forefront of environmental management (Lepage *et al.*, a2002).

Different consensus building formulas exist. The Navigation Consensus Building Committee, by bringing together the stakeholders involved in navigation activities, such as governments (federal and provincial), the shipping industry, pleasure navigation and riverside communities (municipalities, environmental groups) has been recognized as an interesting and productive formula. However, this formula is required to evolve in response to emerging realities.

Stakeholder Awareness and Involvement

One general finding emerges regarding navigation: this is a field of activity with advantages, limits and disadvantages that are fairly unknown to the public. This lack of knowledge translates into demands for changes in practices to mitigate environmental impacts that are often difficult to fulfill without compromising the principles of navigation safety. On the other hand, the shipping industry is not always inclined to change its practices to consider the environmental aspects.

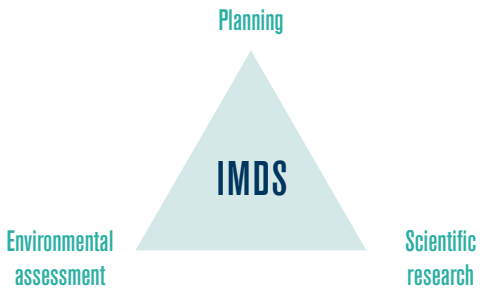
From this perspective, increasing awareness appears to be a prerequisite to consensus building. All of the stakeholders involved in navigation must become aware of the other parties' concerns and be willing to provide adequate responses. Awareness leads to the stakeholders' commitment to remedy or mitigate a situation, or to provide information on the constraints associated with it. This commitment is essential to the achievement of the Sustainable Navigation Strategy and is the most concrete form of its appropriation. The objective pursued by this involvement is two-way, i.e. to facilitate and promote implementation of the strategy and receive feedback from the stakeholders regarding deficiencies or the determination of new issues.

ENSURE IMPLEMENTATION OF INTEGRATED MANAGEMENT OF DREDGING AND SEDIMENTS

Integrated management of dredging and sediments seeks to consider the entire dredging cycle, from removal of the sediments to their disposal, and to examine the potential consequences. An integrated management plan has been developed by a working group bringing together government specialists from different federal and provincial departments. The general orientation framework has the following main objectives:

- consideration of environmental, economic, social and institutional requirements in dredging activities;
- creation of tools to facilitate decision-making and the improvement of communications with promoters and the public.

Three orientation poles are proposed:



Their purpose is to:

- improve the short-term and medium-term planning mechanisms (five-year plan);
- increase public information and participation;
- improve interdepartmental and intergovernmental consensus building;
- make the project planning, evaluation and authorization processes efficient and predictable for the appropriate promoters;
- reduce the scientific uncertainties regarding dredging sediments;
- mitigate the environmental impacts.

A series of recommendations (Working Group on the Integrated Management of Dredging and Sediments, 2003) complete this plan and specify the actions to be implemented within the context of the Sustainable Navigation Strategy.

