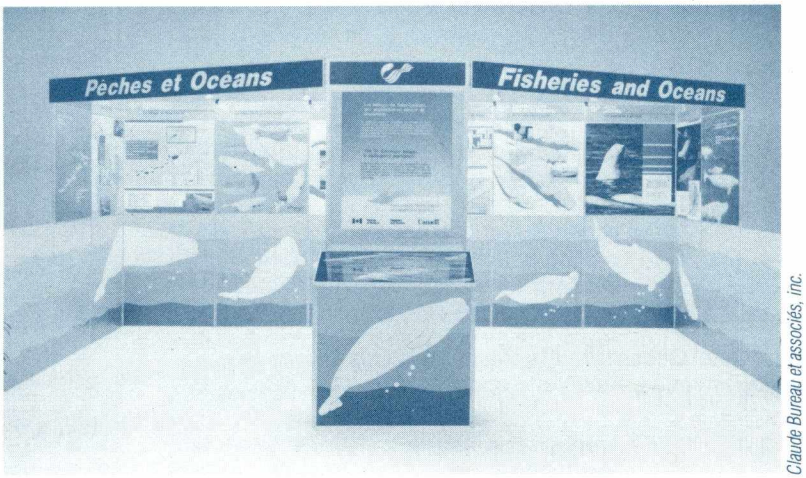
Beluga

Vol. 2, No. 2-3 June 1991

AN INFORMATION STAND ON THE ST. LAWRENCE BELUGA

One of the recommendations put forth in the first annual report (1988-1989) on the Interdepartmental Action Plan to Favour the Survival of the St. Lawrence Beluga Whale was to add an Information component to educate the public about the St. Lawrence belugas and their habitat. A further aim was to publicize actions taken to learn more about the belugas, prevent the various disturbances to which they are subjected and, finally, reduce toxic substances in the St. Lawrence.



Claude Bureau et associés, inc.

In 1989, the Fish Habitat Management Division awarded a contract for the development of a stand concept that would make it possible to meet the above objectives. Later, in the spring of 1990, a second contract was awarded for the construction of the stand, which was delivered in last September and then unveiled at the Symposium on the St. Lawrence Action Plan, held in Montreal on October 8 and 9, 1990.

The stand is designed to fit into a 3 m x 6 m (10 ft x 20 ft) rectangular area. When dismantled, it is easy to handle and to transport and can be mounted by two persons. The entire display consists of 12 panels grouped under three themes: observing, understanding and acting. The panels deal with such subjects as the distribution of beluga populations in the Northern Hemisphere, their habitats and the specific characteristics of this marine mammal, as well as echolocation, toxic substances, disturbances, research, the marine park project and the measures to be implemented to help save the belugas. The explanatory texts are presented in both French and English, with accompanying illustrations, photos and colour maps.

The stand was constructed by the firm Bégin Graphisme Inc. with the assistance of various persons in the Department of Fisheries and Oceans, Quebec Region.

The Fish Habitat Management Division is currently drawing up a tour schedule designed to give various target groups a chance to visit the stand and learn more about the belugas and their habitats.■

Pierre Marchand
Fisheries and Oceans
Quebec Region

RECENT PUBLICATIONS

AUCLAIR, M.-J. et Science Impact, 1990. Toxics in the St. Lawrence - An Invisible, but real threat. "St. Lawrence Update" series, 8 p.

AUCLAIR, M.-J. et A. Groleau, 1990. Objective: Clean-up - The 50 Industrial Plants Targeted for Priority Action. "St. Lawrence Update" series, 8 p.

BOUCHARD, H. et le Groupe Média Science, 1990. The St. Lawrence River and Maritime Transport - Striking a Balance. "St. Lawrence Update" series, 8 p.

These three fact sheets published in the "St. Lawrence Update" series are intended for individuals and organizations interested in conserving.

For more information, contact

Knowledge of the State of the Environment Division
St. Lawrence Centre
Conservation and Protection, Environment Canada
105 McGill Street, 4th Floor
MONTRÉAL (Québec)
H2Y 2E7
Tel.: (514) 283-7000

BRETON, Mimi & T. G. Smith, 1990. The Beluga, Underwater World Series, Fisheries and Oceans, 12 p.

