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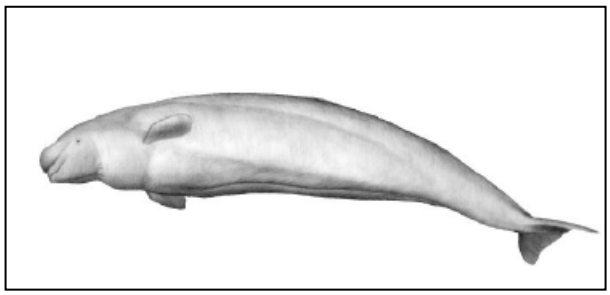
Quebec Region
Canadian Science Advisory Secretariat
Science Advisory Report 2009/070

ADVICE RELEVANT TO THE IDENTIFICATION OF CRITICAL HABITAT FOR ST. LAWRENCE BELUGA (*DELPHINAPTERUS LEUCAS*)



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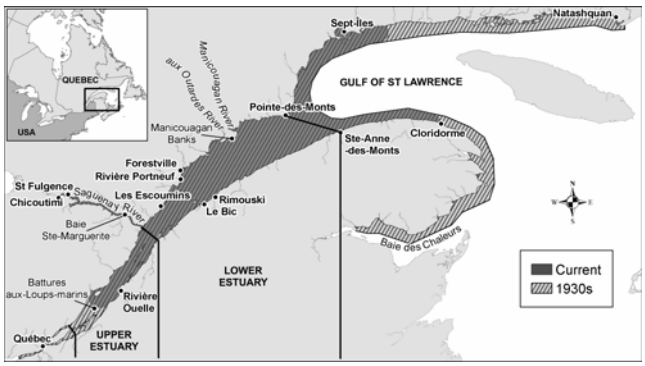

Figure 1: Current and historical (1930s) annual distribution of St. Lawrence beluga.

Context :

In spring of 2004, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessed and designated beluga in the St. Lawrence Estuary as Threatened. The population is currently listed under the Canada's Species at Risk Act (SARA), which requires that a recovery strategy be developed and that critical habitat be identified to the extent possible based on the best information available. In the event that scientific information would be insufficient to designate the full extent of critical habitat, a schedule of studies must be included that, when completed, would allow critical habitat to be identified.

A Recovery Potential Assessment report, which did not include information on habitat, was published for St. Lawrence and other beluga population in 2005 (DFO 2005). In 2006, a research document outlining the recovery goals for the various Canadian beluga populations was also published (Lawson et al. 2006). The Recovery Team has requested science advice on habitat use and characteristics that might be considered in determining habitat critical to the survival or recovery of St. Lawrence beluga.

The present report is an addendum to the 2005 Recovery Potential Assessment (DFO 2005).

SUMMARY

Several characteristics of beluga as a species and of the St. Lawrence population in particular should be considered when assessing the habitat critical for the survival and recovery of St. Lawrence beluga:

- Beluga is an Arctic species, but one population occurs in the St. Lawrence Estuary. This environment is favorable to their continued presence as a result of an upwelling of cold, mineral-rich waters, high productivity and sea ice coverage. The oceanographic

processes responsible for these conditions are deemed crucial to the survival and recovery of this population;

- The population is small and has not shown recovery since the beginning of monitoring in the mid 1980's. Human-induced mortalities of a few individuals per year are likely to have a negative effect on recovery;

- Based on sampling from the 1930s, St. Lawrence beluga have a varied diet constituted mainly of fish such as capelin, herring, sand lance, rainbow smelt, lumpfish, squid, cod, flounder, tomcod, and polychaete. There are no recent data on beluga diet;

- The current range of St. Lawrence beluga is about 65% of that historically (Figure 1). At present, beluga mostly inhabit waters between Battures-aux-Loups-Marins and Rimouski/Forestville, including the Saguenay River up to Baie Ste-Marguerite;

- This population exhibits seasonal movements of limited extent. Their timing and extent are likely influenced by sea ice, predation risks, and food availability. A general movement eastward occurs during the fall and into the winter, with a proportion of the population occupying the northwestern Gulf of St. Lawrence. These movements likely aim at finding winter habitats with suitable ice cover (< 70-90% ice coverage) to minimize risks of entrapment, but where food resources are adequate. Habitats where the presence of beluga has been documented during winter include the Laurentian Channel between Tadoussac and Les Escoumins in the Estuary, and sectors of Cloridorme and Sept-Îles in the northwestern Gulf (from November to April);

