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PREVENTING DISTURBANCES OF BELUGAS AND OTHER WHALES

The beluga population in the St. Lawrence numbers about 475, and since 1983 it has had the status of an endangered population. Two important causes of this precarious situation: their habitats are experiencing high levels of pollution, and shipping is disturbing their feeding, resting and birthing grounds.

The Department of Fisheries and Oceans has only a single ship, "Le Foulon", to monitor compliance with measures to protect the beluga. From its base at the Tadoussac marina, this ship serves an area that includes the Saguenay River and its mouth.

"Le Foulon" carries two of the Department's fishery officers. Their main function is to increase awareness, among pleasure boaters and captains of tour boats, about guidelines on disturbing whales. There are few statutes governing this matter; they amount to a prohibition on deliberately hunting or harassing a beluga, but no definition of "harassment" is given. There is a fine of up to \$5000 and a maximum prison term of 12 months for anyone found to be in violation of the law. There are also a number of guidelines to prevent disturbances of whales, but since they are not laws, compliance depends on the good will of pleasure boaters and tour boat captains. Still, compliance does avoid situations that might constitute "harassment" and thus a violation of the law.

There are two documents which fishery officers distribute on this subject:

- 1 "Guidelines to Small Craft Owners and Tour Boat Captains to Prevent any Disturbance and Harassment of the Whales";
- 2 "Guidelines to Small Craft Owners to Prevent the Disturbance of Belugas".

The guidelines to prevent disturbing the beluga recommend gradual reduction of speed (to 5-9 knots) when near a whale, and avoidance of feeding and resting areas such as Ste-Catherine bay, Ste-Marguerite bay, St-Etienne cove and the southern side of Ile aux Lièvres. Whale-observing boats should stay away from these areas, and craft that cannot avoid entering the areas should pass through at a maximum speed of 5 knots.

We went out on the "Foulon" for one of its patrols, and observed that a great many

small craft do not comply with the guidelines, either because they don't know about them, or don't care. That is why there are regular educational campaigns to increase awareness of the need for everyone to follow the guidelines and take responsibility for conserving this precious resource. An important event in this regard is the pre-season training which has been given once a year since 1986. It aims to inform all concerned of the regulations and guidelines applying to whale observation, and to demonstrate, through simulations of the kinds of situation that can arise, how to approach whales and how far away to stay.

This year the training session took place on June 19 and 20 at Tadoussac. It attracted tour boat captains and owners, naturalists, the members of the Advisory Committee on whales, and fishery officers responsible for surveillance. The first day was spent going over the guidelines, and the second was a "cruise workshop" during which various situations were simulated.

The best approach to preventing disturbances continues to be that of monitoring Ste-Catherine bay from the Pointe-Noire viewpoint, and the Estuary from the interpretation centre at the Cap de Bon-Désir lighthouse. ■

*Pierre Marchand
and Lucie Chrétien
Fisheries and Oceans
Quebec Region*



Aboard the "Foulon"



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THE SAGUENAY/ST. LAWRENCE MARINE PARK: A CHALLENGE FOR REGIONAL DEVELOPMENT

The place where the Saguenay River flows into the St. Lawrence is an area of exceptional beauty. It extends from St-Siméon to Les Escoumins and includes the islands located in the St. Lawrence. Among its many features are spectacular escarpments, vast forests, sparkling streams, a wide range of marine birds and fish, and of course the whales, including the biggest one in the world, the blue whale. The area is also visited each year by an endangered population the few remaining St. Lawrence beluga whales.

This location, with its many distinct ecological environments, has been selected by the Government of Canada for a marine park. Of all the marine species found here, the marine mammals are without a shadow of a doubt the most spectacular. Also, according to many environmental groups, it was the need to protect the beluga that triggered the decision to create the park.

Despite the enthusiasm engendered by the announcement of the park last spring, several questions remain unanswered:

1. THE IMPACT OF THE PARK ON THE PRESERVATION OF MARINE SPECIES AND THEIR HABITAT

The park extends over one of the richest marine environments in Canada, whose oceanographic features make of it a resource of the greatest importance. The flourishing whale-watching industry is helping support a fragile regional economy. By preserving shorelines and landscape in their natural state, the park will further add to the region's attractiveness for tourists. A range of outdoor and interpretation activities will be developed, and the existing international renown of the Charlevoix region will be consolidated. What measures can governments take to reduce pollution of the St. Lawrence and the Saguenay and thus protect the area's natural resources?