This Underwater World factsheet is available from:

Communications Branch
Department of Fisheries and Oceans
Quebec Region
P.O. Box 15 500
901, Cap-Diamant
QUÉBEC
G1K 7Y7

EL-SABH, M. and N. Silverberg, 1990. Oceanography of a Large-Scale Estuarine System: The St. Lawrence. Springer-Verlag, New York, approx. 442 p., 141 illus. (See article p.6)

For more information, contact:

Springer-Verlag New York Inc.
Attn: J. Keller, 21st Floor
175, Fifth Avenue
NEW YORK, NY 10010
U.S.A.

SMITH, T.G., D. St. Aubin and J.R. Geraci (ed.), 1990. Advances in Research on the Beluga Whale, *Delphinapterus leucas*. Can. Bull. Fish. Aquat. Sci. 224: 206 p.

Note: An order form is enclosed.

GAGNON, M., Y. Ménard et Y. Lavergne, 1991. Suivi environnemental de l'estuaire moyen du Saint-Laurent, 1989-1990: Variabilité spatio-temporelle de la structure des communautés et des populations ichtyennes. Rapp. tech. can. sci. halieut. aquat. 1808 F: vii + 41 p.

LANGLET, B., M. Beaulieu, L. Robidoux, Y. Vigneault et Y. Lavergne, 1991. État de la contamination en BPC dans les sédiments et les buccins *(Buccinum undatum)* de la Baie-des-Anglais (Côte-Nord du golfe Saint-Laurent). Rapp. tech. can. sci. halieut. aquat. 1792: viii + 35 p.

BELUGA

VOLUME 2, NUMBER 2-3, JUNE 1991

The **Beluga** newsletter is published three times a year by the federal Department of Fisheries and Oceans in French and English versions. It concerns the St. Lawrence beluga and its habitat. If you are interested in this beluga population and want to let our readers know about your research, educational or interpretation activities or any other activity related to the conservation of this population, we would be pleased to receive your articles.

EDITORIAL COMMITTEE

- Réjeanne Camirand, Department of Fisheries and Oceans (DFO), Québec Region
- Pierre P Marchand, Department of Fisheries and Oceans (DFO), Québec Region
- Jean-Yves Roy, Department of Fisheries and Oceans (DFO), Québec Region
- Jacques Prescott, Foundation for the Preservation of Endangered Species (FOSEM)

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SAGUENAY MARINE PARK – A PUBLIC CONSULTATION

On April 6, 1990, the federal and Quebec governments signed an agreement providing for the creation of a marine park in the fjord of the Saguenay and at the confluence of this river with the St. Lawrence to conserve and protect this unique jewel of our heritage. Under this agreement, the proposed boundaries of the park would be established following a joint public consultation held within nine months of the signing of the agreement. The consultation process started on October 11, 1990 and ended on December 9, 1990.

The proposed boundaries of the Saguenay Marine Park were presented at information sessions held between October 16 and 22, 1990 in Tadoussac, La Malbaie, Baie Sainte-Catherine, l'Anse St-Jean, La Baie and Montréal. Some 250 people participated in the meetings. Public hearings were held from December 6 to 9, 1990 in Tadoussac, La Malbaie, La Baie and Montréal.

Jacques Beardsell, CPS

Cap Bon Desir Halt

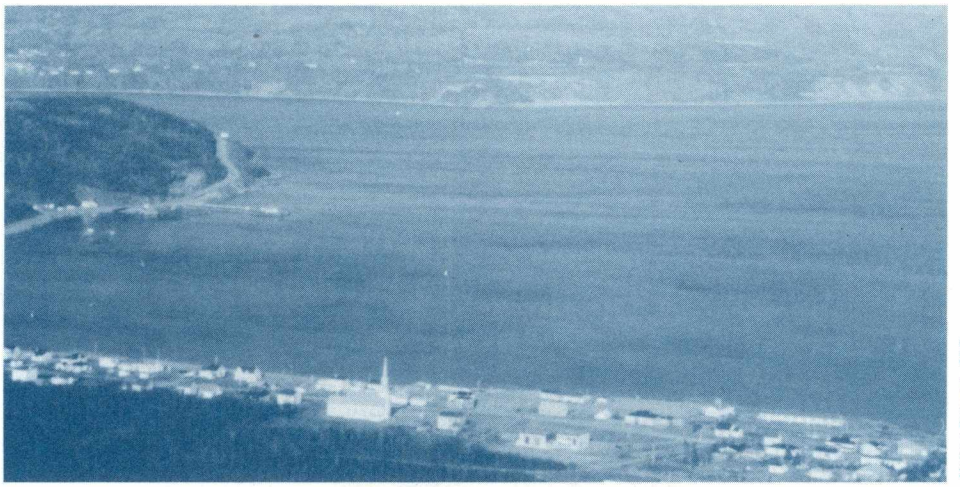
The co-presidents of the Co-ordinating committee of the Saguenay Marine Park, Gilles Desaulniers from the Canadian Parks Service of Environment Canada and Gaston Plourde from the Quebec Department of Recreation, Hunting and Fishing, chaired the public hearings on the proposed boundaries of the Saguenay Marine Park. Of the 70 briefs submitted, 30 were presented orally during the hearings.

