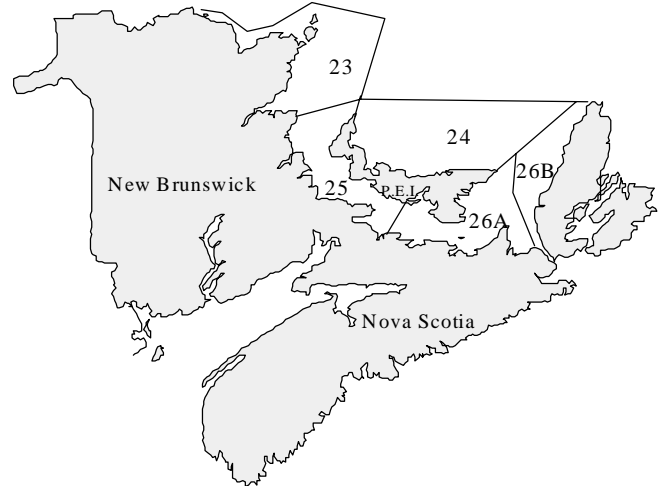


## Southern Gulf of St. Lawrence Lobster (LFAs 23, 24, 25, 26A and 26B)



### Background

*The American Lobster habitat extends along the Atlantic coast from North Carolina to Labrador. In Canadian waters, lobsters may be fished in deep waters (i.e. Georges Bank) but the most important concentrations are generally observed within 20 km from the shore. In the southern Gulf of St. Lawrence, lobster are found in depths ranging from 1 to 40 meters.*

*The life history of the lobster can be divided into a benthic and planktonic phase. The planktonic phase follows the hatching of the eggs during the months of July and August. The larvae will go through the free swimming period which lasts from 3 to 10 weeks depending on environmental conditions. The planktonic phase ends when the larvae settle on the substrate. After 5 to 6 years of growth, female lobsters in the southern Gulf of St. Lawrence become sexually mature (males become sexually mature at smaller sizes and ages than females). Mating occurs between the months of July and September. Generally, female lobsters extrude eggs one year after mating and carry the eggs, attached under the abdomen, for nearly another year.*

*Over the years, the lobster fishery has become and is still a major factor in the social and economic development of communities along the Atlantic coast, and especially to communities in the Gulf of St. Lawrence. In 1997, the 3,276 licence holders in Lobster Fishing Areas 23, 24, 25, 26A and 26B alone (southern Gulf of St. Lawrence) have caught 16,413 t of lobster for a landed value of more than \$170 million.*

### Summary

- Overall catches for the southern Gulf have been slowly declining since the 1990 record landings.
- Catches range between 1.8 to 2.5t of lobster per km<sup>2</sup> of fishing ground.
- Most of the catches consist of new recruits.
- There is no evidence of compliance with V-notching, and other measures will be required to double the egg per recruit.
- New information on growth indicates that lobster throughout the southern Gulf have similar attributes.
- A new analysis of exploitation rates confirms the high levels found in earlier studies.
- A revised egg per recruit analysis suggests that the stock is heavily fished and recruitment overfished, and confirms the need to increase egg per recruit.

**The Fishery**

The Canadian **lobster fishery** began in the mid 1800's. During a short period corresponding to the transition between the 19<sup>th</sup> and the 20<sup>th</sup> century, high lobster catches were reported in the southern Gulf of St. Lawrence. With the expanding fishing effort, these years of good catches were rapidly followed by an overall decline in landings in the early part of the 1900's. Annual catches decreased from 15,000 t annually in 1895 to landings fluctuating around 8,000 t between 1915 and 1975. It is only in the mid 1970's that lobster landings in the southern Gulf of St. Lawrence regained in strength.