2. THE PARK'S BOUNDARIES

According to the Charlevoix Regional Tourism Association, the tentative boundaries of the park should be changed to include a

larger segment of the majestic St. Lawrence. In recent years, several important initiatives have been undertaken by both public and private organizations: for example, several islands in the River have been purchased with a view to conservation, and a World Biosphere Reserve has been established in the Charlevoix region. The challenge is to integrate these initiatives into a coherent whole so as to maximize their effectiveness for conservation.

My own view is that the St-Siméon area should not only be included in the park, but should also be recognized as the park's centrepiece, given its strategic position with respect to the rest of the area.

3. THE DEGREE OF INVOLVEMENT OF LOCAL PEOPLE IN THE WHOLE PROCESS OF ESTABLISHING THE PARK AND IN ITS MANAGEMENT

The local communities have a lively interest in conserving marine species and habitats. There is broad support for the creation of a marine park. Decisions taken during federal provincial negotiations which excluded the regions from having a say in the park boundaries may undermine the spirit of co-operation which is essential to establishing the park.

It will probably be necessary, over the coming months, to create a multi-sector working group, including representatives of the regions affected by the park so as to involve them in decisions regarding park planning and management. Parks Canada must understand that the proposed park will become a reality only if the people in the region are involved in all aspects of the process of establishing it. ■

*Charles Roberge
Regional Development Co-ordinator
Charlevoix Regional Tourism
Association*

BELUGA

VOLUME 2, NUMBER 1, OCTOBER 1990

The *Beluga* newsletter is published four 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.

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- 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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DELPHI THE BELUGA

Delphi is a very special beluga whale. You can see him eight hours a day seven days a week, for three months of the year. You can also play with him as long as you like. Delphi is the latest acquisition of the CIMM (marine environment interpretation centre) at Tadoussac. He may sometimes look very real, but he's actually a computer graphic. The Delphi program acquaints users with three of the St. Lawrence beluga's summer habitats. Users also learn which kinds of food attract the beluga, and which toxic chemicals are contaminating its prey. This educational game was devised by the GREMM (marine environment education and research group), in co-operation with the Fish Habitat Management Division of the Department of Fisheries and Oceans (Quebec Region).

The aim of the game is to give Delphi his daily food ration—about 12 kilograms (kg) of food. You start with 3 energy points and 0 kg of edibles. You select one of the three sites (Ile aux Lièvres, Sainte-Marguerite bay, or the waters off Les Escoumins) and one of three suggested

prey species (e.g. eels, capelins, benthic fauna, sole). But you have to watch out. Delphi may be using up more energy than he is taking in. So if the energy scale drops to zero before you have succeeded in feeding Delphi 12 kg of food, you lose. But if you manage to select the right prey, the kind that will let Delphi grow, then you win. Each time you select a site and a prey species, you receive information about them. As well, a list of toxic chemicals appears on the display screen.

A few technical details: Delphi swims across the 13" colour screen of a Macintosh computer (Mac IIci with 80 MB hard disk and

8 MB RAM). Swivel 3D software divides Delphi into 15 separately moving segments and allows 3D motion. And thanks to Direction Animation software, Delphi lives in a 16-colour environment. Just like the real thing!

To a great extent, Delphi owes his existence to the efforts of Jean-Pierre Delage (professor at the Université du Québec in Rimouski) and Grant Mathieu (a GREMM graphic artist). It took several months to create this high-quality interactive product at the leading edge of computer technology. The thousands of children and adults who will be visiting the CIMM each summer will benefit. The program provides an entertaining and interesting way of discovering the beauty and fragility of the marine ecosystem of the St. Lawrence beluga. It thus fits in with the CIMM's mandate to provide enjoyment while learning.

Delphi is waiting for you! ■

**Nathalie Boudreau and
Patrice Corbeil
Groupe de recherche et
d'éducation sur le milieu marin
(GREMM)**



Delphi the Beluga

TEN INUIT STUDENTS WIN A WHALE-OBSERVING EXCURSION

In the beluga art contest we told you about in an earlier bulletin (Vol.1, No.4), ten Inuit students from the Kativik School Board won a five-day trip to "southern" Quebec.

The students, from the Ungava and Hudson Bay region, were welcomed in Quebec City on August 6 by two representatives from the Department of Fisheries and Oceans, Mimi Breton (advisor on marine mammals) and Marie-Louise Poulin (a communications officer), who accompanied the group on its trip to the Tadoussac area.

