LE FLEUVE

St. Lawrence Action Plan Newsletter
Volume 3, n°2, March 1992

Everything You Always Wanted to Know about the St. Lawrence...

Once upon a time, there was a conscientious administrator who was going through the year's invoices from consultants who'd run up expenses researching documents. Suddenly, the administrator realized he was fed up paying a research bill for every new contract. However, he also knew how important such research was to many of the projects carried out under the St. Lawrence Action Plan. So René Rochon, head of restoration technologies at Environment Canada's St. Lawrence Centre, decided to cut costs by offering consultants a computerized bibliographical data bank known as BRU (Banque bibliographique informatisée sur les ressources et usages du Saint-Laurent). That data bank now contains nearly 5,000 documents!

Lucie Olivier of the St. Lawrence Centre oversaw the implementation of BRU, which includes scientific articles and reports, as well as masters' and doctoral theses gathered from more than 80 sources — the ones most frequently consulted by experts in the environment and in resource management.

Entries are categorized under four main headings: species, habitats, infrastructures (city water outlets, archaeological sites, parks, etc.) and "other," which includes such topics as fishing and biogeography. The 40 or so subjects falling under the four basic categories serve as key words for search purposes.

Réjean Meloche

From left to right: René Rochon, Lucie Olivier and Michel Melançon

Much of the information in BRU comes from major Canadian and American data banks, such as ELIAS (Environment Canada), AQUAREF (Canadian Water Resources Journal), ASFA (containing documents published around the world on topics relating to science, marine and freshwater environment technologies, and resource management and conservation), ENVIRODOC and others. The people who designed BRU also consulted federal, provincial and municipal organizations, hydrographic research institutes, universities, consulting firms specializing in the environment, and various other agencies, such as environmental protection groups and organizations involved in research and education.

The information in BRU is organized so that users can determine quickly whether the documents they've found are relevant to their research. Documents are listed according to the areas they cover: the four fields are dredging administrative regions, priority interest sites (23 sites as defined by the St. Lawrence Action Plan), biogeographic regions, and a general field for documents that cover a broader territory than those defined above.

BRU users can consult a guide that provides a brief summary of the contents of the data bank, along with a list of subjects (key words), sources and a description of the type of bibliography file used. The guide also explains how to install BRU, how to conduct a search and what printing options are available.

All That, and a Data Bank Directory, Too!

Michel Melançon, head of information management at Environment Canada's St. Lawrence Centre, has taken a particular interest in ensuring access to the many computerized data bases containing information about the St. Lawrence River. The system known as REPEN (Répertoire informatisé des bases de données environnementales sur le fleuve Saint-Laurent) makes it easier to consult and manage data bases of biophysical and socio-economic information relating to the river.

About 500 pages worth of information are contained on a single diskette, making REPEN files easy to consult and update.

REPEN deals with raw, i.e. numeric data (cartography, remote sensing, statistics, etc.). The information in the various data bases is then organized in descriptive files. Users can search by subject (water or sediment quality, fauna, industries, and so on), by geographic region, by year of data acquisition or by agency. To date, REPEN includes 155 data bases that may be consulted or obtained from the 50 or so agencies that compile them. The St. Lawrence Centre itself has about 20 data bases that users may access via the Centre ACTIF (Centre d'acquisition et de traitement informatique de données environnementales sur le fleuve Saint-Laurent).

Data bases are indispensable — and they present quite a challenge, especially when it comes to keeping them current. With REPEN, anyone who keeps a data base is asked to cooperate by providing the St. Lawrence Centre with information about all new data bases available. Despite their limitations, BRU and REPEN are definitely facilitating the research process for many people.

BRU and REPEN are available through the documentation centre at Environment Canada's St. Lawrence Centre and can be run on any IBM-compatible computer. ■

PARTNERS

"PROGRAMME ACTION-ENVIRONNEMENT"

Environmental groups are playing a prominent role in protecting the environment, creating public awareness and stimulating public action through their various projects. The Programme Action-Environnement was instituted by the Ministère de l'Environnement du Québec in 1991 to offer these partners special support, and it has been an overnight success.