*Lobster management regime in the southern Gulf of St. Lawrence in 1997.*

Lobster Fishing Area	Minimum carapace size	Fishing season	Number of license holders	Maximum number of traps/fisher
LFA 23	66.7 mm	May - June	749	375
LFA 24	63.5 mm	May - June	637	300
LFA 25	66.7 mm	Mid-Aug. to mid-Oct.	867	250
LFA 26A	65.1 mm	May - June	767	300
LFA 26B	70.0 mm	May - June	256	300

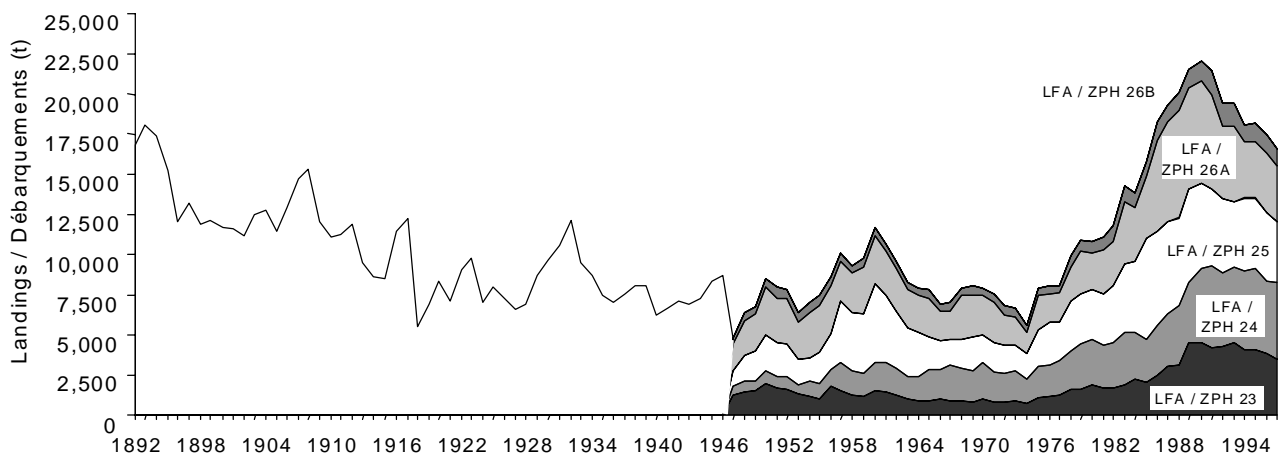
The present fisheries **management** regime is based on five Lobster Fishing Areas (LFA), two major fishing seasons, four minimum carapace sizes at capture and three maximum number of traps allowed per fisher. The spring fishing season takes place during the months of May and June, and the fall fishing season is from mid-August to mid-October.

*Lobster conservation measures by Lobster Fishing Area in the southern Gulf of St. Lawrence from 1998 to 2001.*

	1998	1999	2000	2001
LFA 23	MSI* to 67.5mm V-notch**			
LFA 24	MSI* to 65.1mm	MSI* to 65.9mm	MSI* to 66.7mm	MSI* to 67.5mm
LFA 25	MSI* to 67.5mm V-notch**			
LFA 26A	MSI* to 65.9mm V-notch**		MSI* to 66.7mm	MSI* to 67.5mm
LFA 26B	V-notch**			

\* Minimum size increases (MSI)  
 \*\* V-notching on 50% of egg bearing females caught by trap

In November 1995, the Fisheries Resource Conservation Council (FRCC) presented their report entitled "**A Conservation Framework for Atlantic Lobster**" (FRCC, 1995). The FRCC concluded that the present fisheries were operating at high exploitation rates, harvesting primarily immature animals and did not allow for



*Lobster landing (t) by Lobster Fishing Area (LFA).*

LFA	1950-59 Avg.	1960-69 Avg.	1970-79 Avg.	1980-89 Avg.	1990	1991	1992	1993	1994	1995	1996	1997
23	1437	1069	1099	2463	4508	4186	4257	4486	4111	4069	3784	3467
24	1057	1826	2044	3090	4591	5109	4605	4732	4830	5083	4604	4757
25	2494	2755	2217	4764	5320	4770	4578	4100	4572	4360	4239	3784
26A	2751	2440	2037	4389	6363	5844	4594	4686	3480	3536	3720	3481
26B	552	500	539	977	1281	1543	1411	1455	1110	1152	1126	1079
Total	8290	8590	7936	15683	22063	21451	19444	19459	18103	18200	17472	16568

adequate egg production. Implementation of a new conservation framework was recommended, to establish seven conservation units (Lobster Production Areas) and increase egg production. A target of egg production per recruits (E/R) equivalent to 5% of that of an unfished population was also recommended.