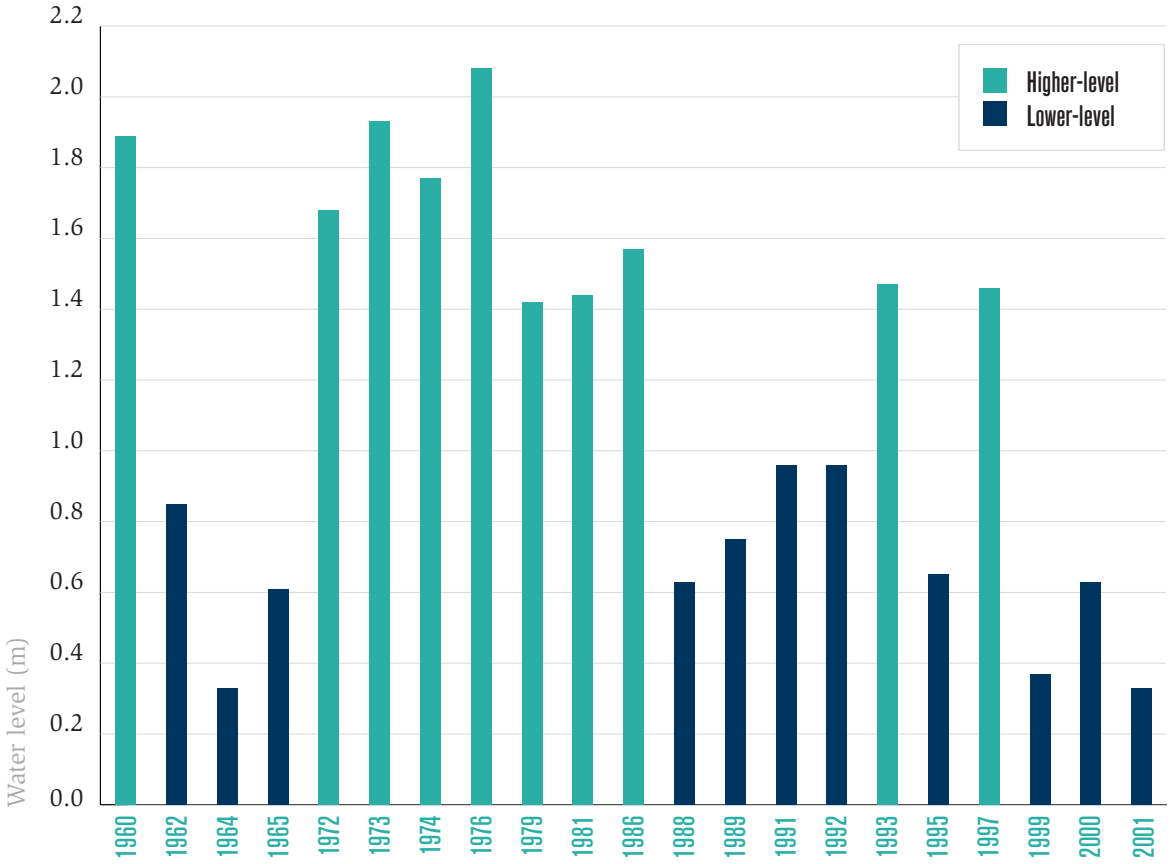
Moreover, a master plan of the locations of the recreational boating ports on the river will be produced. Its purpose is better planning for the implementation of new recreational boating ports (marinas). It will also give priority to those with recurring problems caused by their current location. The environmental criteria, including the reduction of dredging operations on the river, will be among the factors to consider in formulating this approach. A pilot project has been identified for this purpose and should be carried out at Lake St. Pierre. Various criteria led to the selection of this site, notably the silting of the estuaries of the lake's

tributaries, the low water levels observed in the past few years, which make navigation difficult, and the exceptional particularities of the Lake St. Pierre wetlands. This site recently was awarded the title of World Biosphere Reserve by UNESCO. The project will seek to propose an alternative to the recurring annual dredging of the navigation channels, an activity perceived by some as simple but not sustainable due to the special sedimentary dynamics of the estuaries in this sector. The results of this pilot project could subsequently serve as a reference for the drafting of a master plan for the entire river.

EVALUATE OPTIONS FOR ADAPTING NAVIGATION WITH REGARD TO THE FLUCTUATING WATER LEVELS

The flow regulation works upstream from Montreal have contributed to limiting seasonal water level fluctuations while ensuring the maintenance of commercial navigation at Montreal. However, these works have reached their limits if one considers climate cycles and years of very low precipitation, which may cause substantial water level fluctuations (Figure 1).

Figure 1 | *Sequence of Higher-Level and Lower-Level Years in Relation to the Chart Datum, Period 1960-2001, Montreal Region*



Source : DFO, 2002

The climate change prediction models assume that this decline observed since the early 1990s will continue and that flows in the Great Lakes-St. Lawrence system will diminish. This decline will have direct consequences on river water levels and could affect navigation activities and the Québec economy. Even though a relatively considerable margin of uncertainty is associated with these models, the prospect of their occurrence demands the development of adaptation strategies that will allow maintenance of activities at their current level while limiting the environmental impacts.