- Despite the scarcity of data on distribution and habitat use for fall, winter and spring, the area comprised between Forestville/Rimouski and Pointe-des-Monts / Ste-Anne-des-Monts, as well as the northwestern Gulf of St. Lawrence should not be dismissed as habitats important for the survival and recovery of St. Lawrence beluga;

- Spring might be an important feeding period, but little is known about beluga distribution at this time. Feeding habits of the species elsewhere, and the limited diet information from St. Lawrence beluga suggest that spawning fish or other prey at locations where they are abundant in the spring may influence beluga distribution (from April to June). The exact location and characteristics of feeding habitat are largely unknown, but likely involve among others, species such as capelin, herring, and rainbow smelt;

- During summer, segregation by sex and age classes is consistently observed in many populations of this species, including St. Lawrence beluga. In the St. Lawrence, these areas include: the Upper Estuary, from Battures-aux-Loups-Marins to the Saguenay River for females with calves and juveniles (from June to October); and the northern portion of the Lower Estuary for adult males (from June to October) (Figure 2). The Upper Estuary differs mostly from the Lower Estuary by being shallower, warmer and more turbid (less saline), but the exact features attracting different sex- and age-classes to specific areas of the St. Lawrence are unknown. Nonetheless, an access to these areas for each of the classes is considered essential, at least during summer, for the survival and recovery of this population;

- Within these larger zones, there are numerous small areas where beluga occur regularly or where they spend large proportions of their time, some of which have been identified for the summer period in the St. Lawrence. These areas are interconnected via a more or less complex network of travel routes;

- The species also consistently aggregates in estuaries or river mouths during summer, sometimes in large numbers, which suggests that they are an essential part of beluga habitat, though their functions are unknown. In the St. Lawrence Estuary, river mouths where beluga currently or historically congregated during summer include Rivière-Ouelle, Saguenay River, Baie Ste-Marguerite, Manicouagan Banks (Figure 2).

Given that current distribution is small relative to that used historically, recovery of this population may be tied to use of historical habitats. Therefore, access to and integrity of historical habitat should be considered important for the survival and recovery of the population.

There is a need to understand temporal use and movement patterns of individual beluga among habitats, and to establish the key features, biological functions and relative contribution of these habitats to beluga for completing their annual cycle. It is also necessary to describe seasonal beluga diet, so that areas providing prey can be identified. All of this information will be needed to assess the implications of changes in key habitat features or a reduction in availability of key habitats on the survival and recovery of St. Lawrence beluga.

BACKGROUND

St. Lawrence beluga represent one of seven populations currently recognized in Canadian waters. This population has been estimated to have numbered in the neighbourhood of 10,000 beluga in 1866. However, population size was severely reduced over the past century as a result of commercial harvesting and beliefs that beluga constituted a nuisance to fish stocks. The population currently appears to be stable at about 1,100 individuals. A lack of recovery might be related to high levels of persistent contaminants in beluga and their environment, competition for prey with commercial fisheries or other species, loss or degradation of habitat through chemical discharge, noise, hydro-electric development or climate change, disturbance by vessel traffic and noise, or periodic losses from epizootic outbreaks.

ANALYSIS

St. Lawrence beluga are a relict population. Oceanographic processes leading to high productivity and a generally cold environment, including seasonal ice cover, are favorable to the continued presence of this Arctic species at these low latitudes.

The St. Lawrence beluga population is small and appears to be stable at around 1,100 individuals since monitoring began in the mid-1980s. A population assessment suggests that the population is highly sensitive to human-induced mortalities, and that removals as low as 3 animals per year are likely to have a negative effect on recovery.

Beluga have a varied diet constituted mainly of fish species, and St. Lawrence beluga are no exception. They are known to feed on anadromous and possibly catadromous fish, as well as benthic and more pelagic prey, including some invertebrates. Recent diet for St. Lawrence beluga and important prey species are unknown as samples are available only from two stomach contents. However, combining this information with data from the 1930s suggest that diet might include, but is not limited to capelin, herring, sand lance, rainbow smelt, lumpfish, squid, cod, flounder, tomcod, and polychaete.

