Gulf of St. Lawrence (4RST) Greenland Halibut

Background

Greenland halibut of the Gulf of St. Lawrence is considered to be a stock isolated from the main Northwest Atlantic population found to the east and north of the Newfoundland Grand Banks. Parasite research conducted in the early 1990s showed that the Gulf halibut was distinct. The research has made it possible to distinguish clearly between Greenland halibut of the Gulf, the Laurentian Channel and adjacent areas, and those of Labrador and the northern part of the Grand Banks. These findings have led to the conclusion that Greenland halibut complete their entire life cycle within the Gulf.

Greenland halibut, a flatfish also known as turbot, is generally found at depths of 130–500 m (70–280 fathoms) in the Gulf of St. Lawrence. Spawning takes place primarily in winter, from January to March. Males reach sexual maturity at a smaller size (L50 [i.e., length at which 50% of the fish are mature] is around 40 cm) than females (L50 between 46 and 51 cm), and so their growth rate declines more quickly than the female rate. As a result of these differences, females grow to be larger than males and constitute the majority of the fish caught by the commercial fishery.

In the early 1990s, the fishery was characterized by low yields and catches with a preponderance of small, immature fish. Following the Fisheries Resource Conservation Council's 1994 recommendations, conservation measures (reduction in fishing effort, increased mesh size, small fish tolerance protocol for commercial catches) were implemented to ensure better protection for the stock's reproductive potential.

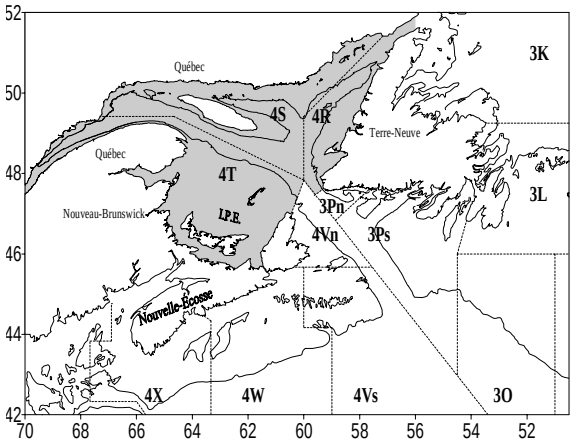

Figure 1. Map of the Gulf of St. Lawrence and adjacent areas, showing NAFO divisions 4RST.

Summary

- The density index from the DFO research survey has been following an upward trend since 1993. The highest index was recorded in 2000. The density indices from the sentinel fishery surveys conducted in July and October have also been rising since 1995.
- Nonetheless, the catch rates of Quebec and Newfoundland gillnet fishers dropped 19% from 1998 to 1999 and 48% from 1999 to 2000.
- The exploitation rate index declined in 1999 and in 2000, given the smaller catches and the stable abundance of commercial-sized fish, as observed during the DFO research survey.
- After a period of low recruitment (especially from 1992 to 1994), the research surveys indicate that the 1995, 1997 and 1999 year-classes are more abundant. Females in the 1995 year-class probably accounted for a large proportion of the commercial catches in 2000.
- The slowdown in the growth of fish of the 1997 year-class has raised doubts about when exactly this year-class will be recruited to the fishery. Furthermore,

the strong abundance of the 1997 and 1999 year-classes may mean that a significant number of undersized (less than 44 cm) fish will be caught in the next few years.

