THE SAGUENAY FJORD WINTER SPORT FISHERY IN 2005

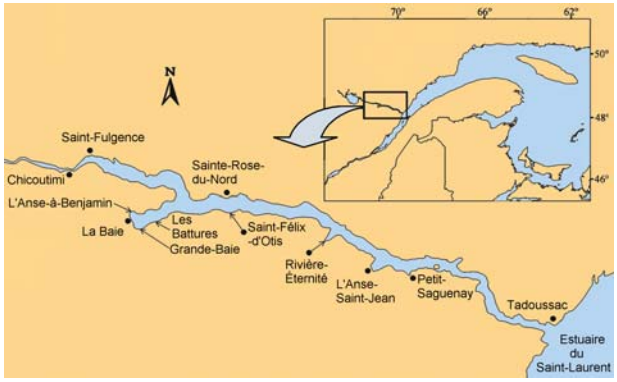

Figure 1. Main fishing sites in the Saguenay Fjord.

Context

The winter sport fishery carried on in the Saguenay Fjord is unique in Quebec by its magnitude and the variety of species that are caught in the area. Fishermen practise their sport by taking shelter in rustic fishing huts.

Winter fishermen generally come from cities and towns near fishing sites. However, in recent years, the activity has sparked interest among North American and even European tourists, who use the services of outfitters. Economic spin-offs are estimated at more than $4 million, making the winter sport fishery a driving force in the region's tourism industry.

As a result of the growing interest in this recreational/tourism activity, various stakeholders are now concerned about resource conservation and the sustainable development of the fishery. In this context, a monitoring program was implemented in 1995 under a research agreement involving Saguenay Fjord fishermen's associations and committees; Promotion Saguenay; Alcan Smelters and Chemicals Ltd.; the Société des établissements de plein air du Québec; the ministère du Développement durable, de l'Environnement et des Parcs du Québec; the Department of Canadian Heritage (Parks Canada), which comanages the Saguenay-St. Lawrence Marine Park; and the Department of Fisheries and Oceans (DFO), which oversees scientific research and the protection of the resource.

SUMMARY

- The 2005 Saguenay winter ice fishing season opened January 17 and ended March 13, 2005 with the arrival of the ice-breaker, which represents a 4 week drop in ice fishing activity compared to 2004. Fishing site frequentation therefore dropped by more than 10,000 fishermen-days (f/d); from 60,000 f/d in 2004 to 50,000 f/d in 2005. The marine species sought by fishermen are Atlantic cod, redfish and Greenland halibut.

- The 2005 Atlantic cod captures have been increasing since 2003, and can be compared to the catches recorded between 2000 and 2002. A drop in Greenland cod captures was recorded from 2000 to 2004, but rose slightly in 2005. Atlantic cod size structure suggests that individuals are being recruited to the fishery.

- Redfish captures are the highest among marine species. From 1995 to 2005, the number of captures has remained relatively stable, except for 1998 and 1999, in which the number of catches rose above 200,000 individuals. Small redfish were absent from the 2005 captures.

- The catch rate index for Greenland halibut shows an almost steady decline between 1995 and 2001. Since the end of this period and up until 2004, a sizeable catch increase was observed, which was maintained in 2005. Size structures indicate the presence of young individuals, but their abundance remains unknown due to insufficient data.

- Since 2000, research missions show low catch rates for Atlantic and Greenland cod. Since 2003, redfish catch rate indices have dropped, while a maximum index was recorded for Greenland halibut. This is mainly due to a strong presence of this species located in the Northern Arm.

- The overall status of marine resources harvested in the Saguenay River is obviously precarious. It appears initially that fishing effort remains high. However, the daily catch limit established at 5 fish since 2004, along with a reduction in the duration of the 2005 fishing season, have stabilized the captures. It is therefore essential that the 2006 winter daily catch limit remain at 5 groundfish while limiting the duration of the fishing season as was done in 2005.

DESCRIPTION OF THE ISSUE

The Fishery

The winter sport fishery is practised over the entire upper basin of the Saguenay Fjord, between St-Fulgence and Petit-Saguenay. The six main fishing villages are associated with the municipalities of Anse-St-Jean, Rivière-Éternité, St-Félix-d'Otis, Ste-Rose-du-Nord, St-Fulgence and Baie des Ha! Ha!, with the latter encompassing Anse-à-Benjamin, Grande-Baie and Les Battures (Figure 1). Generally, fishing sites have two fishing areas. Depending on the area and on the type of gear, bait and fishing technique used, fishermen target a given species. The main species sought are rainbow smelt (*Osmerus mordax*), Atlantic cod (*Gadus morhua*), redfish (*Sebastes sp*.) and Greenland halibut (*Reinhardtius hippoglossoides*). Thus, each fishing site has a "pelagic fish" area, where mainly smelt is caught and where fishing huts are located rather close to shore. The "groundfish" area is further off shore, where fishermen take shelter in huts to fish mainly marine species.

