LE FLEUVE

NEWSLETTER
ST. LAWRENCE VISION 2000

VOLUME 11 — ISSUE 5 — SEPTEMBER 2000

IN TUNE

Biodiversity of the St Lawrence

An impressive synthesis of knowledge of the flora and fauna of the St Lawrence is now available on the Internet. Check out the Biodiversity Portrait of the St Lawrence at the following address: www.qc.ec.gc.ca/faune/biodiv

In search of new marine toxins in the Magdalen Islands

New marine toxins in the Magdalen Islands: the findings of a study on the presence of toxins in shellfish harvested commercially and recreationally in Quebec. Rigorous monitoring has led to some unexpected discoveries.

ZIP Chronicle

Six years of effort in the Upper St Lawrence ZIP (area of prime concern) have paid off: a remediation plan for one of the most contaminated sections of the St Louis River is being implemented with the contribution of Alcan Beauharnois and PPG Canada.

Biodiversity of the St Lawrence—Just a Click Away!

Calling all researchers, land managers, representatives of organizations devoted to conserving and enhancing the St Lawrence, students and nature lovers: you are invited to "surf" the St Lawrence River and discover its many plant and wildlife resources. It is now possible to access a wide range of information contained in maps, popularized texts, species lists, etc on the Internet. Discover the Biodiversity Portrait of the St Lawrence with us.

Produced under the Biodiversity component of the St Lawrence Vision 2000 Action Plan, the *Biodiversity Portrait of the St Lawrence* is the result of the work of some 40 scientists over five years. These specialists in zoology, botany and landscape ecology consulted hundreds of theses, articles, reports and databases in order to summarize inventory data gathered over the past 30 years and make them available on a high-performance geomatic platform.

A summary of our knowledge on the flora and fauna of the St Lawrence, the *Biodiversity Portrait of the St Lawrence* Internet site contains more than 150 pages of text, 350 tables and figures and 2,500 species distribution maps. Internet users can now access a wide variety of information on the physical and biological aspects of the St Lawrence. Before this project was developed, this highly valuable information was scattered in a huge collection of documentation, non-

SUMMARY

Canada

Saint-Laurent Vision 2000

Québec

centralized databases, and even in the drawers and computers of scientists and resource managers.

This ambitious project is a collaborative effort of Environment Canada and the Quebec Department of the Environment. A number of partners (associations, organizations and departments) involved in the St Lawrence Vision 2000 Action Plan also provided essential data. They include Fisheries and Oceans Canada, Parks Canada, the Quebec Wildlife and Parks Agency and the Quebec Department of Natural Resources.

Rich and Varied Information

Taking a user-friendly, educational approach, the Biodiversity of the St Lawrence site presents information under five main headings. The "Ecological Framework" section divides the physical environment of the St Lawrence. The aquatic environment is defined according to its bathymetry, sediment type, hydrographic units and natural divisions, while the coastal environment is divided into coastal segments and coastal landscapes. "The terrestrial environment section is based on the ecological reference framework of Quebec, which maps the area around the St Lawrence in ecoprovinces and natural regions, as well as physiographic units," explained Jean-Pierre Ducruc of the Quebec Department of the Environment.

The *Portrait* focuses a lot of attention on the presentation of the St Lawrence's flora and fauna. The "Biological Diversity" section contains detailed ecological analyses of vascular flora, aquatic invertebrates, fish, amphibians, reptiles, birds and mammals. There are descriptions of the richness, rarity and vulnerability of a number of species in these major groups of organisms. The "Distribution and List of Species" section provides some 700 species lists for the same number of sectors along the St Lawrence, as well as maps showing the distribution of 2,500 species that frequent the ecosystem. The site provides answers to a wide variety of questions, such as where are the richest freshwater and saltwater fish sites in the St Lawrence system?, where are most of the threatened or vulnerable amphibian and reptile species concentrated along the St Lawrence?, where can one find the bird colonies with the largest numbers of colonial species? and what is the geographical distribution of riparian plant species?

The diversity of flora and fauna in the St Lawrence is threatened by a number of human activities. The "Anthropogenic Modifications" section shows the sectors most affected by hundreds of these activities. You can see the extent to which natural shorelines are disappearing and wetlands are being lost to agriculture, urbanization and other uses. There are also data on the effects of the commercial marine fishery, chemical contamination of water and sediments, and the extent of acidification of the environment.

