Freshwater Wetlands
Third Edition

Background

Wetlands—ecosystems that occur where water meets land—are found along the entire length of the St. Lawrence River. They are unique, diversified areas, long recognized for the plant and animal habitat they provide. More recently, they have been recognized as providing other major ecosystem functions and services, including flood storage, erosion protection, and improvement of water and aquatic ecosystem quality.

Over the years, the wetlands of the St. Lawrence River watershed, as in many other parts of the world, have sustained substantial losses. Today’s wetlands are a pale shadow of those of the past. Although the previous edition of this fact sheet (Jean et al., 2005) showed a slowing of the rate of wetland loss, vegetation changes appear to indicate degradation, with implications beyond the mere size of wetlands.

To date, the primary indicator of wetland status has focused on wetland size alone. However, significant temporary changes can occur in estimates of wetland area, resulting primarily from water level fluctuations in the St. Lawrence River.
The indicator has been modified to provide a more comprehensive picture of the presence and status of wetlands. It consists of four aspects:

- the net balance resulting from direct anthropogenic pressure on size;
- internal wetland dynamics;
- wetland habitat diversity; and
- the protection of wetlands from external stressors.

See Figure 1 and the Key measures section for the description of the variables and their evaluation criteria.

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Wetlands in poor condition are subject to significant direct anthropogenic pressures, evolve towards drier conditions, are not highly diversified and are not surrounded by a sufficient buffer strip composed of natural terrestrial vegetation to protect their ecological functions.

Wetlands in good condition are subject to little or no direct anthropogenic pressure, alternate between drying and wetting phases, are diversified, and are surrounded by a buffer strip composed of natural terrestrial vegetation that protects their ecological functions.

**Overview of the situation**

The overall status of the wetlands in the two sectors is fair to good, and the overall temporal trend is stable.

**Boucherville Islands sector**

The status of the wetlands in the Boucherville Islands sector is fair to good, and the temporal trend is stable.

**Direct anthropogenic pressures** on the area between 2002 and 2010 are described as good, with a zero net gain or loss of wetlands, i.e., no lasting net loss or gain of wetlands caused by direct human activity has been observed. The area of wetlands was estimated at 541 ha in 2002 and 405 ha in 2010 (Figure 2). The 136-ha loss is the result of a decline in water levels between the two dates, which caused a significant decline in the area of shallow waters (following the terminology proposed by the National...
The temporal trend in direct anthropogenic pressures in the Boucherville Islands sector since 1990 is described as stable. Although there has been no lasting net loss or gain between 2002 and 2010, the 55 ha of wetlands lost between 1990 and 2002 have not been restored.

The internal dynamics of the wetlands in the Boucherville Islands sector between 2002 and 2010 are considered moderate. The area of wetlands that has dried up is three times larger than the area that has become more wet (Figure 3). The transition from low marsh to high marsh is the most important internal change in wetlands (64 ha), and has been observed in the Boucherville Islands, around the Tailhandier Flats and more specifically along Chenal du Courant.

The internal dynamics of the wetlands shows a deteriorating trend. Internal changes since the late 1970s (Figure 3) show three successive periods of drying and the absence of periods of wetting.

The diversity of wetland habitats in the Boucherville Islands sector in 2010 is classified as moderate. High marshes account for over half of the total area of wetlands in the sector, while no shrub swamps were detected (Figure 4).
The temporal change in the diversity of wetland habitats is stable in this sector of the St. Lawrence River, as all wetland status values obtained since 1990 are classified as intermediate (Figure 4). The temporal trend shows a slight increase in the disparity between wetland classes, with a gradual decline in shallow water and low marshes in favour of open water or high marshes.

**Figure 4  Diversity of wetland habitats in the Boucherville Islands sector**

The protection of wetlands from external stressors in 2010 in the Boucherville Islands sector is considered good. In 2010, a buffer zone was present around 76% of the wetland perimeters in this section of the St. Lawrence River (see example of part of the sector in Figure 5). At 47%, herbaceous plants occupy the largest proportion of the buffer zone. In contrast, 19% of the wetlands perimeter is adjacent to urban areas, especially along the shoreline of the Island of Montréal and the City of Boucherville, as well as certain sectors of the Charron and Sainte-Marguerite islands.