All the winning drawings were exhibited in the lobby of the capital city's Repotel hotel, where the winners were announced and received their certificates in the presence of the media. The drawings were also exhibited in Tadoussac, in the lobby of the Béluga hotel, whose owners gave the visitors a warm welcome.

On August 7, 8 and 9, the students got a chance to visit the Pointe-Noire interpretation centre as well as the Marine Environ-

ment Interpretation Centre (C.I.M.M.) in Tadoussac. The information at these centres succeeded in holding their attention because of its high quality.

Another highlight of the three-day visit was three cruises on the Saguenay River and in the St. Lawrence Estuary. The students were able to observe belugas and other whale species such as the rorquals (which cannot be found in Hudson Bay or Ungava Bay).

Their first reactions were typical of hunters lying in wait. They stared ahead, not daring to make any noise for fear of frightening the animals. This may seem surprising at first, but it makes sense when you realize that the Inuit hunt for a living. For them, the whales were prey rather than a tourist attraction.

The trip allowed these young Inuit to see a different side of southern Quebec — not the Quebec of large urban centres providing social services, hospitals and so forth, but the gorgeous landscapes of the Saguenay Fjord and the marvellous marine fauna.



To conclude, we should mention that all this would not have been possible without the contest sponsors. The Department of Fisheries and Oceans would like to thank the Makivik Society (Air Inuit), the Kativik School Board, Canadian Airlines International, Les Croisières du Grand Fleuve, Les Croisières Navimex (two cruise companies), the Dufour family, the Société linnéenne du Québec, the Groupe de recherche et d'éducation sur le milieu marin (Marine Environment Education and Research Group), the Chateau Repotel, and the McDonald's restaurant in Ancienne-Lorette. ■

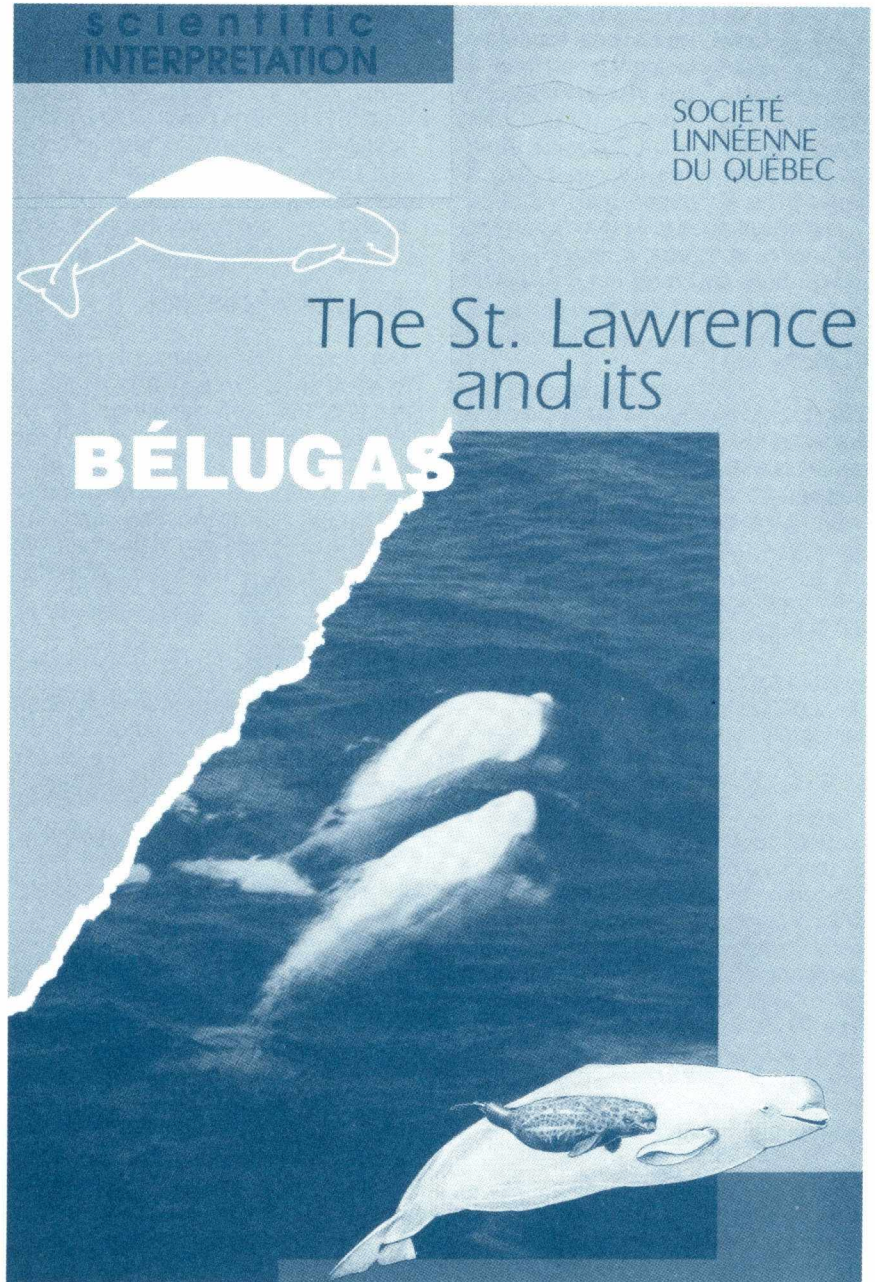
**Pierre Marchand and Lucie Chrétien
Fisheries and Oceans**