Helping to Conserve the St Lawrence

Much more than a synthesis, the *Portrait* is a valuable decision-support tool for resource conservation along the St Lawrence. "In addition to reviewing the areas currently protected by various public and private organizations, the 'Protecting Biodiversity' section lists new priority sites for conserving biodiversity and saving species at risk," explained Jean-Luc DesGranges of Environment Canada. The main plant and animal groups needing special attention are also listed. The Portrait can thus provide direction for and encourage the implementation of a number of projects at the local and regional level to conserve the biological resources of the St Lawrence River.

A compendium of inventory data gathered over the past 30 years along the St Lawrence that is accessible to everyone on the Internet, the Biodiversity Portrait of the St Lawrence is a highly valuable tool for anyone interested in the ecosystem and its many plant and wildlife resources. Visit the site at http://www.qc.ec.gc.ca/faune/biodiv and discover the biodiversity of the St Lawrence!

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Source:

DESGRANGES, J-L, and J-P DUCRUC (under the direction of). 2000. *Biodiversity Portrait of the St Lawrence*. Canadian Wildlife Service, Environment Canada, Quebec Region and the Ecological Heritage Directorate, Quebec Department of the Environment [on line: http://www.qc.ec.gc.ca/faune/biodiv].■

In Search of New Marine Toxins in the Magdalen Islands

Photo : Esther Bonneau
Prorocentrum lima

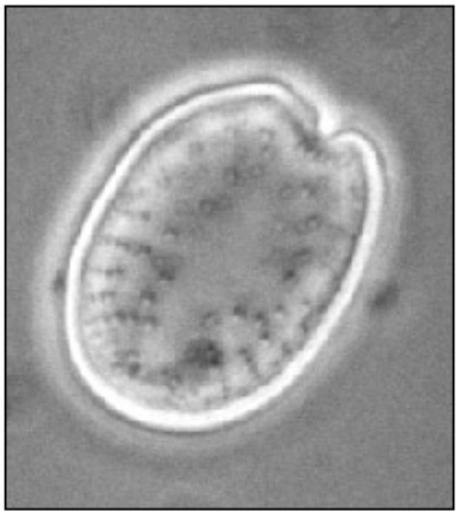

Photo : J.-Y. Couture
Prorocentrum mexicanum

The Canadian Food Inspection Agency (CFIA) manages the Marine Biotoxin Monitoring Program, which is aimed at detecting the presence of toxins in molluscan shellfish harvested commercially and recreationally in Quebec. In 1998, the unexpected discovery of two toxins in molluscs in the Magdalen Islands put CFIA researchers on the alert and led to a research project with Fisheries and Oceans Canada's Maurice Lamontagne Institute (MLI). This article outlines the main findings of the study, which was conducted under the Human Health component of St Lawrence Vision 2000.

Bivalve molluscs, which include softshell clams, surf clams, scallops, mussels, wedge clams and razor clams, are filter feeders. This means that they suck in water and microscopic algae and extract the nutrients they need. As a result, molluscs accumulate toxins produced by algae that can cause illnesses such as paralytic shellfish poisoning, amnesic shellfish poisoning and diarrhetic shellfish poisoning in humans.

Rigorous Monitoring Occasionally Leads to Unexpected Discoveries

Since large numbers of the algae that cause paralytic shellfish poisoning are found in the waters off the North Shore, in the Lower St Lawrence and around Anticosti Island and the Gaspé Peninsula, the CFIA monitors levels of paralytic toxins in shellfish on a weekly basis. When the contamination level in molluscan shellfish exceeds the Canadian standards deemed to be safe for consumers' health, shellfish harvesting areas are closed.

The CFIA also monitors levels of domoic acid, a toxin linked to amnesic shellfish poisoning. Although very large numbers of the algae known to produce this toxin are sometimes found in shellfish harvesting areas in the St Lawrence River, domoic acid had never been detected in seafood products in Quebec prior to the summer of 1998, when a routine analysis identified low concentrations of the acid in scallop gonads.

Another surprising discovery awaited Marine Biotoxin Monitoring Program officials in the summer of 1998. In the Magdalen Islands, 20 people who had eaten mussels showed symptoms resembling those of diarrhetic shellfish poisoning. An investigation revealed that the mussels contained small concentrations of one of the toxins that cause this poisoning, which affects the gastrointestinal tract. The main symptoms are diarrhea, nausea, vomiting, abdominal pain and chills. That was the first time in Quebec that a diarrhetic toxin had been detected in shellfish.