Fishermen use two main types of gear to fish: the tip-up, a fishing line mounted on a mechanical signalling device that alerts them when a fish takes the bait, and rods for light-line fishing.

There are three main approaches to ice fishing. The first consists in being on site continuously, paying close attention to the gear. When a fish takes the bait, the fisherman pulls up the line, removes fish from the line, baits the hook and lowers it back into the water. The second

approach is of a social nature. Tip-ups are baited and lowered into the water, but fishermen are less attentive. A fish that takes the bait could be on the line for a number of hours before being pull up, making it impossible to catch other fish during that time. The third approach consists in baiting and lowering tip-ups in the evening and checking the lines only the next day, before or after work.

In order to ensure the sustainability of Saguenay fish populations, conservation measures were adopted at the beginning of the 2005 winter fishery. Thus, the winter ice fishing season opened January 17 and ended March 13, 2005 with the arrival of the ice-breaker, which represents a 4 week drop in ice fishing activity compared to 2004. Fishing site frequentation therefore dropped by more than 10,000 fishermen-days (f/d); from over 60,000 f/d in 2004 to 50,000 f/d in 2005. Since 1995, this number has fluctuated from 47,000 to over 63,000 f/d (Figure 2).

There are generally fewer pelagic species fishermen than groundfish fishermen, and they generally fish upstream from the Fjord, with Anse-à-Benjamin and Grande-Baie sites being the most popular locations. Fishing effort directed at groundfish is mainly concentrated in Anse-à-Benjamin, Grande-Baie, Ste-Rose-du-Nord and Anse-St-Jean. Cod, redfish and Greenland halibut captures are made almost exclusively (± 98.8%) in "groundfish" areas.