The temporal trend in the protection of the wetlands against external stressors is improving in the Boucherville Island sector. The natural buffer zone has increased since 1990 (Figure 6).

**Figure 5  Examples of buffer zones protecting wetlands from external stressors**

**Lake Saint-Pierre sector**

The status of the wetlands in the Lake Saint-Pierre sector is fair to good, and the temporal trend is stable.

**Direct anthropogenic pressure** on Lake Saint-Pierre between 2002 and 2010 was low, such that the status of the wetlands is classified as good. The net balance shows an increase of 64 ha of wetlands between 2002 and 2010. This gain is associated partly with the formation of 101 ha of wetlands in wildlife developments on Île Dupas and at Saint-Barthélemy, Baie-du-Febvre and Nicolet (Figure 7). In addition, an island formed in the Saint-François River, off Notre-Dame-de-Pierreville, and a delta expanded towards the confluence of the Saint-François and Yamaska rivers. All of these gains were made at the expense of open water and consist primarily of low marshes (71 ha) and shallow water (18 ha). In contrast, 37 ha of wetlands were lost to agriculture, distributed in 7 pockets on the south shore of the lake, near Sainte-Anne-de-Sorel, on the south shore of Île du Moine, south of Saint-François Bay, on Île de Grâce and on Île Saint-Ignace. These losses are largely associated with the use of high marshes for agricultural purposes (28 ha).
Since 1990, the temporal trend in direct anthropogenic pressure in this sector has been stable. The creation and development of wildlife habitat around Lake Saint-Pierre contribute to reducing anthropogenic stresses. However, it remains that the net gain observed does not compensate for the loss of 789 ha recorded between 1990 and 2002.

**The internal dynamics of the wetlands** of Lake Saint-Pierre between 2002 and 2010 are classified as moderate. A slight drying of wetlands was observed during that period (Figure 8). The area of wetlands that became drier was less than twice the area that became wetter. As in the case of the Boucherville Islands sector, the transition from low marshes to high marshes is the most significant change observed. In this case, a larger area, i.e., an estimated 1000 ha, was affected along the shores and in the main bays.

The temporal trend in the internal dynamics of the wetlands is stable, due to alternating low levels of drying and wetting. Since the late 1970s, there has been a moderate period of wetlands wetting, followed by two relatively good periods of drying (Figure 8).
Outlook

Wetlands are complex ecosystems, studied by many stakeholders within their respective areas of interest. One of the best ways to take account of these diverse interests is to assess complementary aspects of the status of the wetlands. It is desirable to maintain and expand the state of knowledge in order to provide an accurate and useful picture for interested stakeholders.

Despite the advantages of using indices to assess the status of the wetlands, such an approach has its limitations. First, the choice of aspects to be monitored is critical to accurately identifying the environmental issues at play. Second, it is also important to identify indices for the aspects selected that clearly reflect them. Last, evaluation criteria corresponding to each of these indices must be carefully selected in order to accurately determine wetland status and changes. Discussions with the various stakeholders are continuing with the aim of improving these choices on the basis of common environmental objectives.

To properly represent the complexity of the wetlands of the St. Lawrence River, it would be advisable to cover all ecosystems in the freshwater portion, from Cornwall to Québec.

The adoption of a sampling frequency more suited to the calculation of the selected indices would make it possible to better distinguish long-term trends with respect to variations in the short term and thus to provide a more accurate picture of the status of the wetlands of the St. Lawrence River. This is particularly important in the context of climate change, where the increased severity and frequency of extreme weather events will have impacts on these highly valuable riparian ecosystems.