The opinions expressed during the hearings dealt mainly with extending the boundaries of the park to the middle part of the St. Lawrence estuary, including representative elements of ecosystems on the south shore of the St. Lawrence, increasing the area of the park to include the Saint-Fulgence flats and creating a buffer zone whose role and boundaries have yet to be defined. It was also suggested that Ha Ha Bay, the islands (within the proposed boundaries) and a strip of shoreline up to Les Escoumins be included.

In addition, some groups and organizations recommended a new name for the park, a participatory style of management, increased regulation while respecting traditional rights and commercial activity. Tightening regulations in regard to commercial navigation and pollution was also discussed.

The many valuable opinions and suggestions expressed during the consultation were carefully analyzed by a committee comprising representatives from the Canadian Parks Service of Environment Canada and the Quebec Department of Recreation, Hunting and Fishing. The final decision concerning the boundaries of the Saguenay Marine Park will be made public shortly by the federal and Quebec governments.■

Rose-Aimée Bouchard
Public Participation
Co-ordinator
Canadian Parks Service
Quebec Region



Nelson Boisvert, CPS

Mouth of the Saguenay River

TOXICITY OF EELS AND TRANSPORT OF CONTAMINANTS TO THE BELUGA

The study on the toxicity of eels and the transport of contaminants to the beluga is a D.F.O. Sciences Branch project headed by Dr. Peter V. Hodson, which is being conducted under the Interdepartmental Action Plan to Favour the Survival of the Beluga Whale. The three-year project, which is scheduled to end in 1993, is being carried out with the co-operation of the Department of Fisheries and Oceans, Environment Canada's Parks Service and the St. Lawrence National Institute of Ecotoxicology.

HOW IMPORTANT IS THIS PROJECT TO THE CAUSE OF SAVING THE ST. LAWRENCE BELUGA?

The project is aimed at assessing toxic effects on eels contaminated by chemical substances from the Great Lakes, particularly Mirex, and determining whether eels represent the primary source of contamination of belugas.

American eels spend the better of their lives in freshwater and migrate to the Sargasso Sea to spawn. Eels that live in the Great Lakes accumulate high concentrations of contaminants, with two serious consequences: the eels become poisoned and they transmit contaminants to their predators, particularly the beluga. Belugas are not the only species that prey on eels but they are nonetheless the most obvious and most emotionally-charged indicator of ecosystem health in the Estuary and Gulf of St. Lawrence.

The project proposes two approaches for addressing the question "Do all contaminated food sources have an equivalent impact on the beluga?" The first consists in studying the distribution of belugas and eels to determine their distribution patterns and to ascertain whether the spatio-temporal distribution of the belugas correlates with that of contaminated eels. This approach is based on the hypothesis that the contamination of eels in the St. Lawrence Estuary is not homogeneous and that peaks in levels of chemical substances do not necessarily correspond to migration peaks. Migrating eels in some areas are more contaminated than in others. It is hypothesized that belugas feed on eels during the peak eel contamination period. Aerial surveys of the study area will be carried out frequently during the eel migration period to accurately characterize the distribution of belugas in coastal areas.

The second approach involves using a food energy model to estimate the rate of accumulation of contaminants in belugas according to their diet in order to identify the foods responsible for the contamination of their tissues. For example, an animal that lives a long time will consume a lot of food and will therefore have a higher or lower concentration of contaminants depending on its diet and the relationship between the food and contaminant absorption rates.