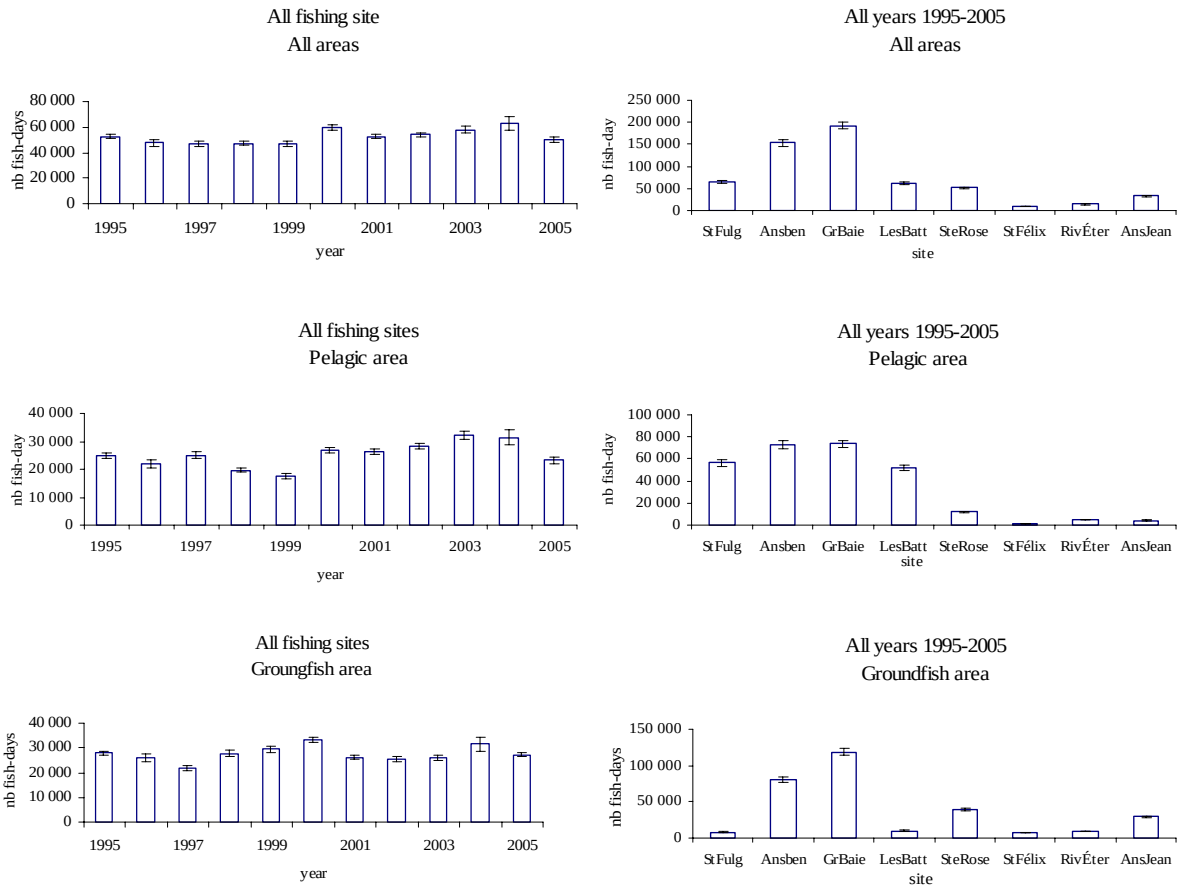

Figure 2. Fishermen-days index (± SE) per area, year and fishing site.

ASSESSEMENT

Resource Status

Since 1995, the DFO has been monitoring the winter sport fishery in the Saguenay, focussing mainly on the main marine species harvested: cod, redfish and Greenland halibut. The program is two-fold and requires the participation of 32 volunteer fishermen from the eight main fishing sites. The first part of the program involves a team of eight samplers, who collect data on catches and fishing effort 20 times over the fishing season. Samplers visit each fisherman to find out the number of lines used, the number of hooks per line, the number of fishing hours and related catch. The second part of the program involves the collection of biological data. Twenty-four samplers record the species, size, weight and condition of individuals caught, based on sampling protocols.

The data gathered are used to estimate annual harvesting levels and trends over a number of years for each species caught. These levels are commonly used as abundance indices for populations. Accordingly, traditional calculation methods were adjusted to better reflect the situation of the winter sport fishery in the Saguenay River. Fishing effort unit is first defined in terms of hooks-hours. Then, yield is calculated (i.e. the number of fish caught per hook per hour) using the effort unit data and the number of fish caught per fisherman. Yields are then extrapolated to obtain the total fishing effort to estimate the number of individuals caught per species and per fishing site.

A condition index is calculated for each species sampled. The index is based on the size and weight of individuals. The heavier of two fish of the same size is generally deemed to be in better condition.

Cod

Cod catches have increased significantly between 1996 and 1999, totalling almost 35,000 individuals (Figure 3), which corresponds to approximately 50 tonnes. This increase is related to the greater number of Greenland cod (*Gadus ogac*) found in catches since 1996. Although fishermen had difficulties differentiating between Greenland and Atlantic cod (*Gadus morhua*), they were able to report the occurrence of Greenland cod unofficially. After asking fishermen to be more vigilant in correctly identifying species, it was found that Greenland cod accounted for 80% of cod catches in 2000. This situation is rather alarming, as it would mean that only 5,000 Atlantic cod were caught in 2000. Total landings of the two cod species dropped until 2004, reaching 9,000 individuals. In 2005, there has been a slight catch increase, which has reached nearly 15,000 individuals.

Cod fishing is especially good at Ste-Rose-du-Nord, as well as in sites located in Baie des Ha! Ha!. Lower fishing indices were recorded at other fishing sites. Indices estimated by Talbot (1992) over the course of the 1990-1991 fishing season for the entire Saguenay River are approximately three times higher than those estimated in this study for 2005.

The size frequencies of cod caught vary, indicating that individuals of different ages were harvested (Figure 4). The interpretation of cohort monitoring results from 1995 to 1999 is risky owing to the fact that no difference was made between the two species of cod sampled. Despite the small number of Atlantic cod sampled between 2001 and 2003, a mode was found to have grown from 450 mm in 2001 to close to 550 mm in 2002 (8 cm to 10 cm per year at this