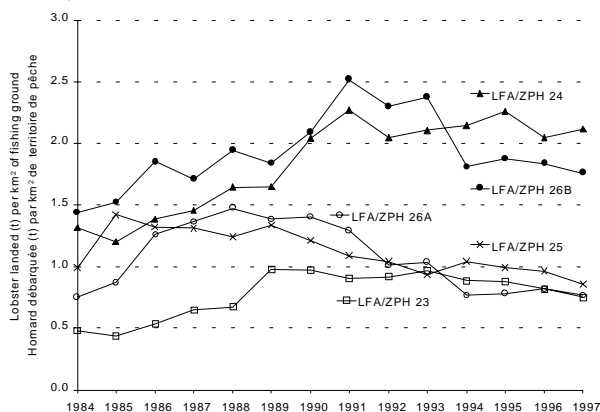
In response to the FRCC, the DFO Minister introduced new measures to double E/R in the southern Gulf in 1998. This target resulted in conservation measures adapted for each LFA so that measures to double the E/R could be achieved within four years.

Commercial lobster **landings** in the southern Gulf of St. Lawrence have shown a sharp increase since 1974 from 5,594 t landed to a record high of 22,063 t in 1990. This represents a four fold increase during a 16 year period. The increase in catches has been observed in all LFAs but there is some variation in the year of peak landing. The factors responsible for the extraordinary catch increase is not well understood. It is believed that the overall fishing power substantially increased when economic and technological developments took an accelerated pace after the Second World War. However, this alone cannot explain the magnitude of the increase that was seen all over the geographical range of the American lobster, from North Carolina to Labrador. Favorable environmental factors are believed to have favored the survival of lobster recruitment over its entire distribution range.

Since 1990, landings in the southern Gulf have shown a steady declining trend. In 1997, about 16,600 t of lobster were landed, which represents a 25% reduction from the peak landing in 1990. The declining trend was not observed with the same amplitude in all LFAs.

### Resource Status

To facilitate comparison among areas, **landing per unit of area (LPUA)** of each LFA was estimated by dividing the landings by the total fishing area in each LFA (t of lobster caught per km<sup>2</sup>). The total fishing area was estimated by calculating the entire surface between one and 20 fathoms. No adjustments were attempted to remove the areas not fished or to give different weights to fishing ground productivity within each LFA.



In recent years, LFA 24 and 26B are emerging as the fishing grounds that yield the most lobster per area. Since 1990, LPUA values for these LFAs have increased, ranging between 1.8 and 2.5 t of lobster per

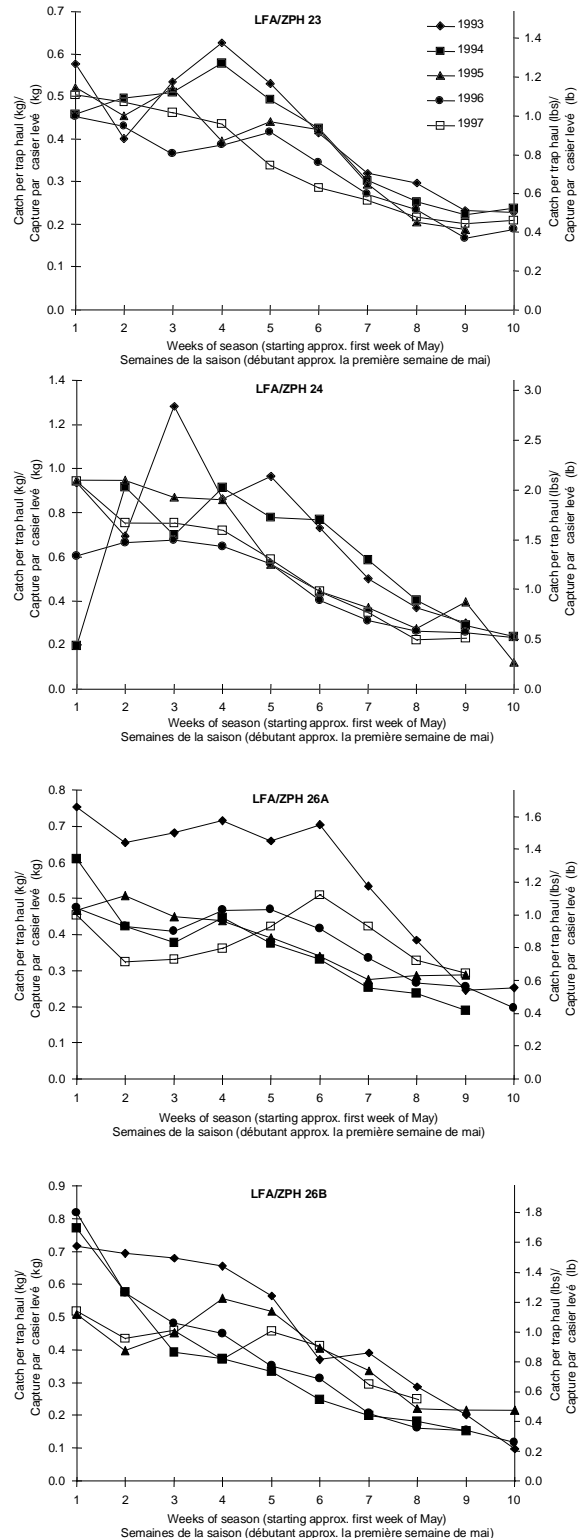
km<sup>2</sup>. During the same period, the other LFAs have shown a steady decline with values ranging between 0.7 and 1.0 t of lobster per km<sup>2</sup>.