As is the case with food energy, the intake of contaminants depends on diet; however, contaminants behave differently. The more lipophilic a compound is, that is, the greater its absorption by fatty tissues, the more it resists being broken down and the more it will bioaccumulate. This phenomenon is responsible for the progressive accumulation of persistent organic compounds such as PCBs and Mirex.

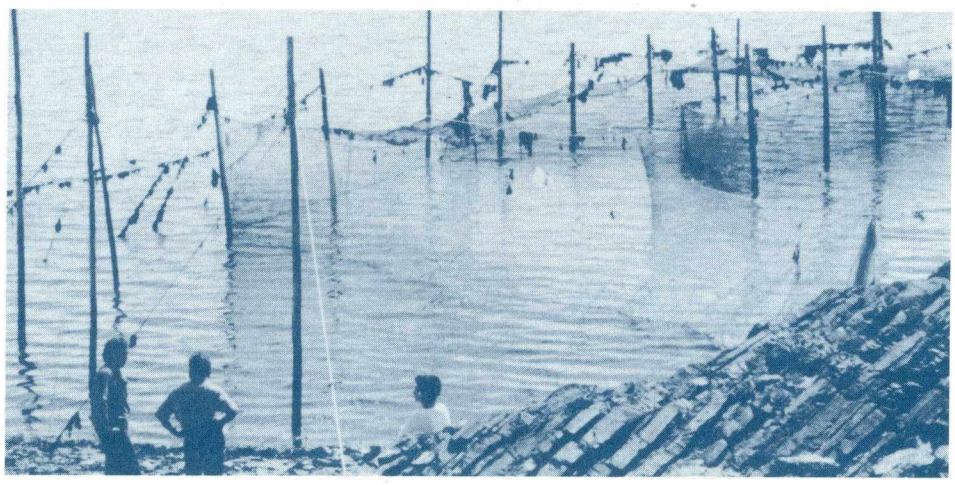
WHAT WILL THE RESULTS OF THIS STUDY BE USED FOR?

This study will make it possible to determine the role that eels play in transporting Mirex, a contaminant whose known sources are in Lake Ontario. If eels are not the only pathway of contamination, a strategy will have to be devised for rehabilitating the ecosystem as a whole. On the other hand, if eels are the sole carriers of Mirex, a different restoration approach will be required, such as increasing the number of uncontaminated eels, thus diluting the total eel population, and thereby lowering the belugas' intake of Mirex.

ACTIVITIES PLANNED FOR 1991-1992

In 1991, measurements of contaminant levels and histological and biochemical analyses will be conducted on a sample of 40 eels. Lab and field experiments will be carried out to determine the causes of eel diseases. Samples of freshwater migratory eels will be taken to remove gills for histopathological examinations and serum for ion analyses. Steps will be taken to determine the prevalence of deformities in eels from areas located upstream and downstream from hydroelectric dams to ascertain whether the lesions found are linked to deformities, in eels from contaminated lakes and rivers and those from "clean" rivers. Finally, a beluga contaminant accumulation model will be developed and subsequently tested and refined to assess the degree of contamination caused by eels compared with other sources of contaminations. Statistical data will be used to determine the sites and weeks of maximum abundance. The spatial and temporal variation of contaminant levels in eels will be studied. A series of 10 aerials surveys will be carried out in the study area before, during and after the eel migration period to accurately characterize the distribution of belugas.■

Peter Hodson
Pierre Marchand and
Lucie Chrétien
Fisheries and Oceans
Quebec Region



Peter Hodson

Fixed gear fishery

THE MARINE MAMMALS INTERPRETATION CENTRE
A DREAM BECOMES REALITY

For three years now, a team from the Marine Environment Interpretation Society (SIMM) has been working on establishing a new marine mammals interpretation centre in Tadoussac. Its efforts finally bore fruit with the Minister of Recreation, Hunting and Fishing, Gaston Blackburn, confirming a one million dollar contribution last fall. The grant was conditional upon the developer investing $290,000. in the project. The money was raised thanks to SIMM's many sponsors and especially to its major collaborators, the Caisses populaires Desjardins and the Fondation de la faune du Québec. The Tadoussac merchants also made a financial contribution of $40,000.