The program has an annual budget of $1 million to fund projects organized by individual non-profit environmental groups, as well as projects that are a collective effort of all non-profit organizations interested in environmental issues. Two types of grants are available: one for projects being carried out over a full budget year and another for projects specifically planned for Environment Month (May).

Some of the organizations receiving subsidies in 1991-92 are the Union québécoise pour la conservation de la nature (UQCN) and the Société pour vaincre la pollution (SVP).

To be eligible for a grant, projects must be designed to foster awareness of certain environmental issues (such as waste and residue management), encourage a better understanding of how ecosystems work, increase people's sense of responsibility with regard to the environment and encourage them to act to promote environmental protection and sustainable development.

Educational activities and information campaigns are just two examples of the kind of projects being funded. Subsidies are granted primarily according to project quality, anticipated spinoffs and compliance with program objectives. Support from individuals or groups working on environmental issues is another factor considered by the jury.

Grants vary from $500 to $15,000 per project. If more than one project is being presented, the maximum grant is $35,000 for province-wide and regional organizations, and $15,000 for other groups.

All groups must provide a report of their activities, including a detailed account of the project and its results.

Application forms and the Action-Environnement brochure are available at either of the regional offices of the Ministère de l'Environnement du Québec.

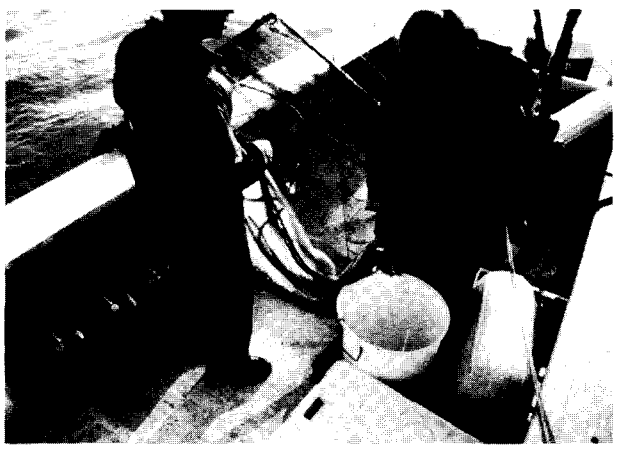
Restoring the Smelt and its Habitats: A Long-Term Project

In this issue, we present the final part in our series on restoration, a priority theme for Year IV of the St. Lawrence Action Plan. As you'll see, restoring endangered species is a long-term process, the first stage of which is systematic observation.

Lake Smelts: KEEPING A CLOSE WATCH ON A PRIORITY SPECIES

The lake smelt is recognized as an endangered species in the St. Lawrence. But how many smelts are there in the St. Lawrence estuary? How can we measure annual changes in the lake smelt population and find out whether efforts to restore spawning grounds are paying off?

"There are so many questions, for which we have plenty of theories, but few absolute answers," says Guy Verrault, a biologist with the Ministère du Loisir, de la Chasse et de la Pêche du Québec (MLCP). "In order to bring fish stocks back up to healthier levels, we must first develop a way to measure their relative numbers from year to year. That's why, in the fall of 1990, we carried out initial studies to estimate the smelt population density in the mid-estuary region, between Montmagny, Île-aux-Coudres and the eastern tip of Île d'Orléans."