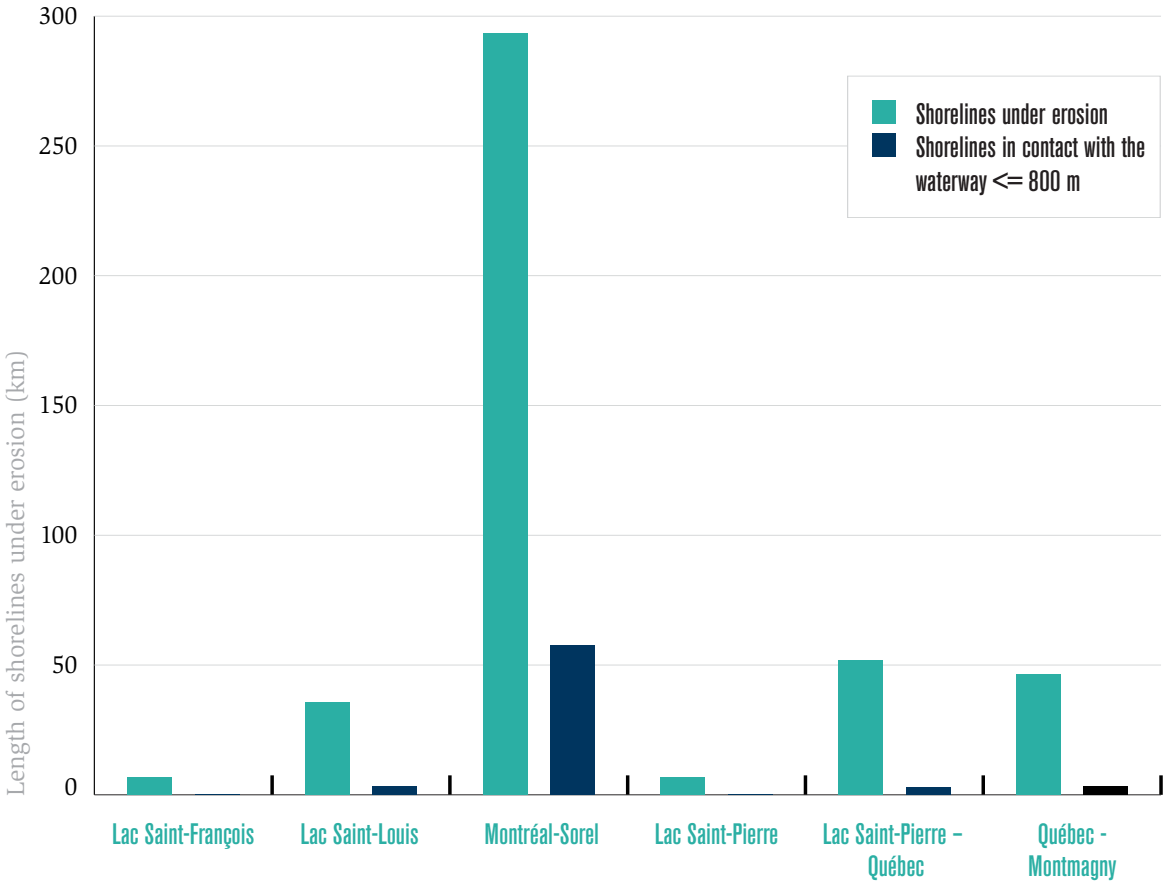
A study project will use the results of the climate change models and integrate them into a hydrodynamic model of the river over a 30-to-50-year horizon. This will make it possible to quantify the river water level fluctuations and locate the sectors most likely to be affected. Besides the studies currently in progress to optimize use of the water column by ships, adaptation strategies to limit the negative effects on marine transportation and on the Canadian economy in general will be designed based on different apprehended scenarios.

PREVENT THE IMPACT OF THE WAKE PRODUCED BY SHIPS AND OTHER CRAFT IN THE SENSITIVE SECTORS OF THE ST. LAWRENCE

The erosion of the St. Lawrence shoreline is a phenomenon that varies in intensity depending on different factors, such as the nature of the materials (clay, sand, rock, etc.), the slope of the banks, the degree of exposure to erosive agents and the extent of the plant cover. Erosion has various causes: natural factors (wind waves, drifting ice, water level variations, runoff, etc.) and human factors (wake produced by ships and other craft, disturbed shoreline).

The wake is the beating of the waves against a watercourse's shores, produced by the turbulence of ships and other craft and causing shoreline erosion. The amplitude of the wake varies according to the speed, the shape of the hull and the tonnage transported. The erosive effect on the shore closely depends on the distance and would be more pronounced when the navigation channel is less than 800 m from the shore (Figure 2).

