



WATER

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BIOLOGICAL RESOURCES

USES

# BELUGA WHALE POPULATION OF THE ESTUARY

## Background

Since 1983, the St. Lawrence Beluga Whale population has been classified as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). This population, which probably numbered several thousand at the end of the 19th century, came under intensive hunting pressure in the first half of the 20th century. The population is also affected by chemical contamination and by serious health

problems that have been observed in whales stranded along the shores of the St. Lawrence in recent years.

In response to initial surveys conducted in the 1970s, which estimated the number of individuals at as few as 300 and on the decline, hunting of St. Lawrence belugas was banned in 1979. Almost 20 years later, in 1996, a recovery plan was introduced. The plan set out research priorities and initiatives aimed at reducing pressure on the pods, and

recommended that the population be monitored in order to verify the long-term success of the recovery measures.

## Program Description

The monitoring, carried out by the Department of Fisheries and Oceans (DFO), comprises two components: a population survey and the monitoring of reported strandings along the shores of the estuary.

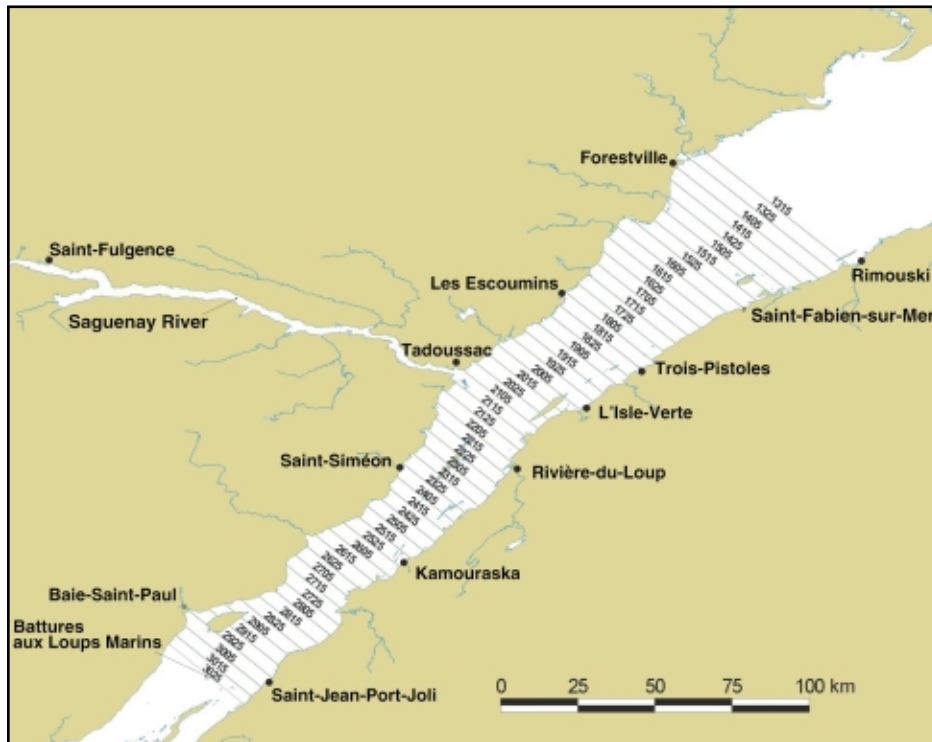
Since 1988, an aerial photographic survey has been carried out every two or three years in order to monitor changes in the population. In the most recent survey, conducted in 2000, two aircraft equipped with a mapping camera flew 52 strip transects over the estuary, from Baie-Saint-Paul to Rimouski (Figure 1).



Photo: Yvonique Lesage, Fisheries and Oceans Canada

A pod of belugas in the St. Lawrence Estuary. Juveniles are generally grey.

**Figure 1. Map of the St. Lawrence Estuary, showing the strip transects of the aerial photographic survey of the beluga population in 2000**



Although the best available technology is used, it is impossible to obtain an exact count, because an unknown proportion of belugas are beneath the surface at the time of the observations. As a result, a correction factor is applied to the number of belugas observed in order to obtain an index of population abundance that takes account of the individuals beneath the surface.

The program to recover and gather information on beluga carcasses stranded along the shores has been ongoing since 1982. Local residents are often the first to discover stranded belugas, and many of them report the strandings to DFO. A communications network was therefore created to receive calls from the public concerning stranded marine mammals, including belugas. A record is kept of each stranding reported to the

Maurice Lamontagne Institute (MLI), with as much detail as possible. When a carcass meets the selection criteria (good state of preservation, site accessibility), it is transported to the Faculty of Veterinary Medicine of the University of Montreal in Saint-Hyacinthe, where a complete post-mortem examination is conducted. If the carcass is in an advanced state of decomposition or impossible to transport, the post-mortem is conducted on site. The scientists gather a variety of data on the individual and collect certain organs and tissues for detailed genetic, toxicological, pathological, parasitological and microbiological examinations. This information provides a better understanding of the biology of the species and can sometimes reveal the causes of mortality in St. Lawrence belugas.