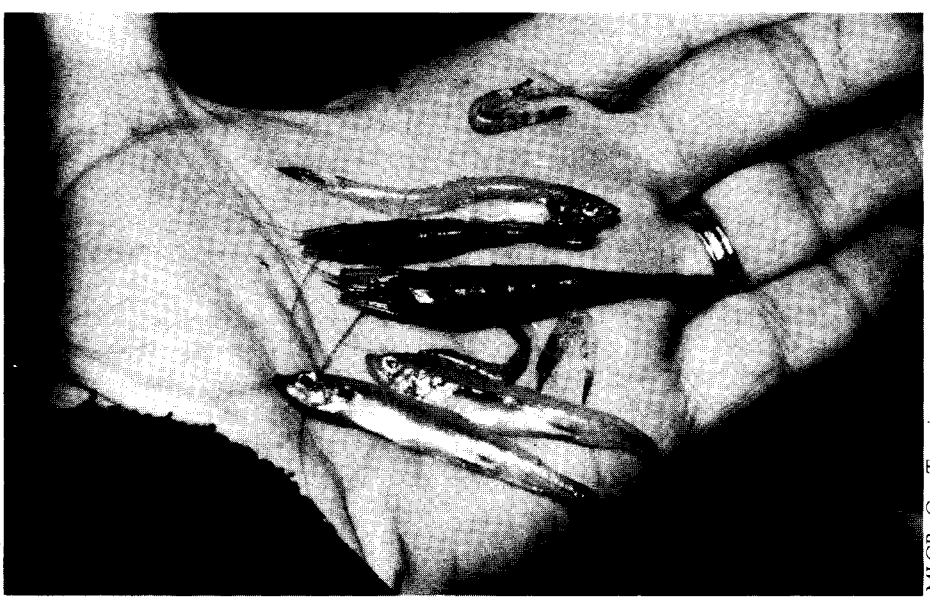


MLCP - Guy Trencia

The mid-estuary region, the "golden triangle" of the lake smelt, was divided into six zones, according to degree of salinity. This is the area of the river where freshwater meets saltwater, creating a certain cloudiness. And this is where trawling operations began. In this procedure, a small boat drags a net shaped like a square funnel, filtering a specific quantity of water and trapping all animals larger than the holes in the net.

"Specimens of each species caught are counted and weighed. Then we measure the length of the fish and, if possible, determine their age," explains Fay Cotton, another MLCP biologist. "We'll soon be able to compare samples from one year to the next."

The 1990 study already revealed a number of things. In the cloudy zone, there were more smelts than any other species among the captured fish. In fact, there were seven times more smelts than Atlantic tommycod, which were the second most numerous. Does this mean that fears about the smelts disappearing from the estuary are exaggerated? "Not at all," replies Guy Verrault. "All indications are to the contrary: the number of smelts today is very low compared to what it used to be. The only thing we can conclude with certainty is that the smelt population is concentrated in this particular triangle during the trawling period."



MLCP - Guy Trencia

It was also noted that smelts prefer less salty waters. For example, there were 37 smelts per thousand cubic metres of water at a salinity of 0 to 5 parts per thousand, but only one smelt in zones where the salinity is greater than 10 parts per thousand.

New Information on Reproduction

Most of the smelts captured were less than one year old. "That means we may have discovered a way to get a quick fix in the fall on how reproduction went in the spring," says Guy Verrault.