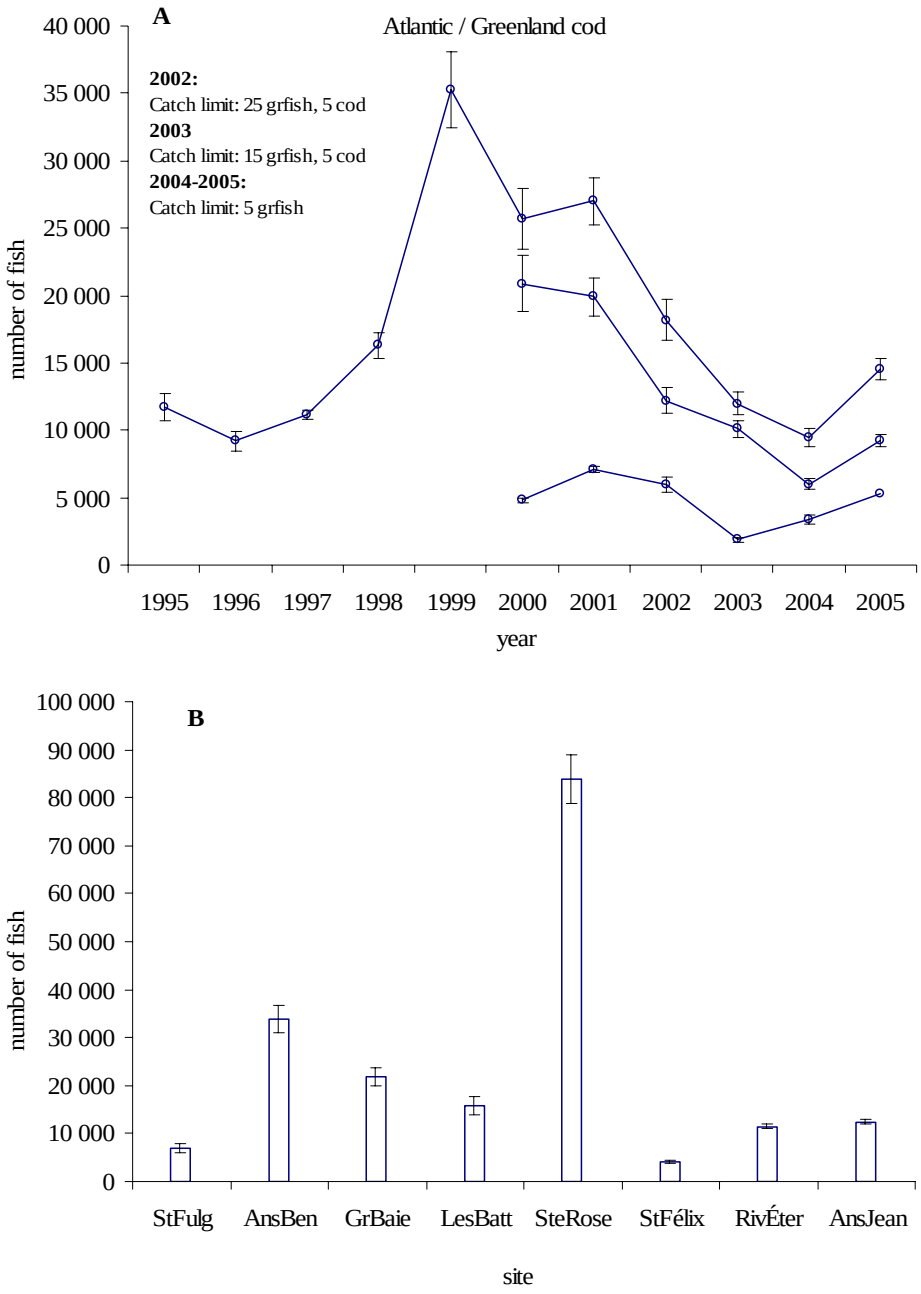

Figure 3. Cod catch rate index (± SE) by A) year and B) fishing site.

range of size), representing a normal growth rate for the species. In 2003, smaller individuals were observed, which are now in the 2005 distribution, suggesting recruitment to the fishery.

The condition index for cod has varied between 1.0 and 1.4 on average over the years in winter in the Saguenay, which is considered high. Generally, the condition of cod sampled is good and the factor cannot account for the decline in abundance in recent years.