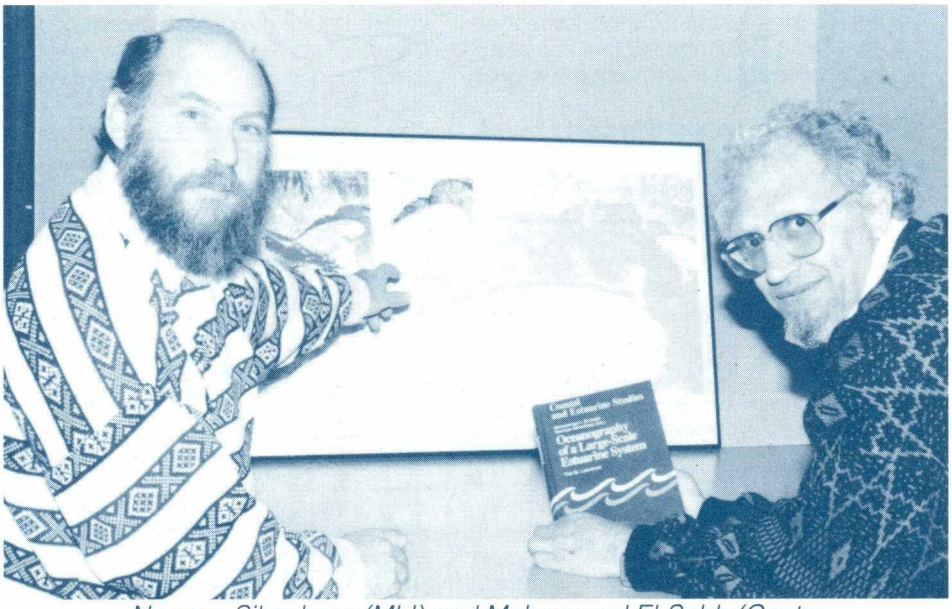
Construction started in February 1991 with completion scheduled for around June 15, 1991. A new permanent display is being finalized and will be set up in the winter of 1991-92 for official inauguration in the spring of 1992.

The Centre will be operating over the summer of 1991. Two outdoor marine aquariums interpreted by a naturalist will provide a window on the sea and its many interesting organisms-seaweed, starfish, sea urchins, anemones, etc. The Centre will also house a collection of skeletons of Tadoussac's major species, such as a 15-metre-long fin whale skeleton, and many hands-on exhibits, photographs, and miniature reproductions of St. Lawrence whales designed to increase public awareness of the mysterious world of marine mammals. Videos and a spectacular slide show will alternate in the auditorium. Tuesday to Sunday evenings, visitors can attend public presentations given by the naturalists from the Marine Environment Research and Education Group (GREMM).

The Marine Mammals Interpretation Centre (CIMM) will open on June 22, 1991. Admission is $3.50 for adults, $1.50 for children and $10.00 for families. Our team of naturalists invites you to discover the fascinating world of the whales at the brand new Marine Mammals Interpretation Centre. Come and see us.■

Patrice Corbeil
Marine Environment
Interpretation Society
Tadoussac

OCEANOGRAPHY OF A LARGE-SCALE ESTUARINE SYSTEM: THE ST. LAWRENCE
THE FIRST SCIENTIFIC BOOK ON THE ST. LAWRENCE ESTUARY



Mario Bélanger

Norman Silverberg (MLI) and Mohammed El-Sabh (Centre océanographique de Rimouski) presenting their new publication

Although the St. Lawrence is among the world's most intensively studied estuaries, it is not often mentioned in the scientific literature. To remedy this situation, Mohammed El-Sabh and Norman Silverberg have edited Oceanography of a Large-Scale Estuarine System: The St. Lawrence – an overview of the physical, chemical, geological and biological knowledge that has been accumulated about the Estuary over the past 20 years. Twenty-six contributors representing all disciplines and several research centres provide an exhaustive description of the St. Lawrence as an example of a large-scale estuarine system.