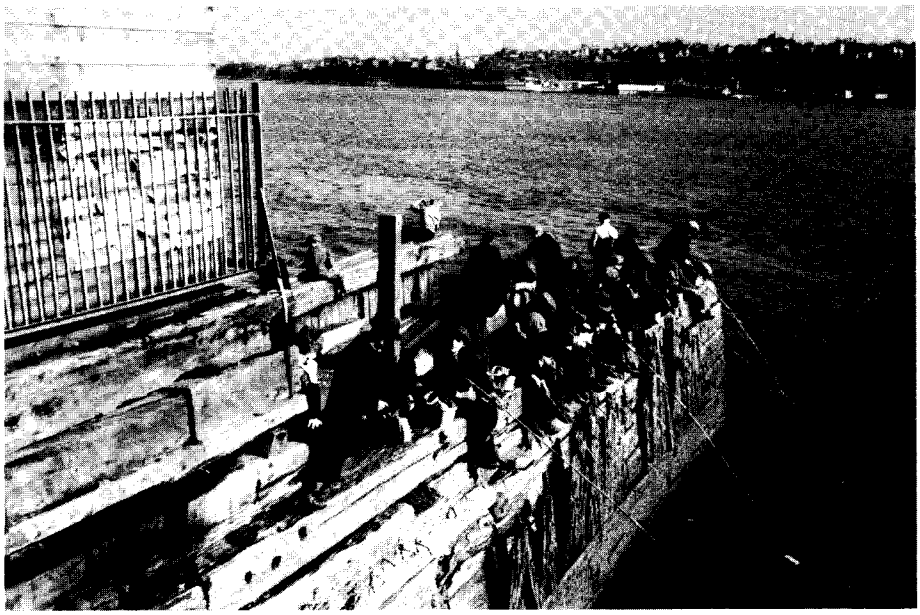
Smelts reproduce mainly in the Ouelle River. Three weeks after the eggs are deposited on the gravel of the river bed, the larvae float downstream towards the St. Lawrence, where tidal currents ensure just the right degree of salinity. The young fish probably stay in the triangle for more than a year before going back to the river to spawn. Those born in 1990 will therefore be spawning this spring. Smelts generally reproduce at two or three years of age; few tend to live longer than that and most spawn only once in a lifetime.

The smelts also tend to stay in the mid-estuary because of the food supply: the area is home to a dozen species of invertebrates, including mysids, which are the smelts' usual staple.

Can the smelt be saved? "Our immediate goal," says Guy Verrault, "is to find a way to determine how restoration of the spawning grounds is affecting smelt population. If we can understand long-term trends, we can probably pinpoint the reasons for annual fluctuations, such as climate, environmental quality, commercial fishing or changes in habitat caused by human activity. Still, we must remember that this kind of undertaking requires plenty of time and patience."

A SMELT INCUBATOR IN TIDAL WATERS

On the de l'Église Brook at Beaumont, about fifty kilometres east of Québec City, is a very special incubator, a joint venture involving the department of Fisheries and Oceans of Canada and the Ministère du Loisir, de la Chasse et de la Pêche du Québec (MLCP). It has an annual capacity of one million eggs and the first spawning is expected in April and May of this year.



J.W. Michaud - Archives nationales du Québec à Québec

Smelt fishermen gathered on a pier was a common sight in the late 1940s. It's estimated that back then, the sport involved 100,000 person-days each year between Québec City and Rimouski.

"We're talking about a world first!" says a proud Guy Trencia, a biologist with the MLCP. "The only other natural habitat smelt incubator we know of in North America is in New Hampshire. But since it is not subject to tidal action, it could not be used as a model. So we had to get creative!"

How Does the World's First Tidal Water Incubator Work?

First of all, nobody sits around waiting for the spawners. Smelts are captured nearby by dragging a special cage called a "dipper" along the shoreline. The fish are then taken to the incubator, which consists of three modules placed side by side. Water enters the centre module, where it is decanted. The purified water is then fed into the two other modules; this is where the incubation takes place.

"Ideally," says Guy Trencia, "we'd like to let the smelts spawn freely and place their eggs on the racks at the bottom of the modules. We'd prefer not to have to intervene, because smelt eggs are very difficult to handle. Within a minute of being released into the water, their membrane ruptures, allowing the eggs to attach themselves to the gravel on the bottom of the spawning module. When we extract the eggs from the fish ourselves, we have very little time to place them on the racks."

During this experimental stage, various methods will be tested to optimize the incubator operations. Questions such as whether the water should be filtered more and whether there should be a system for combatting fungi will be addressed; there are also plans to test different egg concentrations on the racks.

This first incubator was made necessary because of

the lack of natural habitats where the smelt can reproduce. Until the early 1970s, the Boyer River was the species' preferred site. But the smelts stopped coming when the quality of the water and spawning grounds deteriorated, primarily because of heavy sediment build-up and excessive nutrients (like those in chemical fertilizers) leaching in from surrounding farmlands. The river is now being restored (see Le Fleuve, Vol. 2, No. 2, March 1991).