Key measures

The wetlands of the St. Lawrence River are evaluated on the basis of four aspects, representing four facets of these ecosystems.
Direct anthropogenic pressure

Direct anthropogenic pressure on a wetland is estimated on the basis of the net balance of losses and gains in size. This calculation takes into account losses directly attributable to human activity (e.g., urban and agricultural expansion), and of the lasting gains resulting from the creation of wildlife habitats or the formation of wetland areas not attributable to annual water level fluctuations. The objective has been to achieve no net loss due to anthropogenic sources since 1990.

The temporal trend of this aspect can be defined on the basis of three classes:

- cumulative balance greater than 0 and greater than the balance for the 1990–2002 period: trend is improving;
- cumulative balance greater than 0 and less than the balance for the 1990–2002 period, or cumulative balance less than 0 and greater than the balance for the 1990–2002 period: trend is stable; and
- cumulative balance less than 0 and less than the balance for the 1990–2002 period: trend is deteriorating.

Internal wetland dynamics

The estimation of internal wetland dynamics is based on the ratio between the total area that becomes drier and the total area that becomes wetter. The calculation uses the area of low marshes, high marshes, shrub swamps and forested swamps, excluding changes in open water and shallow water. A ratio greater than 1 indicates that the wetlands are drying out (e.g., low marshes becoming high marshes). A ratio of less than 1 indicates wetter conditions (e.g., transformation of swamps to marshes).

The desired situation is characterized by fluctuations leading to successive drier and wetter phases in the wetlands.

Diversity of wetland habitats

The diversity of wetland habitats is estimated by calculating the relative proportion of wetland classes. Five classes are used for the St. Lawrence River: shallow water, low marsh, high marsh, shrub swamp and forested swamp. Peatlands are not taken into account.

The objective is to maximize the diversity of habitats in a given sector through equal representation of the five wetland classes. An evenness index is used to assess the diversity of habitats.
The current status of the wetlands is characterized by the following classes:

- The evenness index is over 0.85: good status;
- The evenness index is between 0.56 and 0.85: average status; and
- The evenness index is below 0.56: poor status.

The assessment of the temporal trend in the diversity of wetland habitat is expressed as follows:

- The trend shows an improvement if the status class in 2010 is superior to the one in 1990.
- The trend is stable if both 2010 and 1990 status classes are the same.
- The trend shows a decline if the status class in 2010 is inferior to the one in 1990.

**Protection of wetlands from external stressors**

The protection of wetlands from external stressors is assessed on the basis of the presence of a buffer zone of at least 50 m of natural terrestrial vegetation on the perimeter of the wetlands.

The objective is to maximize the buffer zone in order to maintain the potential ecological functions and services provided by wetlands.

The current status of the wetlands is determined according to the following classes:

- The status is considered good if the buffer zone exists on more than 75% of the wetland perimeter.
- The status is considered fair if the buffer zone exists on 50% to 75% of the wetland perimeter.
- The status is considered poor if the buffer zone exists on less than 50% of the wetland perimeter.

The assessment of the temporal trend is based on the following classes:

- The trend is improving if the buffer zone increases sufficiently to move to a higher status class.
- The trend is stable if the assessment of the buffer zone remains in the same status class, regardless of whether it increases or decreases.
- The trend is declining if the buffer zone declines to the point that it moves to a lower status class.

Photo: Martin Jean © Environment Canada
For more information:


State of the St. Lawrence
Monitoring Program

Five government partners—Environment Canada, Fisheries and Oceans Canada, Parks Canada, Quebec’s Ministère du Développement durable, de l’Environnement et de la Lutte contre les changements climatiques and the Ministère des Forêts, de la Faune et des Parcs—in collaboration with Stratégies Saint-Laurent, a non-governmental organization that works actively with riverside communities, are pooling their expertise and efforts to provide Canadians with information on the state of the St. Lawrence and its long-term changes.

To this end, environmental indicators have been developed on the basis of data collected as part of each organization’s ongoing environmental monitoring activities over the years. These activities cover the main components of the environment, namely water, sediments, biological resources, uses and shorelines.

For more information on the State of the St. Lawrence Monitoring Program, please visit our website at www.planstlaurent.qc.ca.

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