Figure 2 | *Length of shorelines under erosion in contact with the waterway in the Cornwall-Montmagny sector for the period 1964-1983*



Source: Dauphin, 2000; adaptation, Navigation Consensus Building Committee, 2003

The most sensitive sector is located in the Montreal-Sorel section. In this section, a voluntary speed reduction measure was applied in fall 2000 by commercial vessels. Preliminary data on the monitoring of this measure suggest that erosion is decreasing where speed reduction is applied (Table 1), but the extent of the variation between the years may imply the presence of other factors. Longer-term monitoring, with an increase in the number of monitoring stations, will be necessary for a more precise quantification of the actual impact of ships' wake, as well as pleasure craft. In the latter case, the speed of pleasure craft in the narrow channels of Lac Saint-Pierre would contribute to the erosion of certain islands in the archipelago. However, additional data is needed to substantiate this relationship.

Table 1 | *Preliminary Data on the Variation of Shoreline Erosion in the Sorel Archipelago Section Following the Implementation of the Voluntary Speed Reduction Measure for Commercial Ships*

Year	Monitoring*		Experimental**		Impact
	Number	*Recession (m/year)*	*Number*	*Recession (m/year)*	*(%)*
1999-2000 (before)	5	0.83	29	0.85	–
2000-2001 (after)	5	1.54	29	0.53	-66
2001-2002 (after)	5	0.96	27	0.70	-27

Source: Canadien wildlife service, 2002

*Monitoring: shoreline settings affected by ships but not subject to the speed reduction program.

**Experimental: shoreline settings affected by ships and subject to the speed reduction program.

IMPROVE MANAGEMENT OF SEWAGE DISCHARGES AND CARGO RESIDUES FOR ALL TYPES OF SHIPS AND CRAFT

Sewage

Contrary to other provinces and certain U.S. states, Quebec does not have a regulation prohibiting the discharge of sewage directly into this province's waters. A regulation for the Great Lakes region governs the discharge of black water (discharges from toilets, urinals, medical sinks) for commercial vessels, but its application stops at the St-Lambert locks. Discharges therefore are not regulated downstream from this location. The same lack of regulation exists for pleasure boaters, even though Ontario and New York State prohibit any direct discharge into their waters and oblige pleasure boaters to be equipped with the appropriate tanks.

This practice has a considerable environmental impact. A study conducted by Swedish researchers in 1994 estimated that a fleet of 195,000 pleasure craft produced a volume of untreated sewage, during the two-month summer season, equivalent to the annual discharges of a population of 32,500 inhabitants. Estimating the population of recreational boaters on the St. Lawrence at a little over 500,000 people, we have a rough idea of the magnitude of the potential impact.

Cargo residues

Ore, grain and other bulk materials are loaded into the holds of cargo vessels. When a ship changes the type of cargo, the holds are cleaned, meaning that they are swept and washed with water to avoid possible cross-cargo contamination. In some circumstances, it is permissible to discharge the hold sweepings and wash water into the sea. No data exist concerning the quantitative significance of this practice on the St. Lawrence, but the toxicity level of certain materials and the disruption of wildlife habitats by the accumulation of deposits have impelled the public authorities to regulate this practice to mitigate its impacts. Interim guidelines for this purpose have been issued by Transport Canada for unregulated substances that do not have dangerous chemical properties and for which the principal effect on the aquatic environment is to form deposits on sea beds. However, the recommended option is to dispose of the residues in land collection units.

REDUCE THE RISKS OF INTRODUCTION OF EXOTIC ORGANISMS BY BALLAST WATER FOR ALL TYPES OF SHIPS

The use of water as ballast by ships has contributed to make marine transportation one of the main vectors for dissemination of aquatic organisms on the planet. The International Maritime Organization (IMO) qualified this dissemination as one of the four greatest threats to which the world's oceans were exposed.

Three to five billion tons of ballast water are carried annually between countries and a similar quantity is transported by local and regional traffic. This means that about 7,000 species, including human pathogens, are potentially displaced in this manner.