The Algae Presumed Guilty Already Known to Researchers

The origin of this toxin seemed to be obvious since MLI researchers had already detected the presence of the algae that produce diarrhetic toxins in the St Lawrence, in concentrations considered dangerous in the Atlantic provinces and in other countries. Through its toxic algae monitoring program, the MLI had noted the occasional presence of *Prorocentrum lima* in the Magdalen Islands.

On the basis of these observations, the CFIA and the MLI undertook a study to verify whether Prorocentrum lima could explain the presence of diarrhetic (DSP) toxins in Magdalen Islands mussels. They measured DSP toxin levels in the digestive glands

of mussels and other molluscs in a number of areas around the Islands and in other parts of the province. There was a 9.9% contamination rate in the samples. Of this number, 56% had been sampled outside the Magdalen Islands region, which showed that the contamination observed for the first time in the summer of 1998 could affect other harvesting areas in Quebec.

Mussels accounted for 88% of the cases of contamination and were the species most affected. The contamination rate among cultured mussels was shown to be almost four times greater than that of wild mussels. Samples taken indicated that this difference might be explained by the use of structures in aquaculture that provide the *Prorocentrum lima* with the substrate it needs to reproduce.

A Newcomer to the Group of Usual Suspects

Although concentrations of the toxin produced by Prorocentrum lima were detected in mussels eaten in the Magdalen Islands in 1998, it would appear that these levels do not explain the poisoning that occurred. The guilty party may in fact be *Prorocentrum mexicanum*, an alga of the same family whose presence was unknown in the region. “The presence of *Prorocentrum mexicanum* in the Magdalen Islands was completely unexpected because this alga has until now been considered a tropical species,” explained Maurice Levasseur, a researcher at the MLI.

This discovery added a new twist to the diarrhetic poisoning problem in the Magdalen Islands. *Prorocentrum mexicanum* also produces DSP toxins that cause the same poisoning symptoms. These toxins were not measured as part of the study conducted by the CFIA and the MLI, but they may pose a potential hazard that should be evaluated at a later date.

Toxicity of Algae Strains in the St Lawrence Studied

A number of questions arose during the project led by the CFIA and the MLI. “The next step could be to grow strains of *Prorocentrum lima* and *Prorocentrum mexicanum* found in the St Lawrence in the laboratory and then compare them with those that produce toxins in other regions,” explained the CFIA’s Gilbert Sauvé. The same type of study could be conducted with diatoms, which cause amnesic shellfish poisoning. These algae are sometimes very abundant in shellfish harvesting areas in the St Lawrence, but no direct link has been established between their presence and the occasionally very high concentrations of domoic acid found in molluscs.

By subjecting algae strains in the St Lawrence to various conditions related to temperature, light and the availability of nutrients and observing their ability to produce toxins, researchers will be able to predict the subsequent increase in their toxicity following any change in the environmental conditions of the St Lawrence.

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SAUVÉ, G, M LEVASSEUR, J-Y COUTURE and S MICHAUD. 2000. *Évaluation des biotoxines marines nouvellement identifiées dans des mollusques du Québec et identification de leurs sources*. Canadian Food Inspection Agency and Fisheries and Oceans Canada, 49 p.

ST-AUBIN, G. 2000. *Bien cueillir… bien manger! La cueillette des mollusques et votre santé*, Comité ZIP de la rive nord de l’estuaire, 12 p.■