The Fishery

Landings (thousands of tonnes)

Year	*77-95 avg.*	*1996*	*1997*	*1998*	*1999*	*2000*[1]
TAC	—	*2.0*	*3.0*	*4.0*	*4.5*[2]	*4.5*[3]
Fixed gear	*3.2*	*1.9*	*2.5*	*3.8*	*3.4*	*2.0*
Mobile gear	*1.2*	*0*	*0*	*0.1*	*0.2*	*0.1*
Total	*4.4*	*1.9*	*2.5*	*3.9*	*3.6*	*2.1*

[1] Preliminary figures
[2] TAC for January 1, 1999, to May 14, 2000
[3] TAC for May 15, 2000, to May 14, 2001

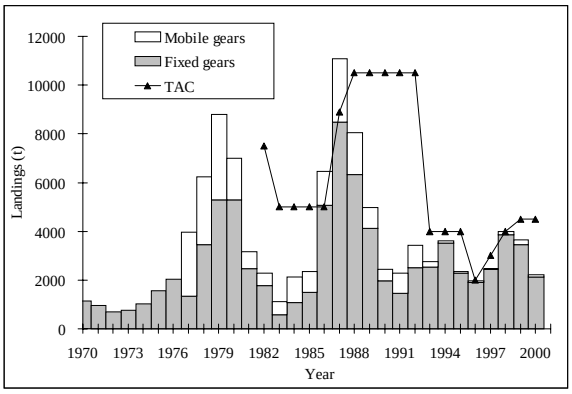

Figure 2. Annual Greenland halibut landings and total allowable catch (TAC) since 1970.

Until the mid-1970s, Greenland halibut landings in 4RST consisted primarily of bycatches of other fisheries. Later, a directed fishery using gillnets and bottom trawls developed and the increased fishing effort led to the 1979 peak in landings (Figure 2). Soon after, landings plummeted and remained weak between 1981 and 1985. The second period of high landings was between 1986 and 1988 and stemmed from several factors: resource abundance, growing interest on the part of fishers, greater fishing efficiency thanks to the technological developments of the early 1980s and the increase in the price offered. In 1989, catches began a steep downturn, falling as low as 2,306 t in 1991, and since then have remained between 2,000 and 4,000 t.

Since 1993, virtually no catches have been made using mobile gear because of the moratorium on cod fishing with this gear type and because use of the Nordmore grate has been made mandatory for shrimpers. No trawlers have been allowed to target Greenland halibut since then, either. This fishery is now heavily dominated by gillnetters whose home ports are in Quebec and on the west coast of Newfoundland. An individual quota (IQ) pilot project was introduced in 1999 for traditional fishers in Quebec to allow them to extend their fishing season. The project was continued in 2000.

Fishery Management

The total allowable catch (TAC) was set at 4,000 t from 1993 to 1995. In 1996, it was cut to 2,000 t, but was raised to 3,000 t in 1997 and to 4,000 t in 1998. The 1999 TAC was increased to 4,500 t, from January 1, 1999, until May 14, 2000. In 2000, the TAC remained the same (4,500 t), but covered the period from May 15, 2000, to May 14, 2001. Preliminary landings in 2000 amounted to 2,211 t. This major decline reflects the disappointing results of the 2000 fishery, especially in Quebec. A significant proportion of the Quebec fishers' allocations (more than 1,700 t) is still available for the fishery until the spring of 2001.

Following the FRCC's recommendations to reduce fishing effort and the number of immature fish taken, major conservation measures have been implemented since 1995, including:

- increase in mesh size from 140 mm (5.5 in) to 152 mm (6 in);

- adoption of a fishing net configuration that is more selective;
- introduction of a minimum size limit (42 cm in 1996 and 44 cm since 1997) along with the application of a small fish protocol;
- establishment of a dockside monitoring program;
- voluntary reduction in the number of nets used by Quebec fishers (from 120 to 80 nets). In July 2000, the maximum number of nets used by Quebec fishers was increased to 100.

Fishing Success

Since 1996, yields, or catch rates, of traditional gillnetters have been calculated on the basis of logbook data from vessels over 35 ft in length (Newfoundland) and over 45 ft (Quebec) and index fisher data. A standardized annual catch rate (by sector, immersion period and month) has been calculated for these years (1996–2000), which cover the use of 152 mm (6 in) mesh. Standardized yields were high between 1996 and 1998 (Figure 3), but dropped by 19% between 1998 and 1999 and by 48% between 1999 and 2000. These drops are behind, with the implementation of IQs in Quebec, the extension of the fishing season in the last two years. From 1996 to 1998, most landings in Quebec were made in a period of just five to seven weeks, while in 1999, the season ran from June until the end of November. In 2000, the Quebec fishing season ran from mid-April until November 1. Although Newfoundland fishers remained in a competitive fishery, their season also became longer, going from three months in 1998 to seven months in 1999 and five months in 2000.