The ecological and economic costs of this dissemination are considerable. The case of the zebra mussel is noteworthy in this regard. Canada spent between $70 million and $120 million between 1989 and 1995 to control this invasion and the damage it caused to infrastructures. On the American side of the border, control measures have required expenditures of over US$ 1 billion since 1989, and it is forecast that repairing the damage caused to infrastructures will cost around US$ 100 million in the years ahead.

Voluntary Guidelines for the Control of Ballast Water Discharges from Ships Proceeding to the St. Lawrence River and Great Lakes were adopted in 1989, in cooperation with the shipping industry. They were replaced in 2000 with Guidelines for the Control of Ballast Water Discharges from Ships in Canadian Waters. The enforcement of these guidelines remains voluntary, but their application now extends to all Canadian waters. Regulations are currently being drafted for the purpose of harmonization with the American authorities, who already subject ships bound for the Great Lakes to compulsory measures.

COLLABORATION OF RIVERSIDE COMMUNITIES IN THE EVENT OF HAZARDOUS PRODUCT SPILLS AND OPTIMIZATION OF RESPONSE METHODS IN THE EVENT OF OIL SPILLS

Thanks to the various measures put in place, the St. Lawrence has been relatively spared by major spills in terms of the number of tons spilled over the past ten years. The latest major spill occurred at Havre Saint-Pierre in 1999 and came from a ship traveling in inland waters. A strong gust of wind struck the ship, which banged into the pier, cracking the hull and releasing about 49 tons of heavy oil (Ship-source Oil Pollution Fund, 2002). Recovery of the oil took several months under difficult conditions, since the shores were still covered with ice.

The other major spills occurred in the 1980s (Table 2).

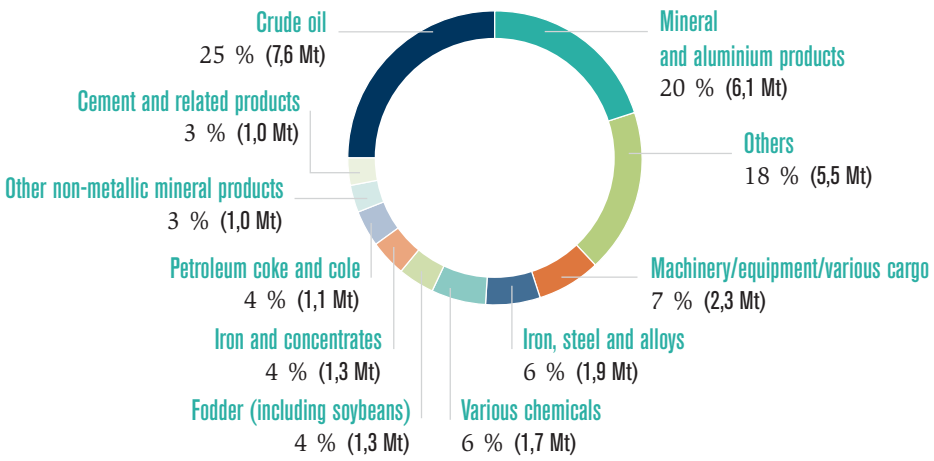
Table 2 | *Major Spills on the St. Lawrence in the 1980s*

Ship	Year	Location	Tons spilled
Rio Orinocco	1990	Island of Anticosti	260 t
Czantoria	1988	Saint-Romuald	100 to 400 t
Barge *Pointe Levy*	1985	Matane	200 t

Source: DFO – CG, 2002

According to the Brander-Smith Report (1990), based on the density of marine traffic and a recurring statistical probability, it is estimated that a catastrophic spill (> 10,000 t) could occur every 15 years. Even though international conventions and national regulations increasingly regulate marine activities, the risk of such an incident still remains present on the St. Lawrence. The types of cargo transported (Figure 3) and the volume of ship propulsion fuel explain this risk.