The St. Lawrence Estuary is immense in every sense of the word. It extends over more than 500 km, from Ile d'Orléans to Pointe-des-Monts and it reaches widths of 60 km and depths of over 350 metres. Phenomena normally associated with continental plateaus and open oceans can be found here. These include upwelling zones (where water from deep down wells up to the surface), eddies 10-15 km in diameter, and major tidal and density fronts (where dissimilar bodies of water meet each other). The Upper Estuary (from Ile d'Orléans to the confluence of the Saguenay) resembles many other estuaries around the world, with its abundant shoals and its high turbidity and large changes in salinity. The Lower Estuary, however, is in many respects unique: because of its vast extent, and the exchange of water coming from the Atlantic, it is more oceanic in nature than most estuaries. Other points of special interest are the ice cover during a portion of the year and the influence of unseasonal releases of fresh water into the Estuary associated with hydro-electric power systems.

A MANY-FACETTED ESTUARY

The book addresses a wide range of topics. It begins with the physics of circulation and mixing in the Estuary, since hydrodynamic phenomena underlie the transport, distribution and reaction processes of interest to chemists, biologists and geologists. Numerical models are presented and used to synthesize information on tides on currents caused by tides, and variations in salinity and velocity are discussed.

Next come the geological and chemical aspects of the Estuary, including sediment distribution, transport and mixing of suspended particulates and of organics matter, sediment - water interactions, and chemical contamination of the Estuary. Because of the great distances particles may travel in the St. Lawrence, it is possible to isolate and observe certain chemical phenomena that cannot be tracked in smaller estuaries thay have shallower depths and rapid mixing. The St. Lawrence Estuary has been partially protected from pollution by its immense volume of water and its strong tidal activity, but it is not immune, as evidenced by the number of beaches closed to shellfish gathering, and the condition of the beluga whale population.

The chapters that follow review the biological aspects of the Estuary, including the ecology of the phytoplankton, zooplankton, and ichthyoplankton (fish larvae), as well as the littoral (shoreline) and deep bottom fauna. Also examined are the hydrodynamic processes affecting the abundance of commercial fish species in the Gulf of St. Lawrence.

There is a separate chapter on the Saguenay Fjord. With a length of 170 kilometres and a depth of 280 metres, the Fjord is a fair-sized estuary in its own right. Then in the final chapter the editors highlight the main features of the Estuary and summarize the current state of our knowledge of this fascinating body of water. The book includes a subject index and an exhaustive and up-to-date bibliography.

A COLLECTIVE EFFORT

The scientists who contributed to the book represent the following institutions: Centre océanographique de Rimouski, the Maurice Lamontagne Institute (Department of Fisheries and Oceans, Mont-Joli), McGill University, IFREMER (France), the Université du Québec at Chicoutimi, Université Laval, the Northwest Atlantic Fisheries Centre (Department of Fisheries and Oceans, Newfoundland), the Bedford Institute of Oceanography (Department of Fisheries and Oceans and Department of Energy, Mines and Resources, Nova Scotia), and the Institute of Ocean Sciences (Department of Fisheries and Oceans, British Columbia).

Oceanography of a Large-Scale Estuarine System: The St. Lawrence is available for $79. US from Springer Verlag (offices in Berlin, New York, Heidelberg, London, Paris, Tokyo, Hong Kong and Barcelona).■

Viviane Haeberlé
Fisheries and Oceans
Quebec Region

MANAGEMENT OF DREDGED MATERIALS AND HABITAT PROTECTION

The Department of Fisheries and Oceans is directly involved in the maritime development of the St. Lawrence and is constructing and maintaining several dozen fishing harbours and marinas along the St. Lawrence River.