"Restoration of the Boyer River is a long-term operation," says Fay Cotton, a biologist with the MLCP. "In the meantime, we had to find other ways to accelerate the growth of the smelt population, since the fish is an important link in the St. Lawrence River food chain."

To design the tidal water incubator, the MLCP called upon the Centre écologique du Lac-Saint-Jean, a regional organization founded in 1983 and dedicated to environmental education and action.

"Because we're filtering the water, the hatching rate will be much higher than under natural conditions, where, at best, barely 3.6 eggs out of 100 will hatch. In the incubator, we're hoping to see 90% of the eggs hatch," concludes Guy Trencia.

It goes without saying that everyone is anxiously awaiting the results of this first experiment. ■

Hydrocarbon Spills: Information Systems to the Rescue

A new system known as DEVERSYS will soon be helping determine which clean-up methods to use in the case of hydrocarbon spills, taking the specific type of milieu into consideration.

Implemented as part of the St. Lawrence Action Plan, DEVERSYS was developed jointly by Environment Canada's Environment Protection Branch, the St. Lawrence Centre and the Canadian Workplace Automation Research Centre (CWARC, Communications Canada). Emergency response specialists from the public sector, the private sector (Sani-Mobile) and international research institutes (the River Road Environmental Technology Centre and CEDRE in Brest, France) have all contributed their expertise.

What Does DEVERSYS Do?

DEVERSYS analyzes all kinds of data about the type and volume of hydrocarbon involved in the spill, as well as characteristics of the shore areas and how they are used. It then recommends the degree of restoration and the most appropriate clean-up methods.

Restoration is the last stage in the procedure following a spill; it's also where DEVERSYS is most useful.

DEVERSYS runs on a portable computer and can therefore be used right on site. Information can be continually updated and a complete history of the event and related data is always available.

"The DEVERSYS memory stores all information about restoration methods used at different times in different situations, so that the newest members of our team can benefit from the experience of many experts in the field," says Alain Lamarche.

Mr. Lamarche and his team at the St. Lawrence Centre were responsible for developing the first prototype of the system for demonstration purposes. Ultimately, several other prototypes will have to be built, as data banks and knowledge bases are completed so that the system can determine the best restoration methods for each situation.

DEVERSYS will provide general information about the site, as well as specific data on the type of shore area, how it was used prior to the spill, any previous restoration methods used, and details about the hydrocarbon involved. Once the system is perfected, it will also contain additional information about shoreline restoration and the degree of contamination.

The system should be operational by September 1992. It will then be made available to its primary users, i.e. the emergency response teams at Environment Canada's Environment Protection Branch. Other organizations, including the Ministère de l'Environnement du Québec's emergency response team and the Canadian Coast Guard will also have access to the system.

After initial tests have been completed, DEVERSYS may be exported. Potential users like CEDRE in Brest and a number of groups in Ontario have already shown considerable interest in purchasing this sophisticated system, specifically created with environment protection in mind. ■

Water Level Management and Habitat Productivity

Everyone knows that fish can't survive without water. What many people don't realize, though, is that water levels affect fish stock productivity, as recent studies on the St. Lawrence system have demonstrated.

High water levels during the summer mean a healthy cohort of northern pike. The young fish enjoy a better, more efficient habitat that offers greater protection against attacks from the pike born the year before.