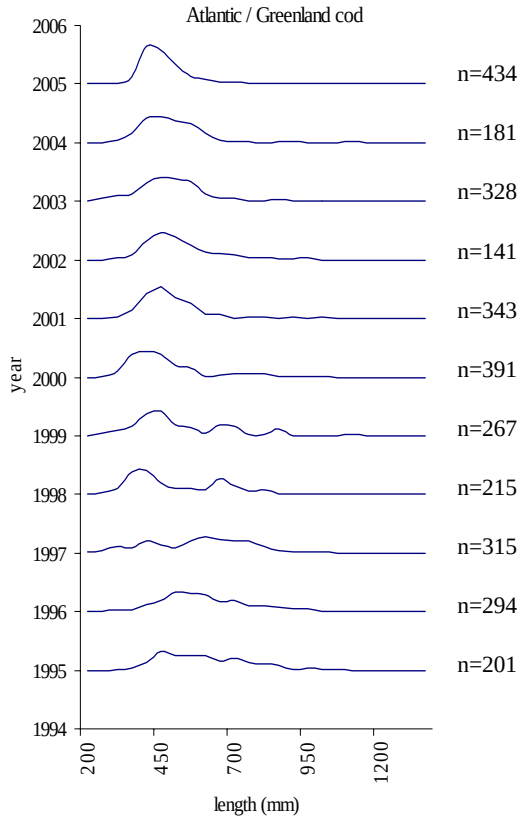

Figure 4. Cod size frequency distribution for all fishing sites. Data for 1995-2000 represents a mix of Atlantic and Greenland cod; data for 2001- 2005 represents Atlantic cod only.

Redfish

Redfish captures are the highest among marine species in the Saguenay Fjord. Between 1995 and 1998, captures increased from close to 150,000 to more than 250,000 individuals (Figure 5), but dropped sharply in 2000 and have remained low but relatively steady until 2005.

The spatial distribution of captures indicates that Grande-Baie, Sainte-Rose-du-Nord, and Anse-à-Benjamin are the most popular groundfish fishing sites; the highest indices are recorded there. Landings estimated at other sites are significantly lower. Finally, very few redfish were caught in St-Fulgence as a result of the limited number of fishermen in the groundfish fishing area.

The modal size of redfish exceeded 325 mm in 2005 (Figure 6). Since 1995, unimodal curves suggested that the fishery focuses solely on fish in the same age group. These observations indicated that given the lack of contributions by new cohorts, the population's sustainability could be at risk. However, in 2004, smaller individuals were noticed with a modal size of approximately 220 mm, suggesting recruitment to the fishery. However, in 2005, far fewer of these smaller individuals were found.
The condition index for redfish generally varied between 1.2 and 1.8 from 1995 to 2005. There have not been weak condition index values recorded for the species in the Saguenay in winter.

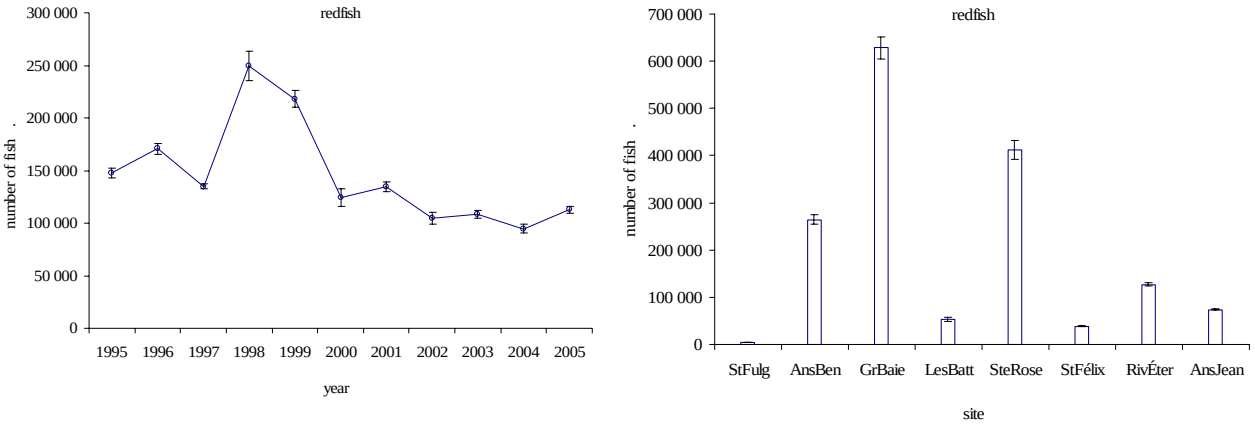

Figure 5. Redfish catch rate index (± SE) by A) year and B) fishing site.