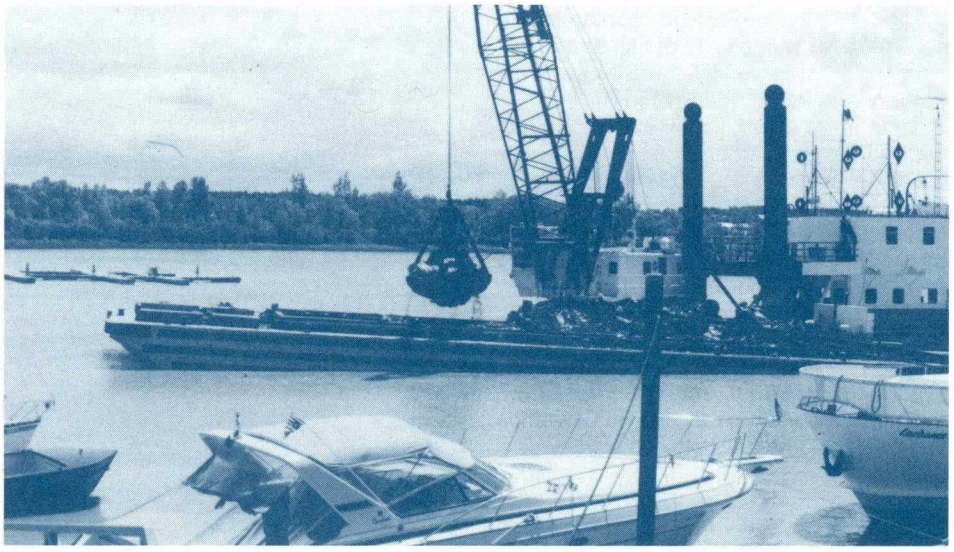
Maintaining this infrastructure requires frequent dredging and the excavation of large quantities of material to ensure proper depth of boat basins and channels. Several thousand cubic metres of sediment are dredged up each year. This material is used in the improvement of port facilities and the construction of embankments and is also dumped into open water.

Dredging can have a negative impact on the marine environment as sediments are stirred up during the operation and discharged into open water.

The Fish Habitat Management Division is mandated to evaluate the nature and extent of the impact of such operations. During project analysis, many factors are taken into consideration so as to minimize negative repercussions on fish habitat and its populations. Sediment nature and composition, the presence of contaminants in the sediments, the chosen disposal site, the timing of the work, the type of dredging equipment, the aquatic resources and the sensitivity of habitats where operations are to be carried out are all factors to be considered when evaluating impact and recommending adequate mitigation measures.

When projects scheduled for marine environments are evaluated, particular attention is paid to the beluga because of its status as an endangered population in the St. Lawrence. To this end, the Fish Habitat Management Division has completed a study on the annual distribution of the beluga in the St. Lawrence and a preliminary description of its habitat. This study and the mapping of beluga habitat which resulted are first-rate tools for analysts preparing precarious situation notices. Since the beginning of the 1991-1992 season, the Division has analyzed and issued notices about dredging projects for six ports located in areas frequented by the beluga.

This process allows the Department to continue its harbours development activities while ensuring the protection and management of a most fragile resource, the St. Lawrence beluga.■



Anne Labbé

Yves Lavergne
Fisheries and Oceans
Quebec Region

A BELUGA AWARD

Last winter, the Union québécoise pour la conservation de la nature (UQCN) called upon the public to participate in its "Stratégies Saint-Laurent" contest by nominating candidates for the Beluga Environmental Merit Award and the Pollution Award.

To be eligible, companies or organizations nominated for the two prizes had to be located along the St. Lawrence River or one of its tributaries and their activities had to have a major positive or negative impact on the environment. Companies could be involved in such industrial sectors as food and agriculture, aluminum smelting or metallurgy, chemicals or petrochemicals, mining, pulp and paper, surface treatment and environmental technologies. Conservation, research, planning and municipal organizations of a public or private, profit or non-profit nature could also be nominated.

At press time, the UQCN advised us that the winners would be announced by the end of September. More details in a future issue.■

CONTAMINANTS AND TOXICITY OF BENTHIC FISH AND INVERTEBRATES IN THE ST. LAWRENCE ESTUARY AND THE SAGUENAY FJORD

The project on "contaminants and toxicity of fish and invertebrates in the St. Lawrence Estuary and the Saguenay Fjord", which is to span three years, from 1990 to 1993, is headed by Dr. Catherine Couillard of the Maurice Lamontagne Institute of the Department of Fisheries and Oceans, Quebec Region. One of the projects covered by the St. Lawrence Action Plan, it is being carried out in collaboration with the Fisheries and Habitat Management Branch of D.F.O., the St. Lawrence Centre, Environement Canada's Parks Service, the University of Quebec's national scientific research institute (Oceanology) and the St. Lawrence National Institute of Ecotoxicology.

Six researchers, Drs. Pierre Béland, Catherine Couillard, Peter Hodson, Emilien Pelletier, Bernard Sainte-Marie and Jean-Marie Sévigny, contribute equally to this research project.