## Overview of the Situation

In the most recent survey in 2000, the population abundance index was estimated at 527 individuals for the entire study area. The comparison of this estimate with the five indices obtained between 1988 and 1997 revealed no significant change in the abundance of belugas in the St. Lawrence Estuary since 1988 (Figure 2). However, recent research has determined that a correction factor of 109%, rather than 15%, would be more appropriate to account for the number of individuals not visible at the water's surface during an aerial survey. Applying this correction factor would bring the beluga population of the estuary in 2000 to an estimated 952 individuals.

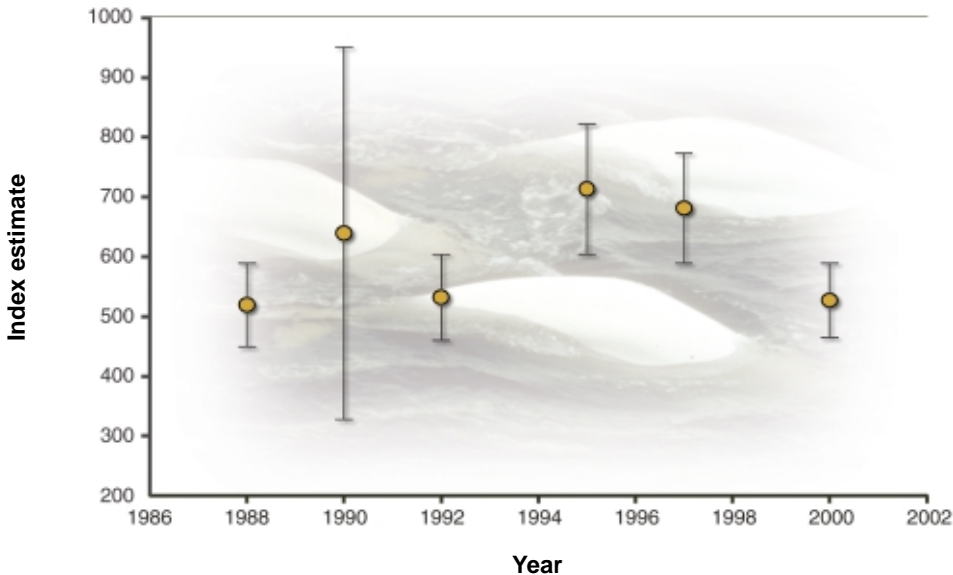
With respect to the monitoring of strandings, 297 cases have been documented since 1983, the first complete year of the program. The number of strandings reported annually has remained



*Conducting a post-mortem examination on a beluga carcass*

Photo: Fisheries and Oceans Canada

**Figure 2. Analysis of published abundance index trends ( $\pm$  standard error) including a correction factor of 15% for individuals not visible at the surface**

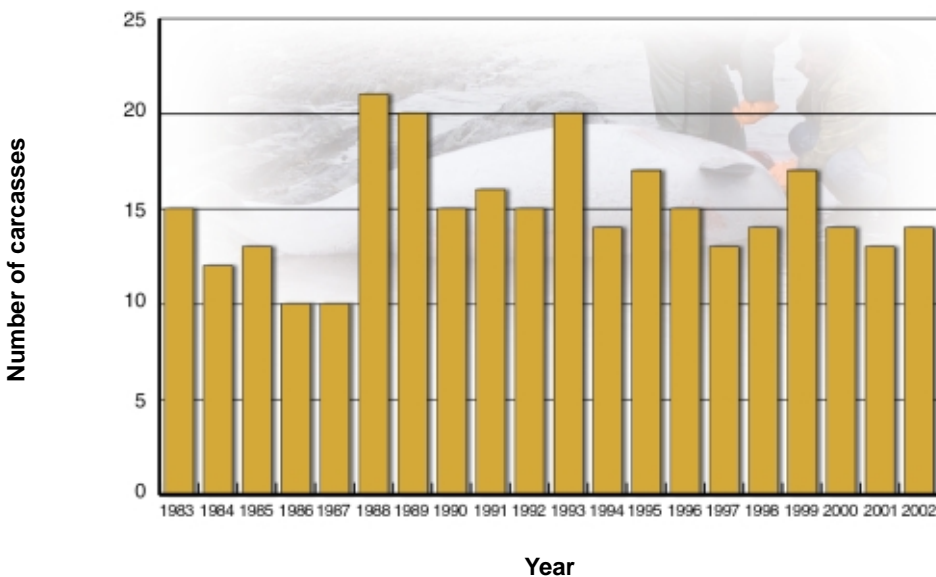


Source: Modified from Gosselin et al., 2001.

relatively constant in the past 20 years, averaging approximately 15 individuals per year (Figure 3). However, the true number of mortalities is probably higher, given that a number of carcasses drift towards the gulf, sink or are eaten, and

are thus never reported. For the period from 1983 to 2001, the average age of the stranded belugas was between 21 and 25 years (Figure 4), but a high number of carcasses were those of belugas under five years of age.

