

Diagram of the major components of the Saguenay–St. Lawrence Marine Park ecosystems, the main ecological processes and sources of pressure



Saguenay–St. Lawrence Marine Park



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The Saguenay–St. Lawrence Marine Park : rich and coveted ecosystems

A marine park: The Saguenay–St. Lawrence Marine Park was created in recognition of the exceptional importance of its ecosystems. The Park covers an area of 1,246 km² that is composed of the water column as well as the underlying seafloor up to the mean high-tide mark.

Two water courses: Located at the heart of the Marine Park, the confluence of the Saguenay and St. Lawrence rivers is very rich yet it also bears the impact of human activities (1). The upwelling of coldwater (2) promotes the development of marine life and the accumulation of forage species.

Three ecosystems: The Marine Park is made up of three tightly connected ecosystems, each with its own distinct biological and physical characteristics : the Upper St. Lawrence Estuary (3) (53 percent of the Marine Park surface area), the Lower St. Lawrence Estuary (4) (30 percent of the Marine Park surface area) and the Saguenay Fjord (5) (17 percent of the Marine Park Surface Area).

Millennia of human presence: Indigenous people have used this territory for over 8,000 years. The arrival of Europeans led to the intensive use of resources and an ensuing modification and pollution of the St. Lawrence and its tributaries. Protection and restoration measures have been initiated over the past 30 years. Representatives from coastal and scientific communities are currently working together for the conservation, education and discovery of the Marine Park, as well as other protected areas of the region, such as the Parc National du Saguenay.

One million visitors: The Marine Park offers a host of recreational and discovery experiences to coastal residents and visitors alike. About one million people visit the Marine Park and the many sites located in its co-ordination area every year.

The Saguenay Fjord : a unique environment

The components of the ecosystem

- The freshwater flow of the vast Saguenay watershed is highly regulated by dams.
- A thin layer of freshwater and brackish water (10-20 m) flows along the surface, while an enormous mass of cold saltwater, representing 93 percent of the water in the Fjord which originates from the Lower St. Lawrence Estuary, flows below.
- The Saguenay Fjord, which at its deepest is 275 m, is divided into three basins that are partially isolated by sills.
- Its steep, rocky shores are interrupted by bays with grassy patches.
- The spawning grounds of small forage fish that play a key role in the ecosystem, such as smelt and capelin, are situated near an urbanized and industrialized zone upstream of the Marine Park.

