

STOCK STATUS REPORT

LAURENTIAN REGION

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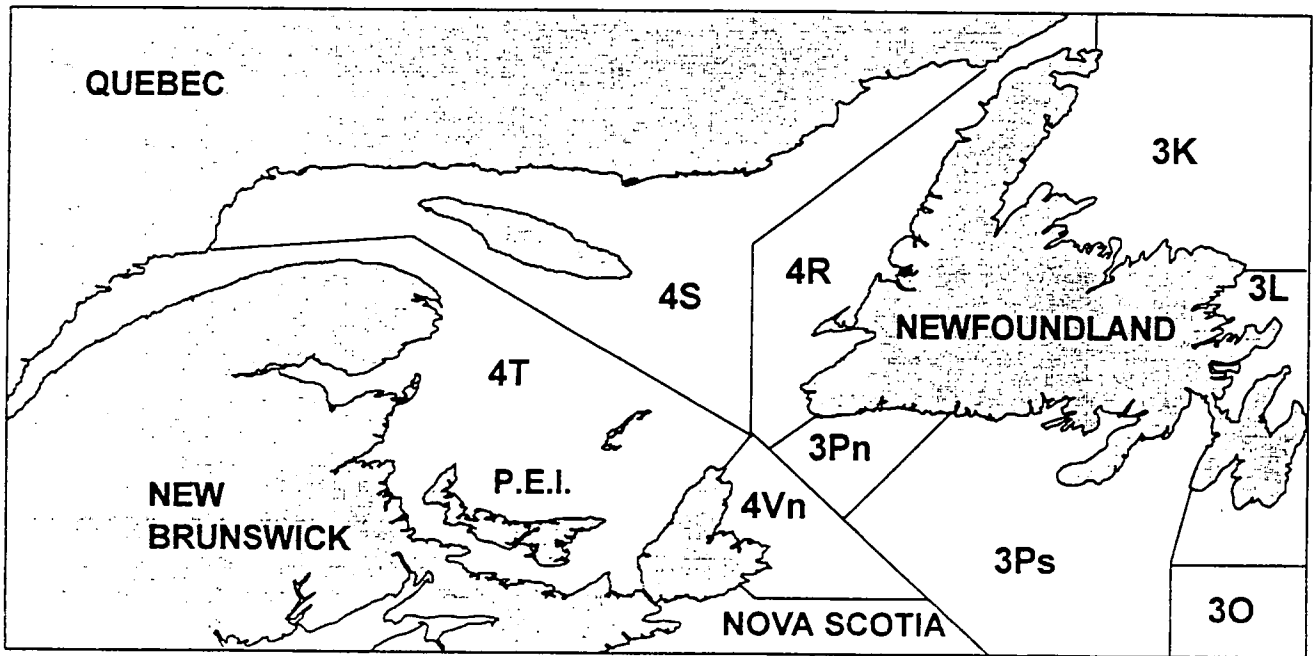
MARITIMES REGION

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GULF OF ST. LAWRENCE FISHERIES OVERVIEW



INTRODUCTION

The fisheries of the Gulf of St. Lawrence were historically dominated by the groundfish resources in terms of landings. However in recent years, with the decline in the abundance of groundfish

and the increased value of the crustaceans fisheries they have changed considerably.

In 1995, directed commercial fisheries on the two cod stocks (3Pn, 4RS and 4T-Vn (N-A)), Unit 1 redfish and white hake in the southern Gulf were prohibited. In

Table 1. Summary information on selected stocks from the Gulf of St.-Lawrence from each of the species groups.