The objective of the project is to evaluate problems relating to contamination and exposure to toxic substances in the St. Lawrence Estuary. The two questions at the centre of this effort are:

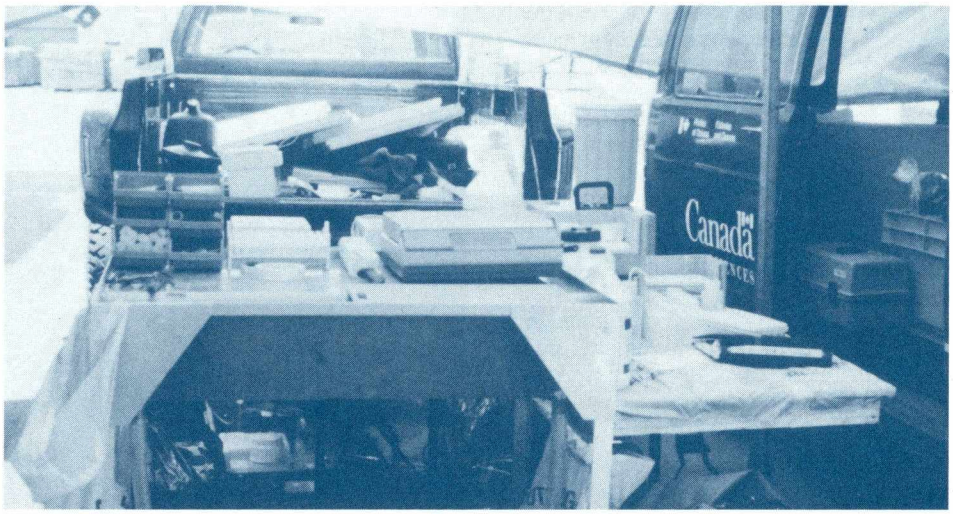
1- Is the Estuary contaminated? and

2- If so, are exposed populations adversely affected? In other words, can signs of toxicity be detected?

The study areas are thus regions with high exposure to chemical contaminants: the Saguenay River and the Baie des Anglais near Baie-Comeau. Sampling of sediments, three species of invertebrates (Northern shrimps, Atlantic snow crab and the whelk), and three species of fishes (Atlantic cod, Canadian plaice and Greenland halibut) will therefore be carried out in these areas. A fourth species of invertebrate, the Arctic Argid *(Argis dentata)*, is sampled in Baie des Anglais.

Three hypotheses are to be tested:

1) the sediments and organisms are contaminated;



Catherine Couillard

Field lab

2) individual subjects show signs of chemical toxicity;

3) the populations are affected by chemical toxicity.

The tests will consist of chemical analyses to measure the concentrations of contaminants such as PCBs, DDT, Mirex, furans and dioxins. An effort will be made to detect biochemical signs of toxicity (enzyme activity, proteins) and any general signs such as disease and deformities. In addition, genetic analyses will be conducted with a view to ascertaining whether there has been any decline in genetic variation and to identify any new strains which may have developed as a result of contamination.

IMPORTANCE OF THE PROJECT IN RELATION TO THE SITUATION OF THE ST. LAWRENCE BELUGA

This project targets the problem of contamination and the impact on the St. Lawrence River and particularly the beluga habitat. The St. Lawrence beluga has the status of an endangered population, and direct studies of these mammals are therefore limited and non-intrusive. By studying other, unendangered species in the same environment, it is possible to obtain a larger sample without creating stress for the beluga population. Consequently, if the lesions or other anomalies detected in the subject species are attributable to contaminants, this means that the St. Lawrence beluga too is subjected to chemical stress. The species of invertebrates and vertebrates used for the analyses are found in various trophic levels and different microhabitats. Discovering signs of toxicity in all these levels of the food chain would indicate a generalized effect of contaminants on the habitat.

WHAT WILL THE FINDINGS BE USED FOR?

Once this project is completed, we will be able to evaluate the contamination and toxicity problems affecting the most vulnerable species in habitats subject to the highest levels of contamination. In addition, the project will provide us with new data on how contaminants move up the food chain, and identify avenues for future ecotoxicology research in the Saguenay and the Estuary. If signs of toxicity are detected, subsequent studies will be carried out to ascertain the magnitude and gravity of the situation in the St. Lawrence Estuary, taking into account those regions and trophic levels that are less exposed to contamination.■

Pierre Marchand and
Lucie Chrétien
Fisheries and Oceans
Quebec Region