RECENT PUBLICATIONS

Michaud, R., A. Vézina, N. Rondeau et Y. Vigneault, 1990. Distribution annuelle et caractérisation préliminaire des habitats du béluga (*Delphinapterus leucas*) du Saint-Laurent. Rapp. tech. can. sci. halieut. aquat. 1756: v + 31 p. *Contact*: Yvan Vigneault, Département of Fisheries and Oceans, Fisheries and Habitat Management Branch, Fish Habitat Management Division, Champlain Harbour Station, P.O. Box 15,500,901 Cap Diamant, Quebec City, Quebec, G1K 7Y7

Smith, T.G., M.O. Hamill, 1990. A Bibliography of the White Whale, *Delphinapterus leucas*. Can. MS Rep. Fish. Aquat. Sci. 2060: ii + 45 p. *Contact*: Thomas G. Smith, Fisheries and Oceans, Arctic Biology Station, 555 St. Pierre Blvd, Sainte-Anne-de-Bellevue, Québec, H9X 3R4.

Plourde, S. & Rooney, E. *The St. Lawrence and its belugas*. Québec, Société linnéenne du Québec, 1990, 32 p. (\$5.95) Also available in french under the title "Le Saint-Laurent et ses bélugas". *Contact*: Société linnéenne du Québec, Aquarium de Québec, 1675 avenue du Parc, Sainte-Foy, Québec, G1W 4S3. ■



RECENT ADOPTIONS

The St. Lawrence National Institute of Ecotoxicology has announced the adoption of a 58th whale under the "Let's Adopt a Beluga" program that was started in the fall of 1988. Since our update of May 24 (Beluga bulletin Vol.1, No.4), four new adoptions in all have taken place as of October 18, 1990. Here are the new whales and their sponsors:

NAMES	SPONSORS
55th VITA	Shacklee Canada
56th SIRIUS	Employees of the Quebec Department of Recreation, Hunting and Fishing
57th BACH	Employees of the Quebec Department of Recreation, Hunting and Fishing
58th NAKAMU	Students of the Faculty of Law, Université de Montréal

If further adoptions take place during the fall, we will let you know in the next issue of the bulletin. Organizations or groups interested in adopting a beluga should contact:

Institut national d'écotoxicologie du Saint-Laurent
310, avenue des Ursulines
Rimouski (Quebec) G5L 3A1
Telephone.: (418) 724-1746

Lucie Chrétien
Fisheries and Oceans
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RECOVERING CARCASSES OF BEACHED BELUGAS

In April 1990, the INESL (St. Lawrence National Institute of Ecotoxicology) submitted to the World Wildlife Fund (Canada) its second report on marine mammal mortality in the Quebec portions of the Gulf and Estuary of the St. Lawrence as well as in the St. Lawrence River. This report deals with 1989-1990, and one chapter is devoted entirely to the St. Lawrence beluga. Research for the report was done by Pierre Béland, Sylvain De Guise and Richard Plante.

STATISTICS

In 1989, 20 beached beluga carcasses were recovered in the Quebec portion of the St. Lawrence, about the same number as in 1988, when 21 were recovered. The average age of the adults was 22, with about equal numbers of males and females. Only one of the 20 animals was a calf, which is less than the annual average of 20% for 1983-1988.

The animals' state of health, as determined by tumours, lung lesions and so forth, was comparable to previous years.