Ecological processes

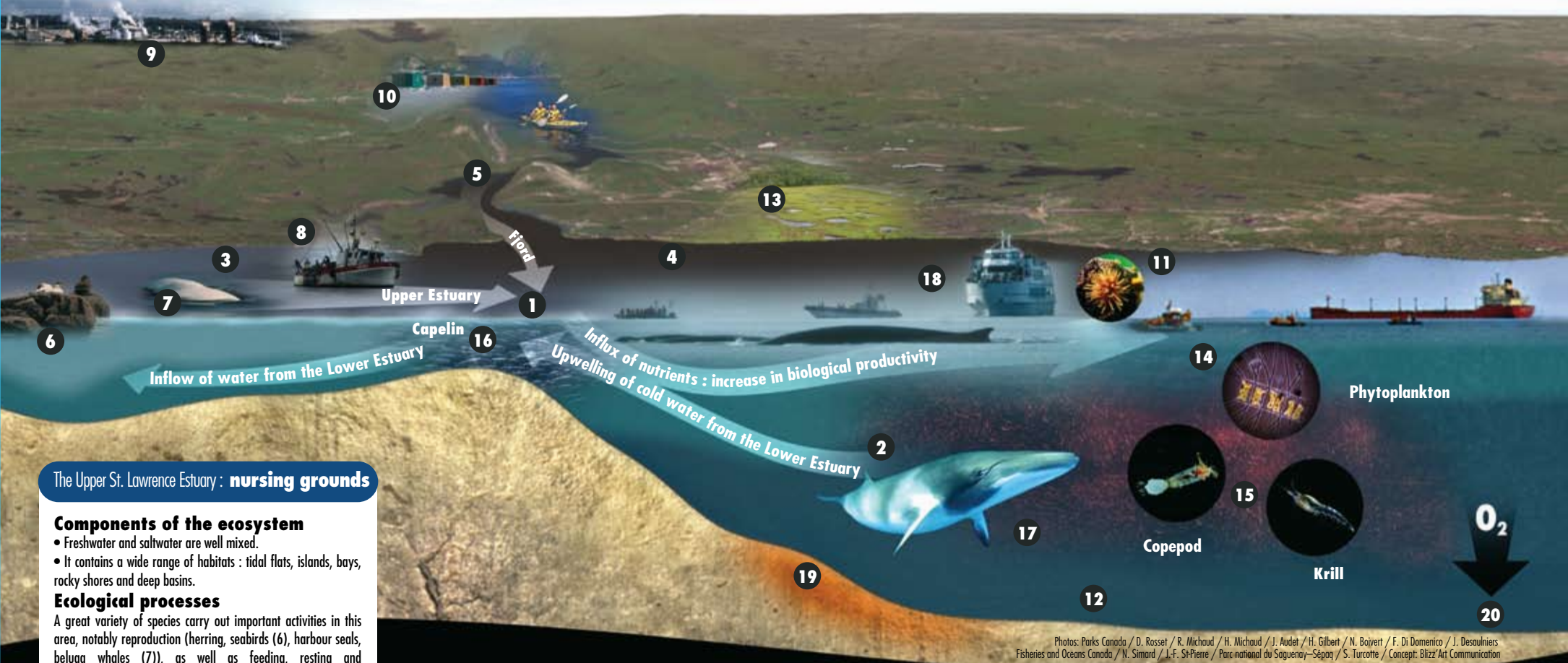
- Biologically speaking, the Fjord is not especially productive. However, it does benefit from the bounty of the Lower St. Lawrence Estuary through the intrusion of cold, salty, well-oxygenated and plankton-laden water (2).

• The shape of the Fjord's basins facilitates the accumulation of chemical contaminants in the sediment.

• Recent studies indicate that the internal recruitment of groundfish, such as cod and deepwater redfish, is weak or nonexistent. These fish probably migrated into the Fjord from the St. Lawrence where populations have since been over-fished.

Sources of pressure

- Wastewater runoff and atmospheric fallout from urban and industrialized areas situated upstream are sources of chemical contamination (9).
- The accumulation of new, less-contaminated sediment impedes the recirculation of the more contaminated toxic sediment built up over the past decades.
- Contamination by faecal coliforms from wastewater limits recreational clam harvesting.
- While commercial fishing is not permitted, sport fishing for groundfish and anadromous fish is a major contributing factor in the decline of these populations (10).



The Upper St. Lawrence Estuary : nursing grounds

Components of the ecosystem

- Freshwater and saltwater are well mixed.
- It contains a wide range of habitats : tidal flats, islands, bays, rocky shores and deep basins.

Ecological processes

A great variety of species carry out important activities in this area, notably reproduction (herring, seabirds (6), harbour seals, beluga whales (7)), as well as feeding, resting and over-wintering.

Sources of pressure

- Faecal coliform contamination from wastewater and seabird colonies limits recreational clam harvesting.
- Only slightly affected by the accumulation of chemical contaminants due to strong currents, with the exception of waters near wharves.
- Boat traffic, made up in part of pleasure boaters and tour vessels, can disturb nurturing periods for birds, seals and beluga whales.
- Sport fishing for smelt and the hunting of migratory birds species are common local activities.
- The intensive commercial harvesting (8) of invertebrate species (clams and sea urchins) takes place near the Alouettes tidal flats, a portion of the Marine Park with a very high level of biodiversity.