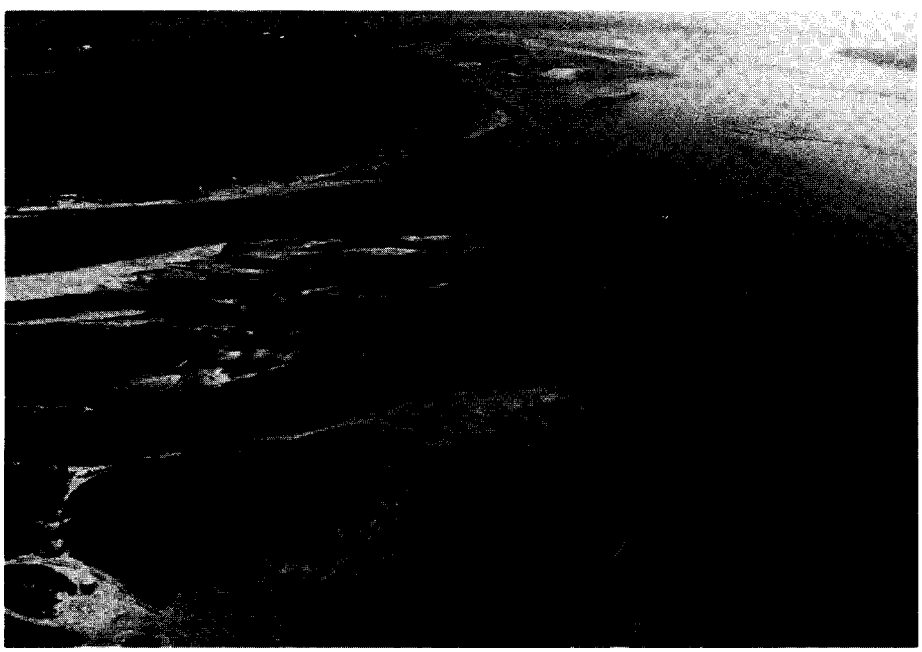
Similarly, the more water there is in the St. Lawrence and the Saint-Anne rivers in December and January, the better the Atlantic tommycod's chances of finding good spawning grounds, and the greater the likelihood of a large cohort.

Other indicators lead scientists to believe that water levels and river productivity also promote healthy stocks of yellow perch and lake sturgeon.

Most aquatic animal species benefit from increased water flow in the St. Lawrence. But what about people? Extrapolating from the example of people who live in flood zones, we could say that high water levels are also in the best interest of human beings.

"A high water level in the river has all kinds of positive effects," says Yves Mailhot, a biologist with the Ministère du Loisir, de la Chasse et de la Pêche du Québec. "For example:

- fish have a greater volume of water for their habitat;
- the quality of migratory waterfowl staging areas improves;
- the water heats up more slowly in summer;
- the river is more able to dilute pollutants;



MLCP

The Sainte-Anne River, where it meets the St. Lawrence at La Pérade. Heavy sand build-up at the mouth of the river is preventing fish from entering, and the problem gets worse as water levels drop.

READINGS

"LES CONTAMINANTS DANS LE SAINT-LAURENT: BILAN DES CONNAISSANCES."

DE LADURANTAYE, R., Y. Vigneault, C. Desjardins, S. Hébert and M. Pelletier. 1990. *Les contaminants dans le Saint-Laurent: bilan des connaissances. Rapp. tech. can. sci. halieut. aquat. viii + 51 p. Department of Fisheries and Oceans of Canada.*

This report describes the current state of contamination of the marine ecosystem, including the tidal zone of the St. Lawrence (from Sorel to the Îles-de-la-Madeleine), Lake Saint-Pierre and the Saguenay Fjord. In drafting the report, the authors consulted the considerable body of studies conducted over the last twenty years.

Data are presented in tables and analyzed according to eight geographic regions, five categories (sediments, fish, molluscs, crustaceans and marine mammals) and certain particular sectors. The contaminants studied—primarily PCBs, mercury, chromium, zinc and nickel—were selected according to two factors: potential toxicity for the environment and human beings, and the amount of data available.

"MODIFICATIONS PHYSIQUES DE L'HABITAT DU POISSON EN AMONT DE MONTRÉAL ET EN AVAL DE TROIS-PISTOLES DE 1945 À 1988 ET EFFET SUR LES PÊCHES COMMERCIALES."