In the males, there was a slight increase in DDT levels and a slight drop in PCBs over the period 1982-1989. Mercury played a major role as a contaminant of liver tissue, and its concentration increased with the animal's age. Small quantities of cadmium were also present, and Mirex was found in low concentrations. According to Béland and Martineau, the presence of Mirex can only be explained as a result of the consumption of eels migrating from Lake Ontario.

Causes of mortality fell into three categories:

- 1 unknown because it was not possible to examine the animal (4 cases in 1989);
- 2 natural cause - no pathology identified (15 cases);
- 3 collision or blow of some kind (1 case).

CONDITION OF CARCASSES

The condition of the carcass is assessed in terms of the ratio of the blubber to total body weight. A whale is deemed to be thin if the ratio is less than 30%. The condition of the St. Lawrence beluga proved to be the same as that of the Arctic beluga: according to the criterion, none of the carcasses were thin (though one was 29.8% blubber).

REPRODUCTIVE SYSTEM

The reproductive organs of both males and females were examined. In all the males, the testicles were normal and active. An interesting finding with the females was that 63% of them had a thick mass of mucus blocking the cervix, a phenomenon unrelated to gestation. In previous years, this was found in only 18% of non-pregnant females (4 out of 22) or in females who had recently given birth (1 out of 3).

PATHOLOGY

In 1989, eight belugas were transported to the laboratory for a necropsy, and eight others were examined on the beach. The findings were the same as in 1988:

- 1 high rate of ulcers in the digestive tract;
- 2 high rate of pulmonary problems;
- 3 periodontal disease common;
- 4 large numbers of tumours;
- 5 mastitis common (four females out of six).

Gastric papillomas and other lesions were found more frequently in 1989 (three out of eight animals). In 1982 and 1986, only one case was found.

HEAVY METALS

St. Lawrence belugas differed from Arctic belugas in the concentrations of mercury, cadmium and lead that were found. They had higher levels of mercury and lead. Mercury levels ranged from 0.03 to 366.03 ppm, and cadmium levels from 0.07 to

0.087 ppm. Lead was present in the liver in small quantities, just within the limit of detection. Belugas do not excrete mercury, and it accumulates in the liver over time, easily reaching concentrations of 100 ppm, and thus highly likely to have toxic effects.

ORGANOCHLORINES

Three common kinds of organochlorine compounds (PCBs, DDT and Mirex) are present at higher levels in St. Lawrence belugas than in Arctic belugas. PCB levels are higher in males, and increase with the animal's age. The same is true of DDT, but in females there were no apparent changes in DDT levels with age between 1982 and 1987. The most characteristic toxic compound found in the fatty tissue of St. Lawrence belugas is definitely Mirex, at levels 72 times those found in Arctic belugas. In the case of Mirex, there is no difference between the sexes and no relationship between concentration and age.

ST. LAWRENCE BELUGAS IN THE ARCTIC?

Since 1987, beluga carcasses have been found in the spring at locations far to the east of the St. Lawrence beluga's summer territory, for example off Prince Edward Island, Anticosti Island, and the Mingan islands. In 1990, two carcasses were recovered along the Atlantic coast of Newfoundland. These findings raise the possibility of exchanges between the St. Lawrence and Arctic populations. Next year, genetic analyses will be made so that the geographic origin of belugas observed in this intermediate area can be identified.

The study of beluga carcasses will end in 1991, with a final report covering the entire period 1988 - 1991. ■

Lucie Chrétiën
Fisheries and Oceans
Quebec Region

PROJECTS GO FULL SPEED AHEAD AT THE MAURICE LAMONTAGNE INSTITUTE

In 1989, as part of the Interdepartmental Action Plan to Favour the Survival of the St. Lawrence Beluga Whale, the Sciences Branch of the Department of Fisheries and Oceans at the Maurice Lamontagne Institute in Mont-Joli initiated seven research projects to take place over a four-year period.

The aim is to learn more about the St. Lawrence beluga and its habitat. Four of the projects concern environmental toxicity, while the others deal with ocean currents, the beluga population, and the ways in which toxic compounds enter the habitat.

CONTAMINANTS, FISH AND INVERTEBRATES

Many contaminants are known to have a tendency to accumulate in lipophilic tissues such as those of the liver and kidneys. But which ones actually do so, what effects do they have, and what concentrations of them are to be found in beluga whales? Two of the projects seek to answer these questions. One is called "**Contaminants and toxicity of fish and invertebrates in the St. Lawrence Estuary and the Saguenay Fjord**", and the other "**Sublethal effects of contaminants in the St. Lawrence River**".