Chronicle
ZIP Committees in the Heat of the Action

The Upper St Lawrence ZIP Committee

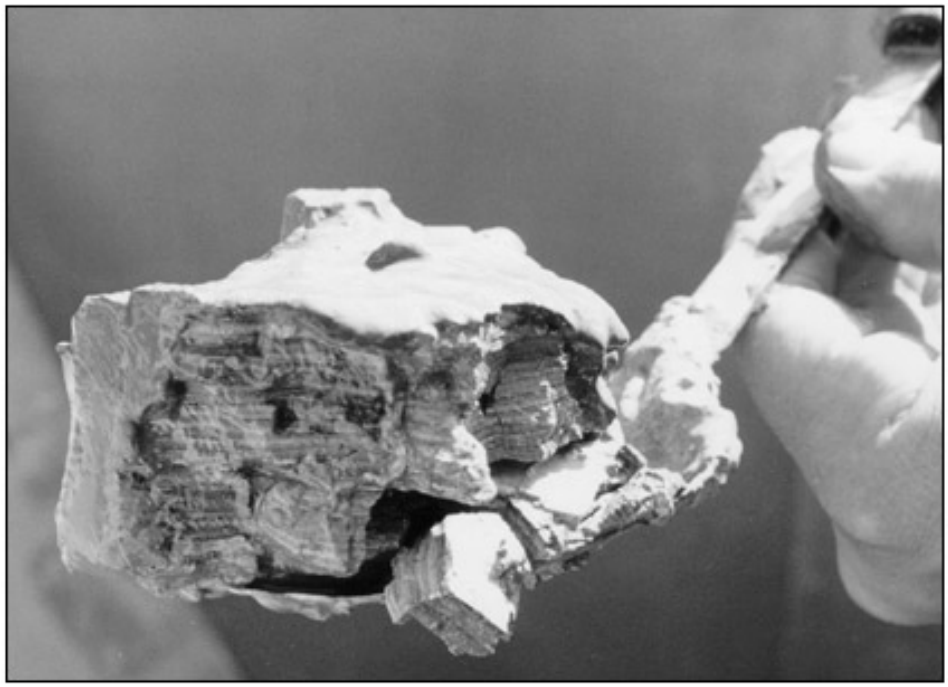

Photo : Environment Canada, DPE

Sediment Remediation in the St Louis River

In April, the Upper St. Lawrence ZIP (area of prime concern) Committee was rewarded for six years of effort with the announcement of a sediment remediation project in one of the most contaminated stretches of the St Louis River. Alcan Beauharnois and PPG Canada have been involved in the Sediment Committee since the beginning and have agreed to invest the resources required to implement a remediation plan. The consensus achieved on the contaminated sediment problem and the commitment made by the two main companies operating in the industrial park, through which the St Louis River runs, show once again the potential of the co-operative approach advocated by ZIP committees.

The St Louis River, which flows between Lake St François and Lake St Louis, traverses an agricultural area before running through the Beauharnois-Melocheville industrial park. The river's sediments, particularly at the mouth and in the area upstream from Smith Dam in the industrial park, were previously identified as highly contaminated, like those in Lake St Louis. Following public consultations held by the Upper St Lawrence ZIP committee in 1994, a working group was given a mandate to draw up a technical fact sheet on the contaminated sediments in the southern portion of Lake St Louis.

The technical fact sheet, which was incorporated into the Lake St Louis environmental remediation action plan (ERAP) in 1997, led to the creation of the Sediment Committee. In addition to representatives of a number of departments and agencies (Environment Canada, the Quebec Department of the Environment and the Montérégie public health department) and environmental groups (Stratégies Saint-Laurent, Crivert and Action Poissons Plus), the Committee also counted among its members representatives of Hydro Quebec and three industrial plants in the region: PPG Canada, Alcan Beauharnois and Canadian Electrolytic Zinc. The Committee members worked together to develop a comprehensive understanding of the problem of contaminated sediments in Lake St Louis and the St Louis River, while keeping in mind the concerns of all participants.

The St Louis River, a Potential Source of Contamination for Lake St Louis

In order to better understand the nature and scope of the contamination in the St Louis River, Sediment Committee members ordered an ecotoxicology characterization study of the sediments in 1998. The study confirmed the presence of contaminants in the river, particularly between Smith Dam and the outfalls of Alcan Beauharnois and PPG Canada. Physical and chemical analyses carried out on surface and deep sediments found concentrations of polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), hexachlorobenzene (HCB) and mercury above the Toxic Effect Threshold (TET) for benthic organisms, as defined in *Interim Criteria for Quality Assessment of St Lawrence River Sediment*, published by Environment Canada and the Quebec Department of the

Environment. Bioassays conducted in the laboratory have shown that sediments at the most contaminated sites were toxic for small organisms (microscopic algae, amphipods, insect larvae). The inventory of benthic organisms gathered on site showed a deterioration in benthic communities.