Figure 3 | *International Freight Unloaded in Quebec, Top Ten Commodities, 2000*



Source: Statistics Canada, compilation by DFO

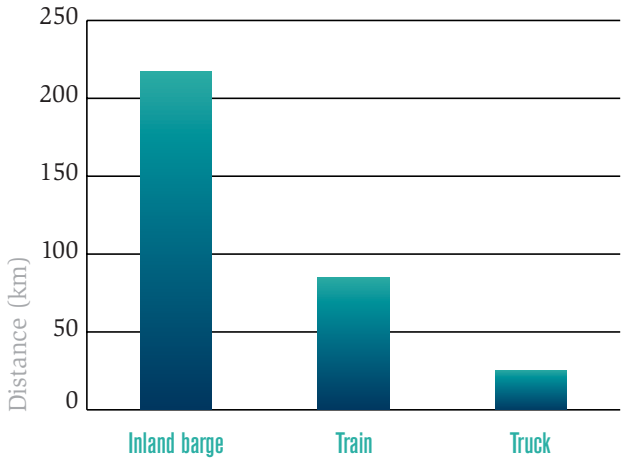
Preparedness efforts for emergency response in the event of a spill, including training of duly qualified personnel, availability of recovery equipment, and communications, must be constantly renewed. In this regard, a well-supervised participation of riverside communities in cleanup operations should be further investigated. Manual cleanup still seems to be the most appropriate method for recovery of oil spillage on beaches without damaging the underlying soil and habitats. However, this method assumes access to a large workforce, making it necessary to rely on rapidly available trained volunteers.

DEVELOPMENT OF MARINE TRANSPORTATION IN RELATION TO ITS ENVIRONMENTAL AND SOCIAL BENEFITS

The issues discussed above made it possible to pinpoint some actual or potential environmental pressures related to navigation activities on the St. Lawrence ecosystems. However, marine transportation does not only involve negative aspects regarding the environment. A brief comparison with other modes of transportation highlights its advantages.

Although standard units of comparison are unavailable, it appears that, in general, marine transportation is the most energy efficient mode of transportation (Figure 4).

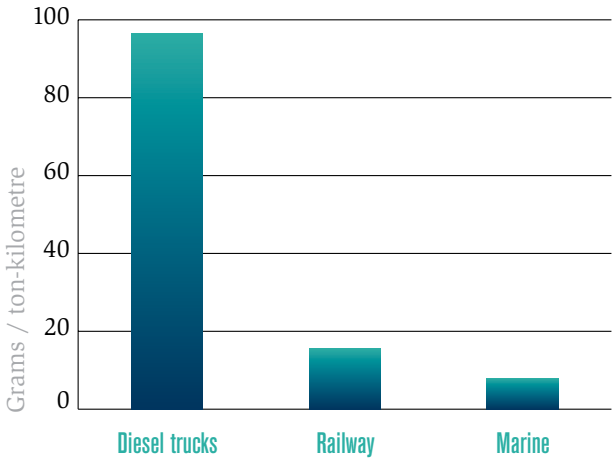
Figure 4 | *Distance Travelled by One Ton of Cargo on One Litre of Fuel*



Source : U.S. DOT, 2002

This energy advantage is primarily based on the load capacity of ships. An inland barge can carry 15 times more freight than a railway car and 60 times more than a truck. Consequently, the quantities of atmospheric pollutants emitted by maritime transportation, including greenhouse gases, are less than those produced by other modes when expressed in kilometre tons (Figure 5).

Figure 5 | *Greenhouse Gas (GHG) Emissions Related to Freight Transportation per Kilometre-Ton, by Mode, 1997*



Source: Transportation climate change table, 1999

Marine transportation also becomes a leading alternative solution, when it is possible to use it, to achieve the objectives of the Kyoto Protocol, especially for the gases targeted in this agreement (Table 3).

Table 3 | *Atmospheric Emission Coefficients of Three Modes of Transportation, in Grams per Kilometre-Ton*

Pollutant	Truck	Train	Ship
CO	0.25 - 2.4	0.02 - 0.15	0.018 - 0.20
CO_2	127 - 451	41 - 102	30 - 40
HC	0.3 - 1.57	0.01 - 0.07	0.04 - 0.08
NO_X	1.85 - 5.65	0.2 - 1.01	0.26 - 0.58
SO_2	0.10 - 0.43	0.07 - 0.18	0.02 - 0.05
Particles	0.04 - 0.90	0.01 - 0.08	0.02 - 0.04
VOC*	1.1	0.08	0.04 - 0.1

Source: OECD, 1997

* volatile organic compounds

However, the growth forecasts for this sector of activity are not the best and, contrary to what is anticipated worldwide, marine transportation activities should decline in Canada up to 2020 (Table 4). This is why it is important to implement coherent transportation policies relative to environmental aspirations and sustainable development objectives.