The Lower St. Lawrence Estuary : a food pantry

Components of the ecosystem

- In summer the water column is divided into three layers. However, in winter, only two layers are distinguished by differences in temperature and salinity.
- The north shore is mainly rocky with several muddy deposits that are subject to erosion.
- The rocky bottom is home to exceptionally beautiful underwater fauna and flora (11).
- The deep underwater valley of the Laurentian Channel (12) enables water from the Atlantic Ocean to flow into the heart of the Marine Park.
- The most extensive salt marshes of the Marine Park are situated in Les Bergeronnes (13).

Ecological processes

- The upwelling of cold saltwater at the head of the Laurentian Channel (2) has a major influence on the ecological conditions of the region; it promotes biological productivity (14) (phytoplankton) and the accumulation of prey (zooplankton (15) and small fish (16)).

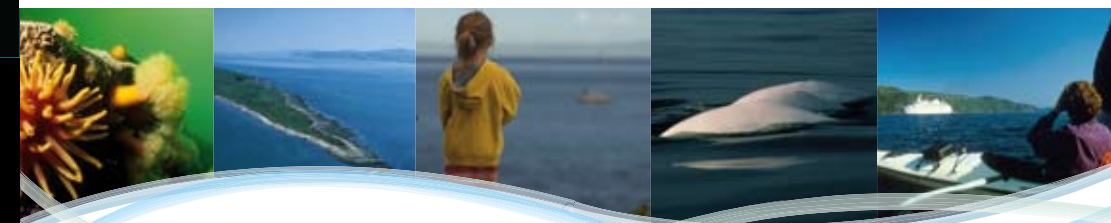
• Fish, whales, seals and birds converge in the Marine Park to feed (17) on zooplankton (copepods, krill) and small fish (capelin).

Sources of pressure

- Dense and heavy boat traffic (18) is focused mainly on observing marine mammals that use the area as a feeding ground.
- The head of the Laurentian Channel is an area where chemical contaminants from further upstream tend to accumulate (19).
- Faecal coliform contamination from wastewater and seabird colonies limits recreational clam harvesting.
- Nutrient leaching from agriculture, deforestation and wastewater in the St. Lawrence watershed contributes to lowering oxygen levels in the deep waters of the downstream portion of the Marine Park (20).
- Recreational harvesting includes migratory bird hunting, sealing, clam harvesting and fishing.
- Commercial fishing targets several species: clams, crab, turbot, scallops, whelks and seals.

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Summary of the State of the Saguenay–St. Lawrence Marine Park Report 2007



Summary of the State of the Saguenay–St. Lawrence Marine Park Report 2007

The Saguenay-St. Lawrence Marine Park was created in 1998 after several years of public support, consultations and negotiations. Managed jointly by the governments of Canada and Quebec with the participation of coastal communities, it is part of both the network of National Marine Conservation Areas (NMCA) and of Quebec's provincial parks system.









The establishment of the Marine Park is a tribute to the remarkable significance of its territory. This dynamic marine environment depends not only on phenomena occurring within, but also beyond, its boundaries. In much the same way, close collaboration between various ministries, user groups and coastal communities is essential to the healthy management of this territory.

After a decade of existence, it became necessary to evaluate the state of the Marine Park to guide future actions aimed at attaining its objectives. The present document highlights the main results of this evaluation, which can also be found in a complete form in the State of the Saguenay–St. Lawrence Marine Park Report 2007.

The analysis presented in this report was guided by the Marine Park's objective to enhance the level of protection of representative portions of the Saguenay Fjord and St. Lawrence Estuary ecosystems for conservation purposes for present and future generations, while encouraging its use for educational, recreational and scientific purposes. The evaluation encompasses the co-ordination area of the Park and covers the years 1995—year the management plan was tabled—to 2007. An integrated multi-disciplinary approach was required to put together a representative portrait of the state of the Marine Park and progress achieved since its establishment. In keeping with this approach, this first report assesses information from key topics divided into six chapters. Summary results are presented below.

Evaluation method for indicators and measures

The state of each of the key topics was evaluated using indicators derived from several variables called measures. Where sufficient knowledge permitted, trends of the indicators or measures were also evaluated.