MARQUIS, H., J. Therrien, P. Bérubé, G. Shooner and Y. Vigneault. 1991. *Modifications physiques de l'habitat du poisson en amont de Montréal et en aval de Trois-Pistoles de 1945 à 1988 et effet sur les pêches commerciales. Rapp. tech. can. sci. halieut. aquat. 1830F. xi + 80 p. Department of Fisheries and Oceans of Canada.*

As the name indicates, this report covers physical changes in fish habitat in two areas (the inland waterways, which include Cornwall-Laprairie and the Saguenay River, and the maritime zone, which includes all the territory east of l'Islet), while offering an analysis of statistics on commercial fishing from 1945 to 1988.

Upstream from Montréal, a number of factors have contributed to altering fish habitat. The most important are the dredging and dredging deposits related to construction of the Seaway, filling and draining of riparian lands caused by demographic expansion, and construction work on the seaport at Gros-Cacouna in the maritime zone.

•ships can navigate the seaway more safely;

•access to the river is made easier for those who use it."

Global warming, however, is threatening the St. Lawrence ecosystem by lowering water levels. Not only is water evaporating more quickly, but the water vapour is falling as precipitation in Northern Québec, instead of in the St. Lawrence River basin.

Furthermore, Yves Mailhot believes it is highly improbable that the people in charge of managing the Great Lakes will allow more water to flow downstream: "Pleasure boaters on the Great Lakes are not likely to appreciate having their hulls scrape bottom as they enter their marinas. Remember, also, that the Great Lakes are of considerable interest to the Americans, who would like to use the water to irrigate the desert regions of the Southwest."

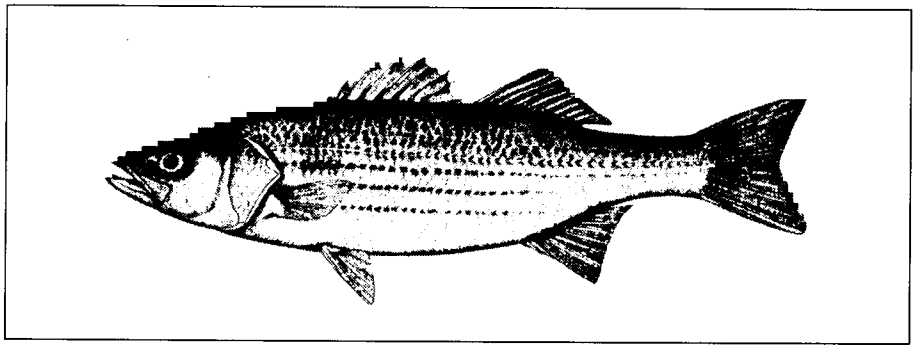
What's the solution? According to Yves Mailhot, "Plans for the river must include a detailed analysis of how global warming and management of the Great Lakes are affecting the river, the way it is used and its productivity." ■

Hot Off the Press

FACT SHEETS ON ENDANGERED SPECIES IN THE ST. LAWRENCE

As part of the St. Lawrence Action Plan, the department of Fisheries and Oceans of Canada has published a series of ten fact sheets, each one dealing with a fish species threatened with extinction in the section of the St. Lawrence running from Lake Saint-Pierre to Sept-Îles and Sainte-Anne-des-Monts. The documents were drawn up based on a 1989 study done for the department. Species covered include the Atlantic salmon, the northern pike and the striped bass.

The fact sheets, which are available in English or French, are attractively presented and written in easy-to-understand language. Each one provides a complete description of the species, its reproductive habits and diet. You'll also find current population statistics, information about the biology of the species, how it is used by man, the presumed causes of its decline and proposed corrective measures. A glossary and list of recommended readings completes each document.