Table 4 | *Forecast Variation of Freight Transportation Activities by Mode in Canada (millions of km-tons)*

	1990	1995	2010	2020	Variation 1990-2020 *(%)*
Trucking	149,000	180,000	240,000	289,000	94
Air	544.5	584.8	859.5	1,111	104
Railway	250,100	282,400	342,800	390,000	56
Marine	50,900	42,500	42,500	42,500	-16.5
Total	**450,544.5**	**505,484.8**	**626,159.5**	**722,611**	**60**

Source: Transportation climate change table, 1999

Conclusion

The Sustainable Navigation Strategy proposes a balanced approach between reduction of environmental impacts and development of the positive aspects of this mode of transportation. It serves as a first structured intervention framework for navigation on the St. Lawrence, oriented both to compliance with the imperatives of sustainable development and a more harmonious sharing of resources among the users.

For the purpose of reinforcing its bases and fostering its appropriation by the various stakeholders, the strategy is based on a series of guiding principles and principles of application that are meant to serve as a reference for administrators, managers and project managers when they have to intervene on matters relating to the navigation field. To complement this, a strategic action plan oriented to the remediation or mitigation of commercial or recreational navigation practices has been drafted and constitutes the first phase for implementation of this strategy. Even though a substantial part of implementation depends on the commitment of the various levels of government, it remains that its continuous updating, which garantees its sustainability, is based on the close cooperation and involvement of the stakeholders.

The initial group in charge of the implementation of this strategy will be the current members of the Navigation Consensus Building Committee. However, an expansion to a more diversified pool of stakeholders is among the objectives to be achieved. Within a perspective of continuous improvement and in accordance with the principles of application adopted, the members will keep each other informed on everything concerning navigation activities on the St. Lawrence. This watchfulness regarding emerging environmental, technological and regulatory considerations will make it possible to integrate the new discoveries and decisions into the strategy and will ensure its updating.

The fulfillment of the strategy depends on consensus building, but also on a form of moral commitment by the stakeholders, and its continuation beyond the initial action plan (2004-2009) will depend on the interest and commitment of the parties concerned. The Strategy's main objectives are to offer to the commercial and recreational navigation community a set of objectives, which will ensure that the environmental impacts associated with their activities are reduced, and to foster the development of marine transportation by enhancing its environmental and social advantages. A commitment by the stakeholders in the navigation community and the riverside communities to compliance with the imperatives of environmental, social and economic sustainability will then contribute to the sustainability of the St. Lawrence ecosystems.

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Synthesis of the 2004-2009 Action plan

CONSENSUS BUILDING

Targeted results

- Coordination of the implementation of the Sustainable Navigation Strategy is assured.
- Preservation of consensus building with regular review of the mode of operation and integration of stakeholders depending on the issues.
- Involvement of community stakeholders according to the targeted issues.

Activities

- Assure administrative and financial monitoring of the various projects.
- Create and coordinate the working groups and ensure the performance of studies and other work.
- Propose new projects and funding sources (*ad hoc*).
- Ensure the dissemination and exchange of information among the navigation stakeholders.
- Design communication and awareness mechanisms to reach effectively all of the stakeholders concerned about navigation activities.

INTEGRATED MANAGEMENT OF DREDGING

Targeted results

- Improvement of the planning mechanisms for maintenance and capital dredging activities, and sediment disposal activities, in cooperation with stakeholders in the field.
- Improvement of the consensus building within the context of the dredging project planning and authorization process.
- Reduction of the scientific uncertainties regardind and sediment disposal.

Activities

- Set up the management structure (planning, environmental assessment, research and development).
- Prioritize and implement the recommendations of the Working Group on the Integrated Management of Dredging and Sediments (see the orientation document on integrated management of dredging on the St. Lawrence, 2003).

ADAPTATION OPTIONS

Targeted results

- Reduction of the effects of water level fluctuations on the St. Lawrence for commercial and recreational navigation activities, and short and long cruises.
- Documentation on adaptation options that are economically and environmentally reasonable for the St. Lawrence.