Group	Species	Stock	Landings (t)	Recruitment	Decline in size since 1975	Exploitation rate relative to target	Abundance	Status 1995 vs 1994
<i>Pelagic</i>	Herring	4T	85,000	Low	Yes	OK	Med	↓
		4R	14,500	High	No	OK	Med	→
	Capelin	4RST	150	?	Yes	?	?	?
	Mackerel		9,300	High	No	Below	High	→
<i>Crustacean</i>	Lobster	Maritimes	18,000	?	No	High	High	↓
		Québec	3,200	?	No	High	High	→
	Rock crab	Maritimes	4,000	?	No	?	High	↑
		Québec	850	?	No	?	Likely high	
	Snow crab	Southern Gulf	23,200	Low	No	OK	High	↓
		Northern Gulf	7,200	Low	No	OK	Med	↓
	Shrimp		17,000	Average	No	OK	High	
<i>Groundfish</i>	Cod	4TVn(N-A)	1,100	Low	Yes	Closed	Low	↓
	Cod	3Pn4RS	148	Low	Yes	Closed	Low	↓
	Redfish	Unit 1	100	Nil	No	Closed	Low	↓
	Greenland Halibut	4RST	2,350	Low	No	Likely above	Low	→
	Atlantic Halibut	4RST	88	?	No	?	Low	?
	Hake	4T	100	Low	Yes	Closed	Low	→
	Plaice	4T	2,300	Low	Yes	Likely above	Low	↓
	Winter. Flounder	4T	600	?	Yes	?	Med	→
	Witch	4RST	300	?	?	Above	Low	↓
	Dogfish		500	?	No	?	High	↑
	<i>Mollusc</i>	Giant scallop	Southern Gulf	400	?	?	?	?
Magdalen Island			3,570	Low	No	Above	Low	↑
Islandic Scallop		Northern Gulf	1,740	Med	No	OK	High	→
<i>Seals</i>	Harp			High	Yes	Below	High	↑
	Grey			High	No	Below	High	↑

addition, the TAC's on several other groundfish stocks were low compared to the levels of the previous ten years.

Based on reviews of the status of the resources conducted by staff from the Gulf Fisheries Centre (Moncton) and the Maurice-Lamontagne Institute (Mont-Joli) in early 1996, this stock status report presents a general overview of the status of the resources in the Gulf of St.-

Lawrence. Stocks of invertebrates are, with a few exceptions, in good shape despite intense exploitation, and the biomass of pelagic fish, which are moderately exploited, is near or above long-term averages. On the other hand, groundfish stocks continue to be in generally poor condition, at levels close to and even below historical lows. Summary information on the selected stocks

from each of the species group is presented in Table 1.

Crustaceans

Three species of crustaceans are fished intensively in the Gulf of St. Lawrence: northern shrimp, snow crab and lobster. These species occupy different habitats in the Gulf ecosystem.

There are four main concentrations of shrimp in the Gulf, namely in the Estuary of the St.-Lawrence, west of Anticosti Island, north of Anticosti Island and in the Esquiman Channel. The shrimp biomass in the Gulf increased systematically from the early 1980s until 1990, then decreased slightly. Owing to recent abundant year-classes, the shrimp biomass is currently increasing. The spatial range of shrimp in the Gulf is also rapidly increasing, as large concentrations of shrimps are now found towards the southeast in the Laurentian Channel where they were rare previously. Shrimp is a major prey for redfish and cod when it is present on grounds used by these species. Its recent range extension is perhaps related to a reduction in predation by the now scarce cod and redfish.

Snow crab live at medium depths (100 m) on relatively soft bottoms. The fishery targets mature males measuring over 95 mm of carapace width, which recruit to the fishery around age 10. Following a high in the early 1990, the crab biomass is currently decreasing in response to the arrival of the weak 1985-1987 year-classes (called a recruitment trough) in the exploitable population. The subsequent year-classes (1989-1992) appear strong, and the biomass should

begin to increase again in 1999. Similar phenomena have been observed in the past. These fluctuations appear to be linked to biological mechanisms that are internal to the crab populations and relatively independent of climatic conditions.

Lobster lives mainly on rocky bottoms near the coast. Landings in Quebec and along the Gulf coastline of the Maritimes Provinces, as in the entire North West Atlantic, have increased steadily over the past 20 years, although some decline (up to 25%) was seen in 1992 and 1993. Lobster catches are essentially based on annual recruitment, and this constant increase is attributed to a combination of environmental factors and increased efficiency by the fishing fleet.