Codes and symbols used to represent the states and trends of measures and indicators			
State of measures and indicators		Trend in measures and indicators	
	Good		Improving
	Fair		Deteriorating
	Poor or altered		Stable
	Unknown		Unknown

Summary results

1. State of governance and socio-economic characteristics



Governance indicator

Given that the success of marine protected areas requires the support of local communities, of users and of government, good governance is fundamental. The foundations of Saguenay-St. Lawrence Marine Park governance have been progressively implemented in collaboration with stakeholders since 1995. The co-ordinating committee provides a privileged forum for securing the participation of regional stakeholders in the Marine Park's management. The overall state of governance is considered good and stable. Closer collaboration with other departments, both at the federal and provincial levels, must be developed to tackle key Marine Park issues that fall under governmental jurisdiction (e.g., fisheries management, habitat protection and the reduction of contaminants). Users must adopt the Marine Park as their own and participate to a greater extent in attaining its objectives.

¹ *The co-ordination area includes the territories of seven municipal regional counties that border on the Marine Park. The co-ordination committee is composed of coastal community representatives and of representatives from the fields of education and science.*



Socio-economic indicators

The Marine Park and surrounding area is very dynamic in terms of tourism development, generating economic spin-offs estimated at \$204 million. The benefits of commercial and recreational harvesting activities, specifically fishing and hunting, have yet to be evaluated.

2. State of marine ecosystems, biodiversity, the coastal environment and watersheds

The main objective of the Marine Park as stated in its mandate, to enhance the protection of ecosystems (see diagram on back), has not yet been reached. The St. Lawrence has been developed, modified and polluted over the course of the past few centuries. Protection and restoration measures have only been initiated in the past 30 years or so. Developing protection measures requires considerable time and effort. Indicators must be identified in order to monitor the state of ecosystems and the effectiveness of management decisions.



State of the Upper St. Lawrence Estuary

This portion of the Marine Park makes up 53 percent of its total surface area. Yet, it is the least known portion of the Marine Park, which makes it difficult to evaluate its state. It includes sensitive habitat, such as spawning and nursing grounds that are vital for the renewal of populations like that of the beluga whale. Reproduction and feeding areas will have to be monitored in order to evaluate the state of this ecosystem for the species that depend on them.



State of the Lower St. Lawrence Estuary

Making up 30 percent of the Marine Park surface area, the Lower Estuary is judged to be fair and stable for several reasons. First of all, the sedimentation of persistent contaminants that flow down from the Great Lakes and St. Lawrence watersheds has a major impact on the ecosystem. Furthermore, oxygen depletion in the deep waters of the easternmost portion of the Marine Park may represent a barrier to circulation of mobile bottom-dwelling animals or to the development of benthic species. Finally, variations in the abundance of zooplankton and other species could have an influence on the number of marine mammals that migrate into the area to feed. Monitoring of forage species should be undertaken.



State of the Saguenay Fjord

The portion of the Saguenay Fjord included in the Marine Park represents 17 percent of the surface of the protected area. The state of the Fjord is considered fair and deteriorating due to the precarious situation of groundfish populations. Moreover, although some contaminants that were problematical in the past have been covered over by fresh sediment, new contaminants have since been deposited into the Fjord.



State of biodiversity

The state of populations of species at risk and the growing threats to their recovery are sources of concern. The Marine Park includes important habitat for a dozen species at risk. The area covered by the Marine Park is especially vital to the beluga whale and Barrow's goldeneye. Although the Marine Park was initially created for the purpose of protecting the beluga whale, this population is not showing signs of increase, yet remains stable, despite numerous efforts to reduce pollution in the St. Lawrence and the existence of a beluga whale recovery plan since 1995. Ever-increasing boat traffic is one source of concern, along with the presence of persistent contaminants in the beluga whales. None of the beluga whale's intensive use areas have been specifically protected; though projects that are on the way will soon correct this situation.