It is worth noting that so far, these yields have been used as an indicator of success of the fishery, not as an indicator of the abundance of the exploitable component of the stock. Changes in fishery management (IQ pilot project in Quebec, differences in the fishing season from year to year, etc.) and possible changes in fishing practices from year to year make it difficult to interpret catch rates as abundance indicators.

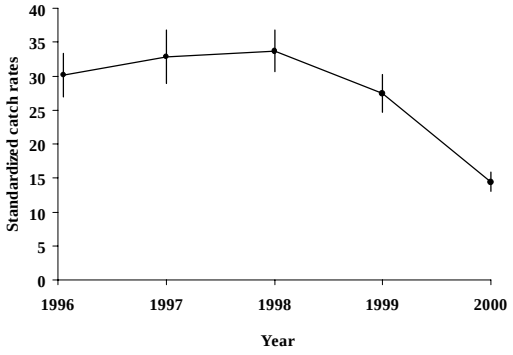

Figure 3. Standardized catch rates of gillnet fishers, 1996–2000.

Size Structure of Catches

The average size of fish caught with gillnets fell sharply from 1980 to 1985 (Figure 4). In 1986, the large 1979–80 year-classes began to be harvested, and so the average length of fish caught rose gradually as these cohorts grew. By 1990, these cohorts had been completely harvested, and new, less abundant year-classes started to be recruited to the fishery, causing the main mode of the catches at length to decline again. In 1995, most of the Greenland halibut caught in gillnets were 40–45 cm long, with a mode of 42 cm. After the mesh size was increased from 140 mm (5.5 in) to 152 mm (6 in) in 1996, the dominant length of fish caught increased from 42 to 48 cm. This value has varied has varied between 47 and 49 cm since 1997. Catches in the years from 1995 to 1998 consisted mainly of fish from the 1989–91 year-classes. Beginning in 1999, however, the 1995 year-class began to be recruited among the smaller modes (43–45 cm). In 2000, the females of this year-

class probably accounted for most of the catches, in contrast to 1999.

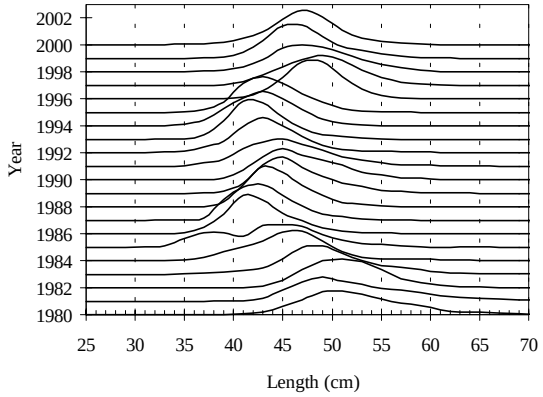

Figure 4. Size structure of Greenland halibut caught with gillnets, 1980–2000.

In the early 1990s, the proportion of females in gillnet catches averaged 58%. When the mesh size was increased in 1996, this proportion rose to an average of 77%. In 2000, the proportion of females varied between 67 and 90%, depending on the month, but was 82% for the entire year.

Resource Status

DFO Research Survey

A groundfish trawl survey has been conducted by the DFO vessel *Alfred Needler* in the northern Gulf and the St. Lawrence estuary every August since 1990. The catch distribution of the 2000 surveys indicates that the highest densities are found in the St. Lawrence estuary, the Sept Îles basin, the Laurentian Channel south of Anticosti Island, Jacques Cartier Strait and the Esquiman Channel (Figure 5). Since 1995, the distribution area has been expanding, especially south of Anticosti along the Laurentian Channel.