TRANSPORT OF CONTAMINANTS

Since the first goal is to decrease the concentrations of those contaminants which are toxic to the beluga, identifying these is a priority. Most of these contaminants are exported from the Great Lakes. They enter the area either in solution or, more commonly, as particulates: toxic compounds become attached to particles suspended in the water and are then deposited on the river bed, where they accumulate. When these sediments are disturbed by currents or by dragging, the contaminants go back into suspension and are transported to new locations. This is why one of the projects aims to establish "**An Inventory of chemical contaminants in the sediments of the St. Lawrence Estuary**".

Since organisms like fish (eels) accumulate contaminants (PCBs, DDT, PAHs,

etc) and heavy metals (mercury, lead, cadmium, etc), and since belugas feed on these organisms, the chemicals accumulate in their fatty tissues. Thus eels, which are part of the beluga's diet, have been found to be major carriers of Mirex, a pesticide formerly employed in the United States. The eels migrate to salt water (the Sargasso Sea) to spawn, and then return to the Great Lakes, thus passing through the beluga's habitat. This is the problem dealt with in the project entitled "**Toxicity of eels and transport of contaminants to the beluga**".

PATHWAYS THROUGH THE FOOD CHAIN

Contaminants are known to exist in the sediments on the river floor as well as in the water itself. There are thus two paths by which they can reach the beluga: from sediment to benthic worms to bottom fish, or from water to plankton to euphausiid crustaceans to pelagic fish. The purpose of the project entitled "**Pathways of contaminants into and through the food chain in the St. Lawrence**" is to check the hypothesis that the primary and secondary levels in the food chain (bacteria, phytoplankton and zooplankton) play a determining role in bringing toxic substances from the water in the St. Lawrence Estuary into and through the food chain that leads to the beluga.

THE CURRENTS IN THE ST. LAWRENCE ESTUARY

The fifth project is work on a "**Numerical model of the circulation in the St. Lawrence Estuary**". This is to be a reliable three-dimensional model of the marine currents. It is hard to exaggerate the importance of such a model: in an environmental emergency such as an oil spill, it could be used to describe or predict the movement or dispersion of the oil slick. The model should be able to account for changes in movement

over time arising from wind and tidal action.

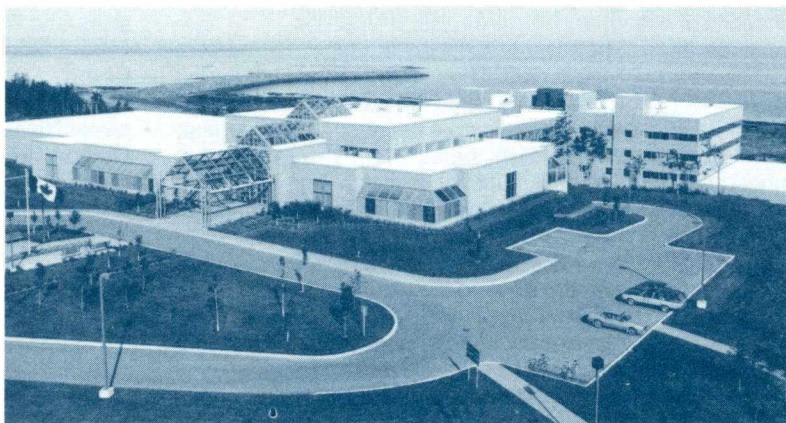
THE ST. LAWRENCE BELUGA POPULATION

The sixth and final project deals directly with the beluga population itself. The aim is to determine the animal's distribution and identify the constraints on its population dynamics. How do contaminants, noise and marine currents affect the growth of the population? Carcasses of beached belugas are recovered and analysed, contaminants are identified and quantities measured, and the causes of death are determined. The project is also trying to identify which habitats are used on a seasonal basis and what the patterns of migration are.

These six projects, all concerned specifically with the beluga whale, constitute one aspect of the larger St. Lawrence Action Plan. Research to ensure this population's survival is thus moving full steam ahead. The projects are being supported financially by the Department of Fisheries and Oceans (Sciences Branch, and Fisheries and Habitat Management Branch) and by Environment Canada (St. Lawrence Centre and Parks Service). Governments and universities are working together to advance our knowledge, in hopes that the disappearance of the St. Lawrence beluga can be avoided. Let us constantly bear in mind that the health of a population such as the beluga is but a reflection of the state of the River and the environment as a whole.

Future issues of the Beluga bulletin will cover these projects in more detail. ■

*Pierre Marchand
Fisheries and Oceans
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Maurice Lamontagne Institute