The state of coastal habitats and watersheds

The state of health of the Marine Park's ecosystems is intimately connected to human activities occurring in coastal areas and surrounding watersheds. The state of coastal habitats and watersheds is fair due to shoreline erosion, the use of rocks to prevent erosion and coastal development.

3. State ecologically sustainable use

The creation of the Marine Park led to the necessity of managing the activities that influence its state. As a result, management tools adapted to a marine protected area and the fulfilment of its objectives are required. Indicators of ecologically sustainable use are designed to assess the effectiveness of management tools in achieving Marine Park goals.



Management of non-consumptive marine activities

The state of the management of non-consumptive activities is considered to be fair owing to the increase in vessel traffic, which could affect the state of the Marine Park in several ways. Motorized vessel traffic has been evaluated at 91,000 transits per year, half of which are ferry crossings. In addition there are approximately 60,000 kayak visit-days. Although improve-

ments have been noted, anticipated results of the management of these activities have not been achieved.



Management of harvesting activities

Management of harvesting activities is considered poor due to the fact that it does not take into account the concept of ecologically sustainable use. This concept must be applied to a marine protected area. A significant decline in groundfish populations has been noted in the Saguenay Fjord since 1999. Furthermore, commercial harvesting activities have been developed in recent years without the requisite knowledge of the state of populations or the impact of this activity on ecosystems. Fisheries and Marine Park managers have launched a process to define model fishing principles within the protected area.

4. State of landscapes and cultural heritage



The Marine Park area is known for its beautiful landscapes. Several peripheral protected areas, such as the Parc National du Saguenay, contribute to the preservation of landscapes and of marine ecosystems. Despite these efforts, the state of this indicator is fair because a number of cultural components and key ecosystems are not protected in the areas around the Marine Park.

5. State of visitor experiences



The Marine Park region offers visitors and coastal residents the opportunity to live a wide range of recreational and discovery experiences. These experiences foster a greater sense of belonging and develop a culture of conservation. The number of visits to the co-ordination area was estimated at over one million in 2005. On the whole, the state of visitor experiences is considered to be good due to the fact that Marine Park services and activities are integrated with the well-established regional tourist industry. A 2005 visitor use and satisfaction study shows that 76 percent of visitors knew they were in a protected area when visiting the Marine Park.

6. State of education and public awareness



A public awareness and education program aimed at the general public and stakeholders is essential to achieve the Marine Park's objectives. The state of this indicator is fair, but improving as education and public awareness programs are being developed. However, the planning of these types of activities is more opportunistic than strategic. There is presently no way of knowing if educational and communication actions are fostering enhanced support for the Marine Park on behalf of visitors and coastal residents.

In conclusion

The analysis of the state of the Saguenay-St. Lawrence Marine Park made it possible to compile information, highlight achievements, draw attention to priority issues and identify knowledge gaps that need to be filled in order to ensure more effective monitoring of the Marine Park. Information contained in this report should foster a common vision to direct future efforts to effectively achieve Marine Park objectives.

To learn more about the Marine Park, we invite you to contact us or consult the following Web Sites: **www.marinepark.qc.ca**

Parks Canada Saguenay-St. Lawrence Marine Park 182, rue de l'Église, P.O. Box 220 Tadoussac, (Quebec) G0T 2A0 Telephone: 418 235-4703 ext. 0 <i>www.pc.qc.ca</i>	Parcs Québec Parc national du Saguenay 91, rue Notre-Dame Rivière-Éternité (Quebec) G0V 1P0 Telephone: 418 272-1509 ext. 0 <i>www.parcsquebec.com</i>
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To learn more about the state of the St. Lawrence and its species at risk, consult the following sites:

Whales Online: *www.wbales-online.net*

Saint-Laurent Vision 2000: *www.sl.v2000.qc.ca*

St. Lawrence Observatory: *www.osl.gc.ca*

Species at Risk Public Registry: *www.sararegistry.gc.ca*

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