Striped bass

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Yves Mailhot
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Ministère du Loisir, de la Chasse et de la Pêche du Québec

READINGS

These documents may be obtained from:
Department of Fisheries and Oceans of Canada
Québec Region
Fisheries and Habitat Management Branch
Fish Habitat Division, Champlain Harbour Station
901, Cap Diamant, C.P. 15 500, Québec (Québec) G1K 7Y7

HOT OFF THE PRESS

The fact sheets may be obtained from:
Department of Fisheries and Oceans of Canada
Québec Region
Communications Branch
901, Cap Diamant, C.P. 15 500, Québec (Québec) G1K 7Y7.

IN BRIEF (Lake Saint-Pierre)

Jean Burton
(514) 283-9930
St. Lawrence Centre
Environment Canada

COMING EVENTS

INTERNATIONAL CONFERENCE ON BIORECOGNITION

From June 1-4, 1992, Montréal will host an international conference on biorecognition, organized by the federal Department of Industry, Science and Technology. Speakers from a number of countries will discuss scientific topics, as well as technological applications and trade issues relating to the field of biotechnology. An exhibit of experimental biotechnologies, and activities designed specially for young people will round out the event. Presentations will be in French or English and simultaneous interpreting will be available.
For more information, please write to:
Doris Ruest, Secretariat, Biorecognition
National Research Council of Canada
Ottawa, Ontario K1A 0R6

PROVINCIAL CONFERENCE ON ENVIRONMENT AND HEALTH

The Comité de santé environnementale of Québec's Départements de santé communautaire (community health departments) invites you to its second provincial conference on June 4 and 5, 1992, at the Bonaventure Hilton Hotel in Montréal. This year's subject is: **Le développement industriel: de la protection de l'environnement à la protection de la santé.**
For more information, please call the Centre de coordination de santé communautaire in Montréal, at (514) 842-4861; in Québec City, contact Daniel Bolduc, Comité de santé environnementale at the DSC Enfant-Jésus, (418) 623-1010.

SEMINAR ON CHEMICAL SPILLS

This June in Edmonton, Environment Canada will present the 9th Technical Seminar on Chemical Spills. The first part of the conference, dealing with chemical products, will take place on June 8 and 9. Petroleum products will be the focus from June 10 to 12. Corporations, government agencies and the general public are all welcome. Environmentally sound products will be on display.
For more information, please contact
Susan Clark, (613) 953-5227.

IN BRIEF

The State of Lake Saint-Pierre
A PROMISING MEETING

Lake Saint-Pierre is in Good Hands!

More than 120 people attended an information and consultation meeting about Lake Saint-Pierre, organized February 8 by the Union québécoise pour la conservation de la nature (UQCN).

There were ordinary citizens, elected municipal officials, representatives from industry and health services, members of environmental agencies, civil servants and delegates from the Department of National Defence—all of them motivated by a common conviction that something must be done to protect and restore this precious community asset. Gone are the days of the old-style confrontations between developers and "nature lovers"!

In the morning, representatives from the St. Lawrence Centre, Environment Canada's Canadian Wildlife Service, the Ministère de l'Environnement du Québec (MENVIQ) and the Ministère du Loisir, de la Chasse et de la Pêche du Québec (MLCP) gave short presentations that provided an environmental diagnosis of the Lake Saint-Pierre region, in terms of habitats, uses and degree of contamination.

After lunch, workshops were organized on the three topics just mentioned; the twenty or so proposals arising from those workshops were all adopted at the plenary session. Unanimous consent was also given for the creation of a committee under the aegis of the Corporation pour la mise en valeur du lac Saint-Pierre (COLASP), and a request was made for financial support from both the provincial and federal governments.

The day's activities took place as part of the St. Lawrence Strategies program, implemented by UQCN in cooperation with many environmental groups in Québec. The program is designed to create public awareness and encourage public participation in plans to restore the St. Lawrence River. This meeting was the first time residents along the river were consulted under SLAP, and the first time the three invited government departments agreed on the diagnosis of the situation.

In all, it was a worthwhile experience for everyone who attended.

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