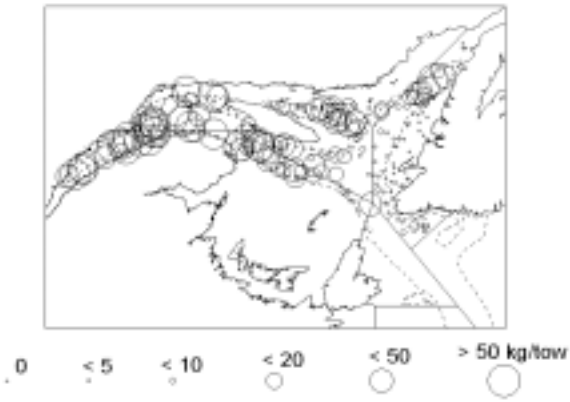

Figure 5. Summer distribution of Greenland halibut, according to the DFO survey, 2000.

The density index (in kg/tow) derived from the survey has shown an upward trend since 1993 (Figure 6). The highest value in the series was observed in 2000. The highest catch rates (kg/tow) were recorded in divisions 4S and 4T.

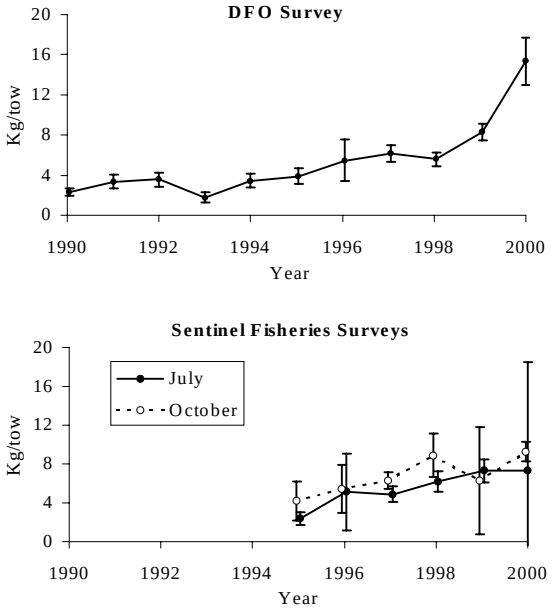

Figure 6. Density indices (in kg/tow) of Greenland halibut for divisions 4RST, estimated for the DFO survey and sentinel fishery surveys.

The size structure of the summer survey catches shows two strong recruitment pulses for juveniles measuring between 15 and 20 cm: the first in 1990–92 for the 1989–91

year-classes, and the second in 1996–2000 for the 1995,1997 and 1999 year-classes (Figure 7). The 1992–94 year-classes occurring between the two pulses were smaller. The 1997 and 1999 year-classes are the largest in the series. Abundance of the 1996 and 1998 year-classes appears to be close to average.

Abundance of fish 44 cm and longer (minimum size limit since 1997) indicates a stability in the exploitable component of the stock since 1996 (Figure 8). Recruitment of the 1995 year-class, since 1999, partially explains the stability of these abundance indices.