Molluscs

Many species of molluscs are exploited in the Gulf of Saint-Lawrence (scallops, oysters, clams, surfclams, quahaug, etc.). These species live either directly on the bottom, or buried in the sediments. Their presence is thus strongly linked to the nature of the bottom. They are often found in localized, spatially well delimited beds. Management of these resources is usually done through effort control on a small geographical scale, although some species are under quota management (Arctic surfclams, some scallop areas). Because of the multiplicity of species and populations, it is difficult to give an overall picture of molluscs in the Gulf, although it appears, that for the most valuable species, exploitation is intense.

Scallops are the species for which we have the most information. Most of the

major scallop beds are the subject of commercial fisheries, particularly in the Northumberland Strait and Magdalen Islands. Indications are that they are heavily fished. For instance, the biomass for the various beds in the Magdalen Islands is now at very low level, with the fishery being sustained only by annual recruitment.

Other invertebrate species such as rock crab, toad crab, and green sea urchin are the object of developing fisheries, particularly in the southern Gulf. However, there is little information on the abundance and the level of exploitation for these species.

Pelagic Fish

Herring is the most important exploited pelagic species. There are two spawning components in the northern and southern Gulf: spring spawners and fall spawners. As is the case for all pelagic fish, recruitment of herring varies significantly from year to year. In the northern Gulf, the herring biomass was at its lowest level in the early 1980s, after a period of many years of low recruitment. The strong 1979, 1980 and 1982 year-classes allowed the biomass to increase rapidly up until 1989-90, after which it declined despite relatively strong recruitment in 1986-87. Although the spawning stock biomass is near average, the spring spawner component in Bay St. George is now very low, partly due to relatively intense fishing aimed specifically at this component. For the southern Gulf, population abundance was also low in the early 1980s but increased significantly up until the early 1990s with the arrival of the large 1988 year-class. In the southern Gulf, the fall fishery is the

largest and catches in 1995 amounted to over 74,000 t compared with 16,000 t in the spring. There are indications that recruitment in recent years has been reduced and some decline in the population is expected.

Mackerel is a summer visitor to the Gulf. In the winter, the mackerel gather on the edge of the continental slope off New England and Nova Scotia. In summer, a large portion of this population comes into the Gulf to spawn (June-July); after spawning, the mackerel scatter to such areas as the Gulf and Grand Banks to feed and leaves in the winter. The mackerel is not currently heavily exploited, and its biomass is high. Fluctuations in abundance are mainly due to fluctuations in recruitment. Major year-classes of mackerel are only produced on occasion (for instance in 1967, 1982, 1988). The 1988 year-class has allowed the biomass to stabilize at relatively high levels, and the abundance of young fish in the commercial catch in 1995 (age 1 and 2) is an indication that there was probably strong pulses of recruitment in both 1993 and 1994.

Capelin is another major pelagic species in the Gulf, but it is not extensively harvested; there is only a small fishery in the northwestern Gulf. The capelin biomass is presumed to be large, but little information is currently available on its abundance and variations. The size of capelin in 1995 was below market requirements, and the fishery was halted prematurely. Capelin is one of the major prey for cod in the northern Gulf, as well as many other species like seals and summer visitors such as whales.

Groundfish

The groundfish fishery in the Gulf of St. Lawrence is dominated by three groups of species: gadids (cod in the northern Gulf, cod in the southern Gulf and white hake), redfish (Unit 1) in the deep waters of the Laurentian Channel, and flatfishes. Cod fisheries have traditionally dominated landings in the Gulf of St. Lawrence but, due to reductions in TACs, cod represented only 28% of groundfish landings in the Gulf in 1993 in the last year when a directed fishery was prosecuted. Landings of other species, which are often by-catches in the cod fishery (such as American plaice and white hake) also declined.