An additional characterization study was carried out in 1999 to verify whether there was any contamination upstream from the industrial outfalls. PCBs were the only substance identified, but at low concentrations that could be attributable to remote non-point sources. This second study was also aimed at determining whether the contamination observed between Smith Dam and the outfalls was recent. According to the analyses, sediments in this section were contaminated before the 1970s, before discharge control measures were put in place by industrial plants. However, the third component of the study demonstrated that contaminated sediments could be remobilized if the river were to narrow or the current were to increase in some areas upstream from Smith Dam. These contaminated sediments could one day end up at the mouth of the river, or even in Lake St Louis.

Efforts that Paid Off

Based on the findings of the above-mentioned characterization studies and the many discussions at the Sediment Committee's meetings, a consensus was reached and a remediation plan for contaminated sediments between Smith Dam and the industrial outfalls was submitted. PPG Canada and Alcan Beauharnois have agreed to voluntarily implement the remediation plan. A consultative committee made up of representatives of the Quebec Department of the Environment, Environment Canada and the ZIP Committee will monitor implementation and provide support in relation to the regulatory and technical requirements involved. According to the preliminary schedule, restoration work should begin in spring 2003. There are a number of steps still to be completed between now and then, including the development of various options, impact studies and public consultations.

"Since it has been demonstrated that few contaminants have accumulated in this section of the river over the past 30 years, remediation work is a logical, sustainable follow-up to the measures that have already been put in place by Alcan Beauharnois and PPG Canada to improve their environmental practices," explained Claire Lachance, Co-ordinator of the Upper St Lawrence ZIP Committee. "In addition, knowing that contaminants accumulated in this stretch of the river could be remobilized in the southern portion of Lake St Louis if, for example, there was exceptionally heavy flooding, this project can be considered an important first step towards protecting and improving water quality in the lake, which is very popular with fishers." There is no doubt that the efforts made by the Upper St Lawrence ZIP Committee and its partners to achieve a consensus have paid off in the success of this major co-operative effort.

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Sources:

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LORRAIN, S, J P SAVARD and J VASS. 2000. Caractérisation additionnelle des sédiments de la rivière Saint-Louis (Beauharnois — 1999). Technical report written by the Service d'études sédimentologiques, a division of Environnement Illimité Inc, for the Upper St Lawrence ZIP, 36 pages + appendices + map.■

News *in* BRiEF

New Guide

Tourism Quebec, in co-operation with 16 financial and professional partners, recently published a guide to enhancing bodies of water in Quebec for recreational, tourism and heritage conservation purposes entitled Guide de mise en valeur des plans d'eau du Québec à des fins récréotouristiques et de conservation du patrimoine. This detailed resource covers regulatory aspects, legal statutes and jurisdictions, authorizations, permits and existing technical and financial support.

The abundantly illustrated guide is divided into five main sections: water, a valuable resource; opportunities for recreational and tourism development near you; for a sustainable tourism industry; a collection of inspirational experiences; and developing a good business plan.

The guide, available in French only, can be found on the Internet at the following address: http://www.bonjourquebec.com/eau.

Chinese delegation

On August 25, a Chinese delegation came to Canada and the United States to promote relations among the three countries. The purpose of their visit was to evaluate opportunities for co-operation with the environment industry by sharing information and holding discussions on environmental technology know-how. The delegation was very interested in various aspects of the St Lawrence Action Plan (conservation, protection, management and partnership) and in sharing information on the roles and responsibilities of various stakeholders.

Septième Rencontre du Conservatoire régional de la Loire et de ses affluents

André Stainier of *Les Amis de la vallée du Saint-Laurent* has been invited to speak at the 7th Rencontre du Conservatoire régional de la Loire et de ses affluents [meeting of the regional conservatory of the Loire and its tributaries] to be held in Saumur, France in September. The theme of the meeting is "the river as perceived by riverside residents." One of his topics will be the St Lawrence Vision 2000 Action Plan. Mr Stainier's involvement in conservation and promoting the river will make him a seasoned ambassador.

LE FLEUVE

NEWSLETTER
ST. LAWRENCE VISION 2000

Le Fleuve is jointly published by St. Lawrence Vision 2000 partners.

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The *Le Fleuve* Newsletter is published on the SLV 2000 Internet Site at: www.slv200.qc.ec.gc.ca/slv2000/english/indexeng.htm

ISSN 0847-5334

Legal deposit:
National Library of Canada, Bibliothèque nationale du Québec
Volume 11, issue 5.

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