Beluga do not have any known dwelling-place similar to a den or nest during any part of their life cycle, hence the concept of “residence” as defined in the Species at Risk Act does not apply.

Information on historical distribution and habitat use comes from a study conducted in the 1930s, using knowledge of mariners, catch data and visits to communities in the Estuary and northern Gulf of St. Lawrence. Information on recent habitat use comes mostly from aerial and boat surveys but few of these results can be found in the primary literature and data remain scarce for periods other than summer.

These data indicate that current and historical distributions of beluga in the St. Lawrence are centered on the Saguenay River, but that the current distribution represents about 65% of the range reported in the 1930s (Figure 1). The current annual core distribution of St. Lawrence beluga is approximately 5,000 km^2, which is at the lower limit of areas of occupancy described for any population of this species. In summer, this figure is even lower, at approximately 2,800 km^2. The core distribution is between the Battures-aux-Loups-Marins and Rivière-Portneuf / Rimouski in the Estuary, and Baie Ste-Marguerite in the Saguenay River. Concentration areas outside of this region vary seasonally, as in the 1930s, but are now constrained within a zone comprised between Battures-aux-Loups-Marins and Sept-Îles / Cloridorme (vs west of Quebec City to Natashquan in the 1930s), with only rare observations in the Baie des Chaleurs. Beluga also disappeared from the Manicouagan Banks, where beluga from all age and sex classes congregated during summer in the 1930s.

St. Lawrence beluga undertake seasonal migrations, but their extent is relatively limited. St. Lawrence beluga likely migrate to find habitats where risks of ice entrapment are minimal, but where food resources are adequate. Other populations of beluga winter regularly in areas covered at 70% with ice, and occasionally where coverage reaches 90%. Risks of killer whale predation might also affect beluga seasonal distribution. Killer whale predation has been documented as a source of mortality in this population. Even though killer whale reports have been nearly nonexistent in the St. Lawrence Estuary over recent years, the threat of killer whale predation might still affect the seasonal distribution of this population.

A progressive movement towards the east occurs during the fall, when beluga leave the Upper Estuary to occupy the Lower Estuary and northwestern Gulf, presumably as a response to the migration of prey species towards deeper waters, and to seek areas where ice conditions reduce risks of ice entrapment. Beluga distribution appears to be at its maximum extent during the spring (April-June), when feeding is thought to be the most intense. The limited data available indicate that, in spring, beluga still occupy the northwestern Gulf of St. Lawrence, but that a large proportion of the population has moved back into the Upper Estuary all the way west to Battures-aux-Loups-Marins. During summer when females give birth and nurse their calves and when feeding occurs on a regular basis, most beluga occupy the sector corresponding to the core distribution area defined above. Beluga are often observed, sometimes in large numbers, in the mouths of tributary rivers at that time of the year.

Several smaller areas where beluga are observed on a regular basis or where they spend relatively large proportions of their time exist within these larger zones, and have been identified for the summer period (Mosnier et al. 2009). The proportion of the population using an area at any one time is usually 5% or less. Individual beluga frequently move among these smaller areas, which are separated by only a few kilometers in the Estuary, likely following a definite network of traveled routes. However, key features and biological functions of these small areas are not understood.

Beluga are long-lived and gregarious, and exhibit age and sex segregation. In summer, smaller individuals tend to use shallower waters nearer to shore, whereas larger individuals are found further offshore in deeper areas. It is not known whether age and sex segregation occurs in other seasons. These features are also shared by the St. Lawrence beluga population. Females accompanied by calves and juveniles concentrate in the Upper Estuary, between the Battures-aux-Loups-Marins and the Saguenay River, where waters are relatively shallow, warm, turbid, and brackish; the large white adults, presumably adult males, concentrate in the deeper, colder and more saline waters of the Laurentian Channel in the northern Lower Estuary where females with calves and juveniles are only rarely observed during summer. The Saguenay River and its mouth and the southern portion of the Lower Estuary are used by both types of herds (Figure 2). The use of shallow waters by females with calves and juveniles might reduce predation risks and ensure access to adequate food resources for the smaller individuals with more limited diving capacity.