Activities

Commercial navigation and long cruises

- Produce adaptation scenarios that exclude a physical modification of the river and others that include it, to ensure cargo transportation.
- Improve the models for predicting the water level usable for commercial shipping.
- Study the possibility of reorganizing marine transportation, intermodality and port collaboration, in a context of low water levels and competitiveness.
- Evaluate the possibilities of capital dredging at certain strategic points in the navigation channel.
- Ensure consensus validation of the results by the Committee members.

Recreation navigation and short cruises

- Ensure follow-up of the studies of the International Joint Commission regarding this sector.
- Support the development of a common position on water needs for the St. Lawrence.
- Ensure integration of the problem of water levels into integrated management of dredging.

IMPACT OF THE WAKE PRODUCED BY SHIPS AND OTHER CRAFT

Targeted results

- The environmental effectiveness of the voluntary speed reduction measure for commercial shipping is reviewed.
- Knowledge of the impact of erosion attributable to pleasure craft is improved.

Activities

- Continue environmental monitoring of the voluntary speed reduction measure for commercial shipping.
- Maintain the current speed reduction measure in the Sorel Archipelago–Varennes sector;
- Document the impact of pleasure craft on shoreline erosion.
- Document the impact of the wake produced by ships on human safety.
- Provide recreational boaters with awareness tools.

SEWAGE AND CARGO RESIDUE MANAGEMENT

Targeted results

- More environmentally-friendly management of bulk cargo residues of ships.
- Better control of sewage discharges of all types of ships and craft.

Activities

- Inventory polluting materials and collection and treatment systems.
- Draft and implement control procedures.
- Harmonize management of discharges of sewage and cargo residues with Great Lakes practices.

INTRODUCTION OF EXOTIC SPECIES

Targeted result

- The risks of introduction of exotic organisms are significantly reduced for all types of ships.

Activities

- Enforce the current guidelines;
- Increase awareness of recreational boaters and the shipping industry to the problem of dissemination.
- Monitor the effectiveness of ballast water exchange in port areas;
- Establish a decision help model for exchanges in the alternative exchange zone (Laurentian Channel).
- Monitor the effectiveness of other control methods.

HAZARDOUS PRODUCT SPILLS

Targeted results

- Cooperation from riverside communities increases, under the supervision of emergency response specialists, to mitigate damage caused by spills.
- Support is obtained from the public authorities concerned to develop training programs for volunteers.
- Environmental knowledge of spilled products is improved to reduce health risks.

Activities

- Ensure adequate training, in accordance with occupational health and safety standards, for riverside communities.
- Offer the communities a forum to establish emergency response priorities.
- Increase the riverside municipalities' awareness of the risk factor represented by a marine spill and the importance of adopting an emergency plan.
- Improve winter emergency response methods.
- Verify the applicability of burning as an emergency response method on the St. Lawrence.
- Document the residual risks relating to consumption of resources after a spill.
- Support and promote the preventive measures in force to all stakeholders in the navigation field.

DEVELOPMENT OF MARINE TRANSPORTATION

Targeted result

- Reliance on marine transportation is optimized in situations in which it offers more environmental gains.

Activitiy

- Make decision-makers and stakeholders aware of the environmental benefits of marine transportation.

Sustainable Navigation Strategy

FOR THE ST. LAWRENCE

The Sustainable Navigation Strategy is intended as a contribution to the development of navigation, in its multiple aspects, in compliance with the environmental conditions of the St. Lawrence. Based on the sustainable development principles, the strategy has been drawn up by the Navigation Consensus Building Committee of the St. Lawrence Action Plan. It represents a first systematic attempt to orient the management of all navigation activities, taking into account their economic, environmental and social impacts.

Montréal Port Authority
St. Lawrence Shipowners Association
Corporation des pilotes du Saint-Laurent central
Environnement Canada
Environnement Québec
Fédération de Voile du Québec
Shipping Federation of Canada
Canadian Auxiliary Coast Guard
Les Amis de la vallée du Saint-Laurent
Fisheries and Oceans Canada
Ressources naturelles, faune et parcs Québec
St. Lawrence Economic Development Council
Société d'initiative et de conservation du Bas-Richelieu
Stratégies Saint-Laurent
Transport Canada
Transports Québec