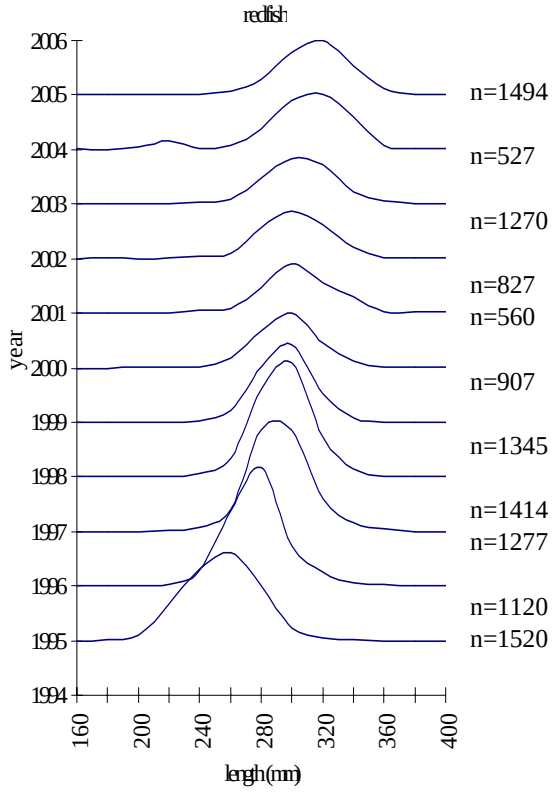

Figure 6. Redfish size frequency distribution for all fishing sites, 1995-2000.

Greenland Halibut

The number of Greenland halibut caught in the Fjord as a whole has been decreasing almost steadily between 1995 and 2001 (Figure 7). There has been a slight increase since then, and from 2003 to 2004, the increase was even more noticeable. In 2005, catches have continued to increase and have reached nearly 4,000 individuals.