Fluctuations in Gulf cod have followed those for most other Northwest Atlantic stocks, particularly the more northerly stocks. After a period of great abundance in the mid-1960s, the two stocks dropped to very low levels in the mid-1970s, and then rose until the mid-1980s following several years of very strong recruitment. After that, the stocks collapsed, reaching record low levels in 1992-1993. Until the fishery closures, harvesting rates for these stocks had been very high and had increased gradually over the past decade, while the growth rate of individuals had decreased during the period. This reduction in growth, and the increasing scarcity of large fish that has resulted, have led to an increase in the number of small fish (under 41 cm) being discarded by the commercial fishery.

Intense harvesting combined with a decrease in biological production has brought about this catastrophic decline in the cod stocks. The two components

of production -- individual growth and recruitment -- have both decreased greatly since the mid-1980s. Indications are that recruitment for cod has been low in recent years and that the recovery to average levels will take several years.

The redfish stock is in fact made up of two separate species (*Sebastes fasciatus* and *Sebastes mentella*). Effective methods of distinguishing the species have been developed in recent years, and biological differences are beginning to be recognized (distribution, reproduction), but their impact has not yet been established. Redfish in the Gulf appear to be closely linked to those of the Laurentian Channel (3P4V). This stock, and thus its fishery, have been dominated by the sporadic appearance of strong year-classes (particularly those born around 1946, 1956-58, 1970 and 1980), while recruitment was practically nil during other years. The succession of these year-classes in the population has resulted in significant variations in catches. The last year-class to recruit in abundance to the fishable population was born in the early 1980s, but since then, no significant year-classes have been produced. A year-class, born in 1988, was present in abundance at ages 1 to 3, but these fish have not persisted in the Gulf (it is perhaps due to mortality or migration), and it will not contribute to the fishery in the future. In the absence of recruitment, the redfish biomass has decreased considerably under the heavy exploitation at the point that all directed fishery was forbidden in 1995. As redfish take 7 to 10 years to reach commercial size, a significant recovery of this stock can only occur 7 or 8 years after

significant recruitment has been produced.

Indications are that many of the flatfish stocks are also near their lowest levels. The most abundant flatfish in the Gulf of St. Lawrence is American plaice which is predominantly found in the southern Gulf of St. Lawrence. After a period of relatively high abundance in the mid-seventies, this population has declined and is presently at its lowest level. Prior to the closure of the cod fishery, a high proportion of small plaice were caught and discarded.

Greenland halibut differs from other species of flatfish by its substantial fluctuations in abundance, once again linked to marked variations in recruitment. Harvesting of this population is intense, and fishing success depends essentially on recruitment. The fishery is also characterized by the abundance of immature fish in the landings.

Witch flounder, particularly in the northern Gulf of St. Lawrence has declined considerably over the recent time period and is considered to be at low level. The decrease in cod TACs has made winter flounder more attractive. This species occupies primarily coastal habitats and there are probably several separate populations in the Gulf. In the southern Gulf (4T), the abundance of this species does not appear to vary widely, although declines have been noted in certain locations (particularly in the Magdalen Islands).

Atlantic Halibut, is a rare but highly valuable species. Recent reported landings have been very low (between 100

and 200 t), but in the first half of the twentieth century, landings in the Gulf were significantly higher (between 1,500 t and 4,000 t steadily over 60 years) indicating that this stock could produce much higher yields if properly managed. Because of the low landings, it is difficult to obtain information on the species, but as in the case of Greenland Halibut, there is a problem of high exploitation on immature fish.

Spiny dogfish is now found in abundance in the southern Gulf of St. Lawrence in summer. In 1995 almost 500 t of dogfish were taken in a directed fishery. In the past (1920s and 1950s), there have also been occurrences of dogfish in the Gulf. These fish are considered to constitute one stock on the Atlantic Coast. Dogfish spend the winter in the deep waters off the coast of New England where they are also exploited. The occurrence of dogfish in the Gulf is thought to be due to an expansion of their range concurrent with an increase in their abundance.