**Figure 3. Number of documented beluga strandings between 1983 and 2002 in the Estuary and Gulf of St. Lawrence**



In collaboration with pathologists from the Faculty of Veterinary Medicine of the University of Montreal in Saint-Hyacinthe, the cause of mortality was determined in 103 beluga carcasses of sufficiently good condition (Table 1). One-half of the stranded calves under one year of age are believed to have died at birth. In juveniles (females aged 1 to 5 years and males aged 1 to 7 years), parasitic infections are believed to be responsible for close to three-quarters (73%) of the cases of mortality diagnosed. In contrast, this type of infection is believed to be the cause of death in only 17% of the adult belugas. In adults, the cause of death is thought to be related to infectious diseases in close to 40% of the cases and to neoplasia (cancers) in 23% of the cases.

Belugas can also be affected by contaminants, which can compromise their immune systems, making certain individuals more susceptible to viral, bacterial or parasitic infections, including respiratory diseases, which are particularly harmful to animals that dive. Close to 90% of the belugas found stranded on the shores of the estuary were infected by lungworms, *Halocercus monoceris* being the most pathogenic of the three species present in the beluga. According to estimates obtained by a systematic examination, some individuals were infected by over 12 500 lungworms. In addition, histopathological examinations have shown that stranded belugas that were heavily infected by lungworms suffered a form of pneumonia caused by this infection, called verminous pneumonia.

**Figure 4. Age structure of beluga carcasses stranded on the shores of the Estuary and Gulf of St. Lawrence between 1983 and 2001; the age is determined by dentition**



Such infections can be fatal or can lead to the development of secondary viral or bacterial infections, which are themselves fatal. However, although the contaminant concentrations measured in the carcasses are relatively high, the role of chemical contamination and its possible immunosuppressive effects in the prevalence and severity of the infections observed are unknown. In addition, the possible role of a co-factor, such as viruses that interact with the chemical contaminants, has not been explored in sufficient detail to answer these questions.

The status of the St. Lawrence Beluga Whale was reevaluated in 1997, and the population is still considered endan-

**Table 1. Causes of mortality by age group in belugas stranded on the shores of Estuary and Gulf of St. Lawrence between 1983 and 2000**

Principal cause of mortality	Number of individuals	Prevalence (%)
<b>Calves (under 1 year)(n = 10)</b>		
Viral/bacterial Infection	1	10
Parasitic infection	2	20
Stillbirth	5	50
Other/unknown	2	20
<b>Juveniles (1 to 5 years or 1 to 7 years, depending on the sex) (n = 11)</b>		
Viral/bacterial Infection	2	18
Parasitic infection	8	73
Unknown	1	9
<b>Adults (5 or 7 years and over, depending on the sex) (n = 82)</b>		
Viral/bacterial Infection	13	16
Parasitic infection	14	17
Terminal neoplasia (cancer)	19	23
Other/unknown	28	34
Dystocia	2	2
Trauma	6	7
<b>Total number diagnosed</b>	<b>103</b>	

gered. Following the 2000 survey and in the absence of significant changes in the number and condition of strandings since the 1980s, it is estimated that the population is currently stable at approximately 1000 individuals.

## Outlook

The St. Lawrence Beluga Recovery Plan must have a long-term perspective. To this end, it is important to continue to monitor the population in order to periodically assess its condition. Given the low reproductive potential of the species and the variability of the estimates of the last decade, the inventory will have to span several years in order

to identify a significant change in the abundance of the population. The strandings monitoring program will contribute significantly to our understanding of factors that may limit the growth of the population, by documenting the number and causes of mortality and the prevalence of certain diseases.

DFO will pursue its research in order to gain a better understanding of the biology and behaviour of the beluga and the impacts of human activities on the St. Lawrence population. Studies will be conducted using new methods to indirectly determine the beluga's diet. Research will also be carried out on disturbances and on the sources, exposure pathways and effects of chemical

contaminants in order to more accurately assess their impacts on the St. Lawrence population. Finally, DFO will continue its work on the pathogens observed in belugas and on other potential sources thereof, particularly certain human activities and other marine mammals that use the estuary in summer. The resistance of the beluga to infections will also be studied.

All of these issues are important in the context of the recovery plan and the management measures that are put in place to more effectively protect the St. Lawrence Beluga Whale.



*A beluga carcass found on the shores of the St. Lawrence*

Photo: Fisheries and Oceans Canada

## To Know More

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## State of the St. Lawrence Monitoring Program

Four government partners — Environment Canada, the ministère de l'Environnement du Québec, the Société de la faune et des parcs du Québec, and Fisheries and Oceans Canada — are pooling their expertise and efforts to provide Canadians with information on the state of the St. Lawrence and long-term trends affecting it. To this end, environmental indicators have been developed on the basis of data collected

as part of each organization's ongoing environmental monitoring activities. These activities cover the main components of the environment, namely water (quality and quantity), sediments, biological resources (species diversity and condition), uses and, eventually, shorelines.

For additional copies or the complete collection of fact sheets, contact the

St. Lawrence Vision 2000 Coordination Office:

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The fact sheets and additional information about the program are also available on the Web site: [www.slv2000.qc.ca](http://www.slv2000.qc.ca).

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