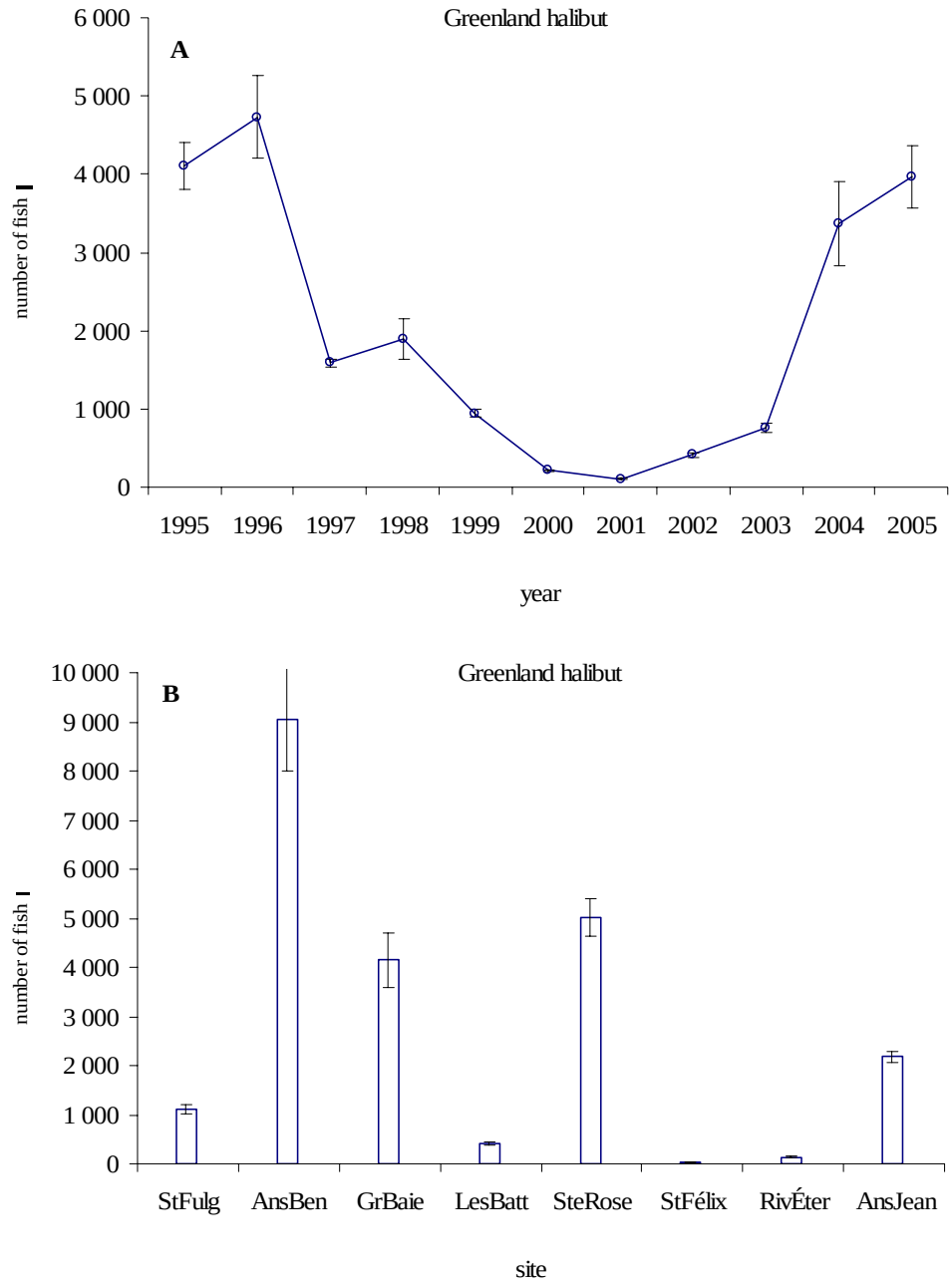

Figure 7. Greenland halibut catch rate index (± SE) by A) year and B) fishing site.

Anse-à-Benjamin is considered to be the most important site, as ice fishermen catch more than half of the Saguenay's Greenland halibut there. Fishing sites such as Sainte-Rose-du-Nord, Grande-Baie and Anse-Saint-Jean are also of some importance.

The size frequency distribution of Greenland halibut indicates a mode growing from 400 mm to close to 700 mm between 1995 and 2003 and a second mode consisting of smaller individuals in 2002 and 2003, of which growth is noticeable in 2005 (Figure 8).

The condition index for Greenland halibut shows greater variability, but generally ranged from 0.8 to 1.3 for the 1995-2005 period.

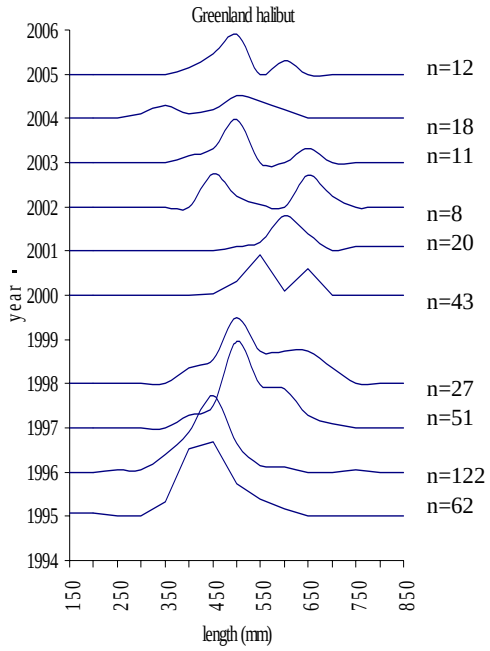

Figure 8. Greenland halibut size frequency distribution for all fishing sites, 1995-2005.

Research Survey

In order to validate data gathered during the winter fishery, research surveys have been conducted in the Fjord over the last five years. These surveys were conducted as soon as possible following winter sport fishery closure, in April of every year. Gillnet catch rates (Figure 9) show that inter-annual variations between cod and redfish are similar. The rates were down from 2000 to 2002, followed by an increase in 2003 and another drop until 2005. The latter are nonetheless similar to those of 2000-2002. It should be mentioned that the research vessel used in 2003 was different than the one used in previous years. It is therefore possible that even if fixed gear was used, the catch potential of both vessels may have been different; e.g. the way the nets are cast. The main fishing sites are generally located in Baie des Ha! Ha!. Certain stability has been observed for Greenland cod since 2001, while the 2005 rates are at their highest since 2000 for Greenland halibut. This is mostly due to strong catches made in the Northern Arm near Saint-Fulgence. There are certain indications that species such as redfish and Atlantic and Greenland cod have already begun their descent towards deeper waters at this time of year, while Greenland halibut would have been latecomer.

Other than in 2003, it appears that catch rates have increased since 2000 and stabilized in 2005. Globally, this situation resembles the winter sport fishery.

CONCLUSIONS AND ADVICE

The interest in ice fishing in the Saguenay River keeps growing and the number of fish caught there is considerable. The data available suggest that the current status of marine resources harvested in the Saguenay River is very worrisome. Cod, redfish and Greenland halibut landings have dropped considerably over the years and have been low for a number of years now. Recruitment is uncertain and does not look promising. The populations' sustainability is at stake. In light of these observations, we recommend that the fishing effort reduction adopted in