Marine mammals

Four species of seal (harbour, hooded, grey and harp) are abundant in the Gulf of St. Lawrence. No information is available on the number of harbour seals in the Gulf.

The grey seal population of the Gulf is growing at the rate of about 8% a year, and grey seals also breed on Sable Island outside the Gulf. The production of young seals in the latter population was in the order of 10,000 newborns in 1990, and is increasing at the rate of 12.6% per year. Some Gulf seals spend part of the year outside the Gulf, while a few Sable Island animals spend part of the year in

the Gulf. Quantitative information on diet and distribution are incomplete. Some information is available from the northern Gulf (May-September) since the mid 1980s, and throughout the year in 4VsW for recent years. Quantitative diet information is not available for other regions including the southern Gulf, 4X, 3P, and 2J3KL. Grey seal consumption of cod in eastern Canada is estimated to have increased from approximately 14,000 t in the early 1980s to approximately 40,000 t in 1993, mostly in the Gulf and on the Eastern Scotian Shelf. Assuming that on average 88 % of the Sable Island herd and 25 % of the Gulf herd remains outside of the Gulf, then total consumption of cod by grey seals in 1993 would be in the order of 18,000 t in the Gulf of St. Lawrence, 17,000 t in 4VsW, and 5,000 t in the remaining areas. In earlier samples (before 1988), the majority of cod consumed by grey seals consists of pre-recruits. However, in a recent sample of 250 seals collected in 1992, 50% of the cod consumed were of a commercial size (more than 40 cm). It is not possible to assess the impact of this consumption by grey seals in the Gulf of St. Lawrence on Gulf cod stocks.

Harp seals are the most abundant pinniped in the Northwest Atlantic. In March 1994, an aerial survey was conducted to estimate harp seal pup production in the Gulf of St. Lawrence and off the east coast of Newfoundland. The results of this survey indicate that pup production has increased from 580,000 ($\pm 78,000$) in 1990 to 703,000 ($\pm 127,000$) in 1994. The 1994 population estimate is 4.8 million animals with a range of 4.1-5.5 million. This estimate could be as low as 4.5 millions if pup mortality is

assumed to be higher than that of older seals.

Cod consumption by harp seals in the Gulf of St. Lawrence was estimated using information on individual energy requirements, population size, diet and the seasonal distribution of animals. In 1994, it was estimated that Gulf harp seals consumed 53,700 t (13,500 t-150,000 t) of cod. The majority of these cod were juveniles (10-20 cm long), too small to be taken by the commercial fishery. The wide range in current estimates of consumption are due to uncertainties in diet composition and the distribution of animals in the Gulf of St. Lawrence. The proportion of cod in the diet of harp seals along the west coast of Newfoundland varies between 9% and 20% while it is less than 2% in the Magdalen Islands and upper estuary. Uncertainties in the proportion of the Gulf population in each of these areas during the time that they are in the Gulf will have a major effect on cod consumption estimates.

Little information is available on the size of the hooded seal population. Production of young hooded seal in 1993 in the Gulf of St. Lawrence was approximately 3,000 newborns. No information is available on the diet of hooded seal in the Gulf. Information from the "Front" indicates that these animals feed mainly on capelin, turbot and redfish. Little is known about the relationship between the hooded seal in the Gulf and those of the "Front", or on the proportion of juveniles returning to the Gulf in winter. Based on diet data from outside the Gulf, an attempt has been made to model hooded seal fish consumption. If they

have a diet similar to hooded seals off the eastern Newfoundland Coast then in 1995 they may have consumed 2,800 t to 4,100 t of Greenland Halibut, 1,300 t to 1,900 t of redfish, 70-100 t of cod and 20-30 t of capelin in the Gulf. Fifty per cent of these are less than 30 cm, and only 10% of the Greenland halibut and 10% of the redfish are greater than 40 cm.

For further information

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