Like other populations, St. Lawrence beluga make regular use of some, but not all of the mouth of tributary rivers during summer or early fall. These include Rivière-Ouelle, the Saguenay River, Baie Ste-Marguerite, and historically the Manicouagan Banks (Figure 2). Hypotheses to explain the recurrent use of river mouth or estuaries by beluga during summer include a need to access warm waters of shallow estuaries to stimulate moulting of skin, to care for young, to feed or to avoid killer whale predation. In the case of St. Lawrence beluga, the biological functions associated with these areas are unknown. However, it is noteworthy that St. Lawrence beluga are already in an estuary, in which the southern channel of the Upper Estuary resembles the shallow, warmer areas often associated with beluga aggregations elsewhere.

Patterns in habitat use depend in part on learned behaviours and individual beluga show some evidence of site-fidelity. These characteristics can limit excursions into new areas and slow down range expansion, including recolonization of past habitats. In the St. Lawrence for instance, females with calves and juveniles were reported along the north shore of the Lower Estuary in the 1930's but are now rarely found there during summer. Similarly, beluga of all age and sex classes were once abundant on the Manicouagan Banks (located only a few tens of kilometers downstream of the current core distribution area) but disappeared following over-harvesting. These changes in distribution patterns may reflect the extermination of groups that were using these sites preferentially. Subsequent recolonization of these areas might have been hindered by fidelity of surviving beluga groups to areas located farther upstream.

CONCLUSIONS AND ADVICE

At present, St. Lawrence beluga mostly inhabit waters comprised between Battures-aux-Loups-Marins and Rimouski/Forestville, including the Saguenay River up to Baie Ste-Marguerite, although a general eastbound movement towards the northwestern Gulf of St. Lawrence is observed during the fall. There remains considerable uncertainty about the relative proportion of the population using the Lower Estuary vs northwestern Gulf during winter and spring. Therefore, the area of the Lower Estuary comprised between Forestville/Rimouski and Pointe-des-Monts/Ste-Anne-des-Monts as well as the northwestern Gulf of St. Lawrence should not be dismissed as an area important for the survival and recovery of St. Lawrence beluga, considering their historical importance and potentially high usage during spring, a period when feeding is presumed to be intense. Areas of concentration and key habitat features likely differ among season in these areas, and require further investigation.

St. Lawrence beluga have a varied diet constituted mainly of fish. However, there are no recent data on beluga diet.

St. Lawrence beluga exhibit spatial segregation among age- and sex-classes during summer. The Upper Estuary, where females accompanied by calves and juveniles concentrate, is likely important habitat for calving and juvenile rearing. Reasons for sexual segregation and habitat characteristics that are critical to the survival of females, juveniles and calves in this sector are unclear.

The smaller areas of high usage that were identified within the summer distribution range of St. Lawrence beluga are probably where essential life processes are taking place. Because several areas may need to be visited sequentially by individual whales to fulfill their biological needs, access corridors and habitats they connect need to be considered equally important for the population. There is a need to determine what these habitats are being used for, when they are used, how important they are, and the consequences of a degradation of their key features or a reduction in their accessibility for the survival and recovery of the population.

St. Lawrence beluga regularly use or have made historical use of the mouth of tributary rivers during summer, including Rivière-Ouelle, Saguenay River, Baie Ste-Marguerite, and historically, the Manicouagan Banks. Although only a small fraction of the population might be using these areas at any given time, they are used regularly during summer. Considering the consistent use of these environments in this species, we conclude that they might be important for completion of life processes critical to the survival and recovery of the population. Further research is needed to determine the proportion of the population using river mouths, their key features and biological functions.

The current distribution range of St. Lawrence beluga is at the lower limit of those defined for the species and even smaller during summer. Therefore, a degradation of key habitat features or a reduction in key habitat availability would probably result in negative effects on this population, and especially more so if this population is to increase. In this context, preserving access to and integrity of areas used by a large proportion of the population, including areas of historical use, such as the Manicouagan banks, might allow a range expansion of the population. However, species characteristics in terms of longevity, social organization and learnt behaviours are probably influencing seasonal habitat use, and might hinder re-colonization of these areas by slowing down this process.