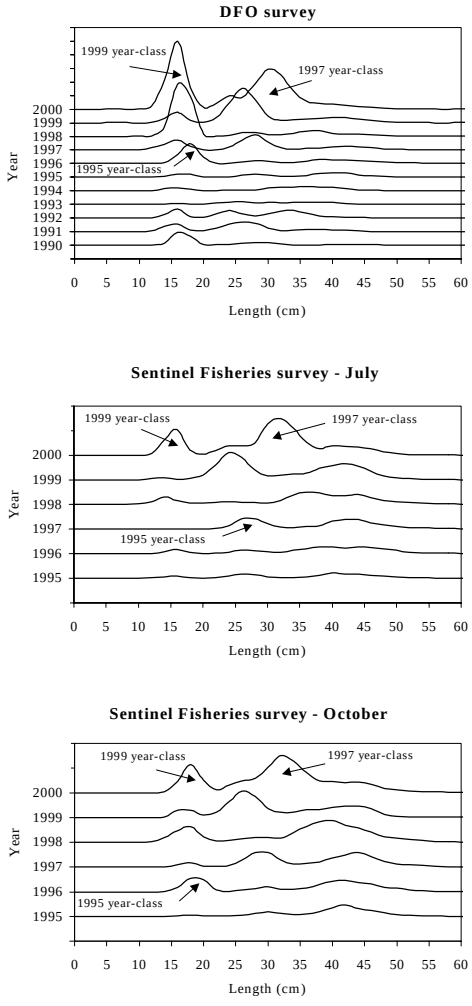

Figure 7. Size structure of Greenland halibut caught during the DFO survey and by sentinel fishery surveys.

Greenland halibut grow very quickly in their first few years of life. During a period of strong growth, a fish can go from a length of 16 cm at 1 year of age to 37 cm at age 3. A decline in the growth rate was, however, observed for fish of the 1997 year-class, which had a modal length of only 31 cm in the summer of 2000. Data collated since 1998 for fish under 40 cm indicate a drop in the amount of food in their stomachs in 1999 and 2000 in some areas (Estuary, Gaspé Peninsula and Sept Îles). This change may be one of the causes of the decline in the growth rate.

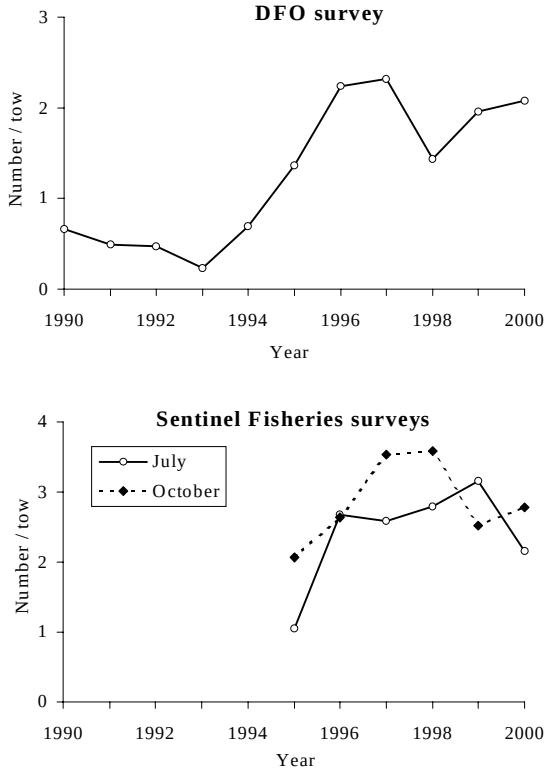

Figure 8. Abundance indices of Greenland halibut measuring 44 cm and over caught during the DFO survey and in sentinel fishery surveys.

The 1997 and 1999 year-classes should begin to be recruited to the fishery starting in 2002 and 2004 respectively. The slowdown in the growth of fish of the 1997 year-class has raised doubts, however, about when exactly this year-class will be

recruited. Furthermore, the strong abundance of the 1997 and 1999 year-classes may mean that a significant number of undersized (less than 44 cm) fish will be caught in the next few years.

Sentinel Surveys for Cod

Since 1995, twelve sentinel surveys for cod have been conducted in divisions 4RST3Pn by nine otter trawlers. Six of the surveys were done in the summer (July-August 1995 and July 1996–99) and six in the fall (November 1995 and October 1996–99). These surveys did not cover the St. Lawrence estuary, where 20% of the Greenland halibut biomass is found. The Greenland halibut density indices (in kg/tow) have been increasing since 1995 (Figure 6).