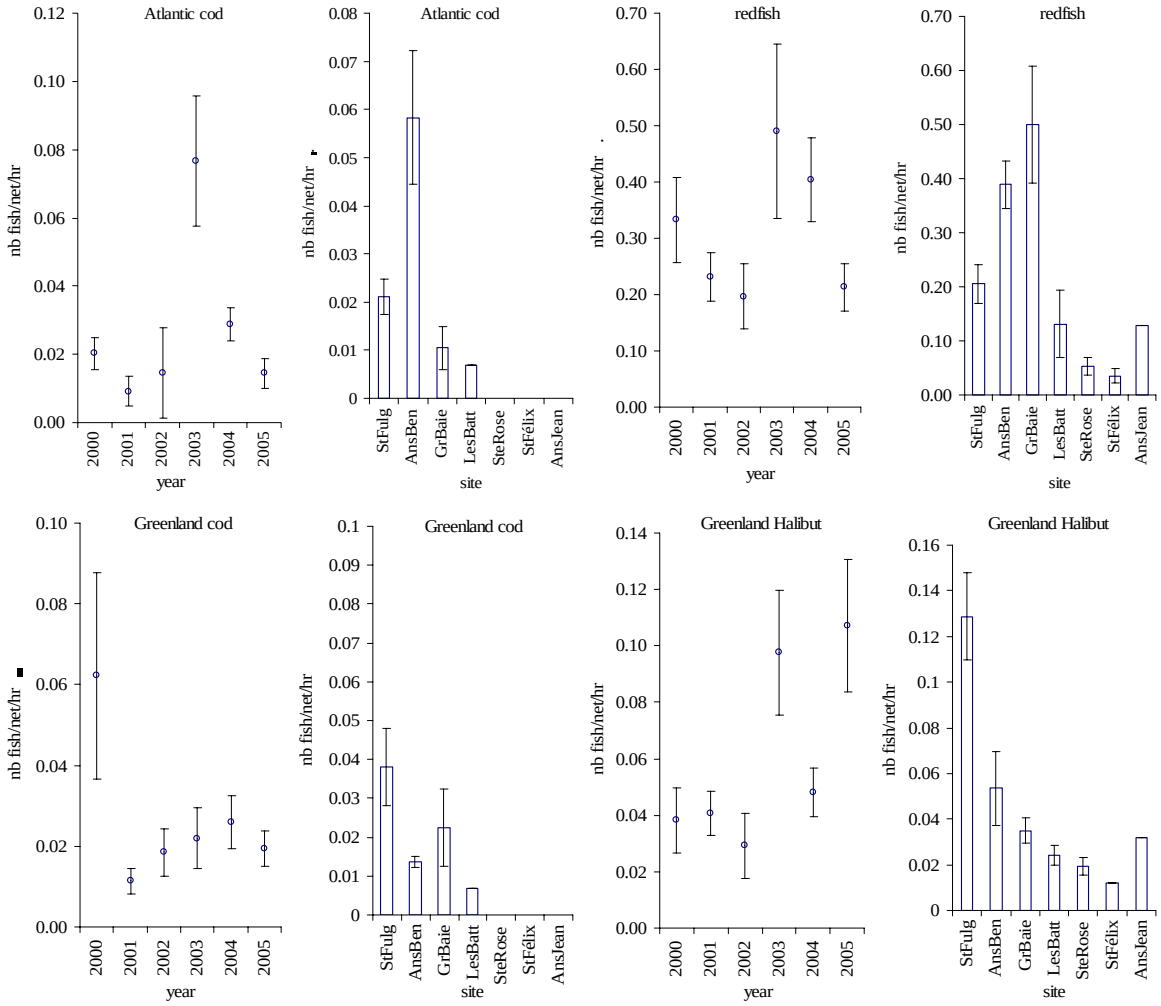

Figure 9. Catch rate (± SE) per species, year and fishing site. Saguenay survey 2000-2005.

2005 be maintained. The long-term monitoring of Fjord populations will provide more information on species' status and will allow for better management in terms of resource conservation.

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FOR MORE INFORMATION

Contact: Jean-Denis Lambert
Maurice Lamontagne Institute
850, route de la Mer
P.O. Box 1000
Mont-Joli (Quebec)
G5H 3Z4

Tel: (418) 775-0575
Fax: (418) 775-0740
E-Mail: LambertJD@dfo-mpo.gc.ca

This report is available from the:

Regional Science Advisory Secretariat
Quebec Region
Fisheries and Oceans Canada
Maurice Lamontagne Institute
P.O. Box 1000, Mont-Joli
Quebec (Canada)
G5H 3Z4

Telephone: (418) 775-0825
Fax: (418) 775-0740
E-Mail: BRAS@DFO-MPO.gc.ca
Internet address: www.dfo-mpo.gc.ca/csas

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