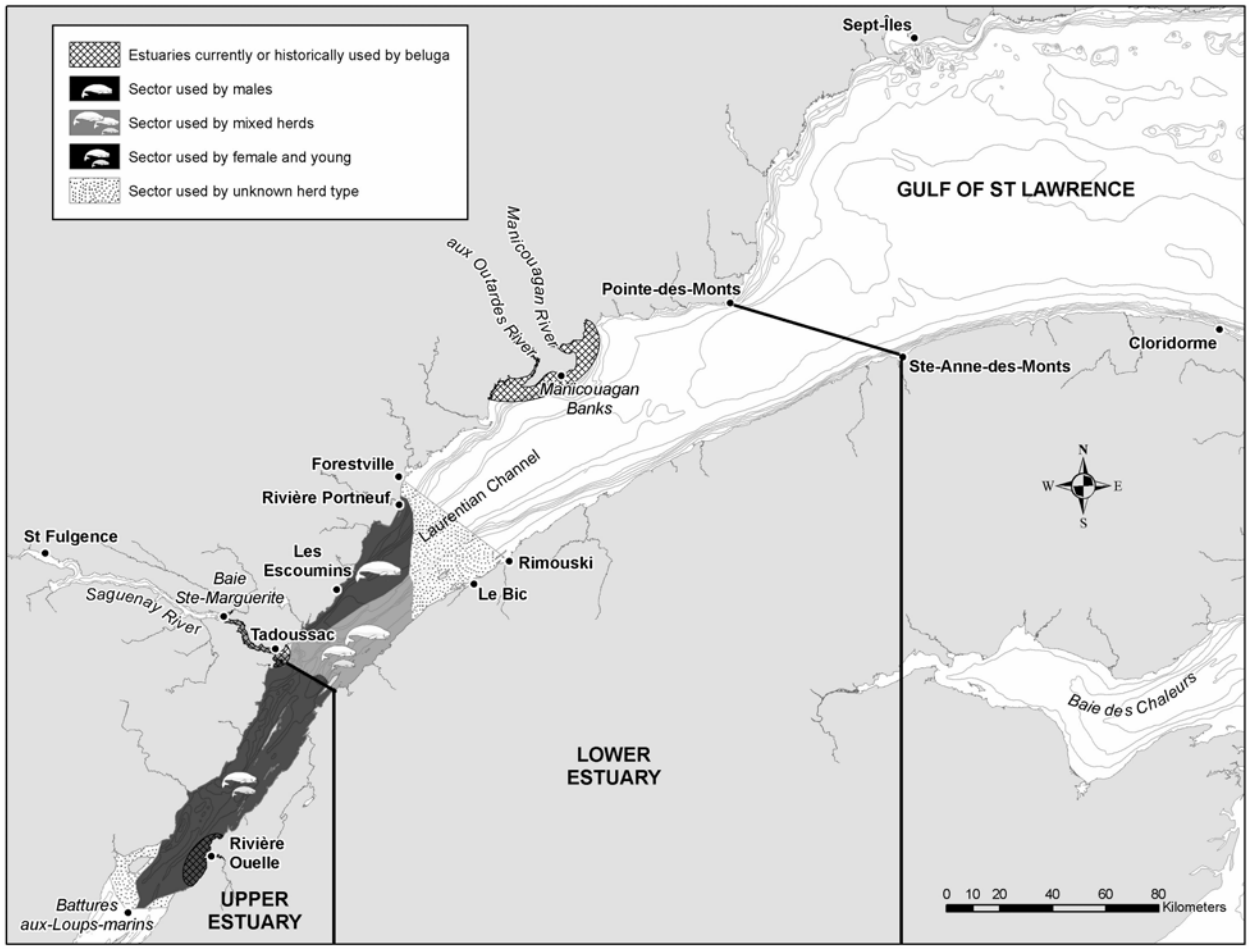

Figure 2. Distribution of the various types of beluga herds, and location of estuaries currently or historically used by St. Lawrence beluga.

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ISSN 1919-5079 (Print)
ISSN 1919-5087 (Online)

La version française est disponible à l'adresse ci-dessus.

CORRECT CITATION FOR THIS PUBLICATION

DFO. 2010. Advice relevant to the identification of critical habitat for St. Lawrence beluga (*Delphinapterus leucas*). DFO Can. Sci. Advis. Sec., Sci. Advis. Rep. 2009/070.