The length frequency distributions derived from the July and October sentinel surveys indicate the presence of juveniles and prerecruits, corroborating the findings of the DFO survey (Figure 7). The 1997 and 1999 year-classes are also well represented in catches, but in smaller quantities than for the DFO survey, owing to the differences in the fishing gear used.

Abundance of fish measuring 44 cm and longer (minimum size limit for the fishery since 1997) in the sentinel surveys indicates a stability in the exploitable component of the stock since 1996, like the DFO survey (Figure 8).

Exploitation Rates

Estimates of the exploitation rate of the stock were calculated by comparing numbers at length from the commercial fishery and from the DFO research survey. The DFO survey numbers were extrapolated from the preceding spring by adding numbers at length from the commercial catches made during the year up until the August survey. The exploitation rate reached a low point between 1995 and 1997 and then increased in 1998, for all sizes fished, but especially for fish measuring 50 cm and over owing to the introduction of the 152 mm mesh size (Figure 9). These increases can be explained by the increased TAC and the entry of weaker year-classes (1992–94) into the fishery. Exploitation rates declined in 1999 and 2000 because of lower catches and the stability of the abundance index for the fishable stock.

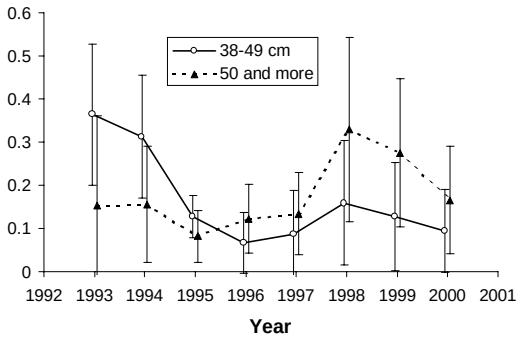

Figure 9. Mean estimated exploitation rates based on fishery catches and the DFO survey.

Industry Point of View

Remarks from people involved in the Quebec industry focussed on the poor results of the fishery in 2000. According to some fishers, the drop in catch rates was due to the heavy abundance of snow crab on traditional fishing grounds, which sometimes forced them to switch areas or depths. Others attribute the lower yields to the use of 6 in mesh since 1996. Many claimed that the stomachs of the fish they caught were less full in 2000 than in previous years.

Uncertainty

The commercial catch rate data show that the quantity of Greenland halibut available to the fishery has declined significantly over the last two years. At the same time, however, the abundance indices derived from the surveys have remained stable over the same period as fish from the 1995 year-

class have reached harvestable size. The poor success of the fishery in 2000 does not appear to be related to the abundance of the resource, but rather to other factors that affect the availability of Greenland halibut to gillnets. The possible factors are either biological (distribution, movement, feeding, growth and condition) or else are related to interactions with other species, especially snow crab, which is very abundant at present. With the data available at the moment, it is not possible to identify the causes more precisely than this. This means there is still some uncertainty about the magnitude of the contribution of the 1995 year-class to the fishery and about the recovery of fishers' yields until such time as new strong year-classes bolster the harvestable stock.

The reduced growth observed in juvenile fish also raises some uncertainty about the entry of the recent strong year-class (1997) into the fishery over the next few years. Although a similar period of weaker growth has been seen in the past (in the early 1990s), the various factors affecting growth are still poorly understood.

Outlook

Owing to the production of weak year-classes between 1992 and 1994, the 2001 fishery will depend primarily on the 1995 year-class and, to a lesser degree, on the weaker 1996 year-class. For subsequent years, the abundance indices of juvenile and prerecruit fish according to the research surveys show that the 1997 and 1999 year-classes are heavily represented. However, the low yields seen in the fishery in 2000 and the decline in the growth of juveniles are factors that make it difficult to forecast the success of the fishery for the next two years or to predict what year the 1997 year-class will enter the fishery. The heavy abundance of the 1997 and 1999 year-classes means that a significant number of undersized fish (smaller than 44 cm) may be caught over the next few years.

References

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