From 1984 to 1997, LFA 26B has maintained the highest or second highest LPUA values. This LFA has the smallest fishing ground area and went through the most important change of the minimum legal carapace sizes; from 63.5mm to 70mm (the largest in the southern Gulf). Although, LFA 24 has the smallest minimum legal carapace size in the southern Gulf, the LPUA is relatively high in relation with the other LFAs. However, the increase in LPUA for this LFA only started in the mid-1980's.

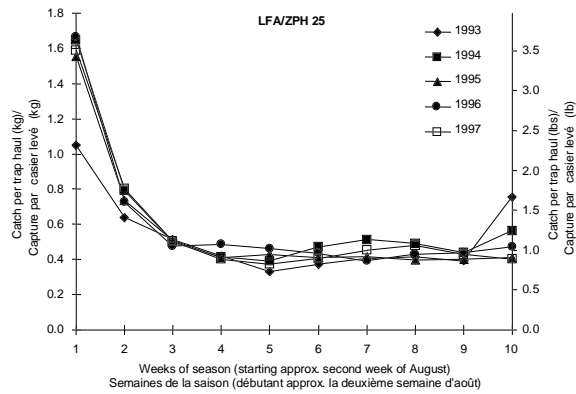
**Catch per unit of effort** or catch rate (CPUE, weekly average) for each LFA was calculated from the index fisher logbooks. The calculated CPUE was not adjusted for soak time and represents the nominal catch rates.

For the spring fisheries in LFAs 23, 24, 26A and 26B, the CPUE pattern and values are similar from year to year. For the fall fishery in LFA 25, CPUE is different from the other LFA both in their seasonal pattern and values. For all LFAs, the variation in weekly CPUE between index fishers is large, the coefficient of variation being in the range of 11% to 122%. This variability reflects the important geographical variability that exists within a LFA. Therefore, estimates of fishing mortality were conducted at the port level.

**Fishing mortality** or the annual removal (exploitation rate) was calculated using CPUE data from the index-fisher program. Data by ports were summarized based on fishing habits, habitat and bottom type to form 23 homogeneous fishing areas. Leslie analyses (Ricker, 1975) were conducted on a small geographical scale within LFA.



Leslie estimates of fishery removals assume that catchability is constant and that there are no additions or removals from the population other than the fishery.



Movement or redistribution of fishing effort within the different study areas can also influence the exploitation rate calculations. This is difficult to measure but is known to occur in different localities of the southern Gulf. For instance, fishers in LFA 26B have attributed the localized fluctuations of exploitation rates to changes of fishing effort. It is suggested that the cod fishery moratorium in 1993 has resulted in fishers putting more effort into the lobster fishery and increasing the overall exploitation rate for the LFA. This phenomenon has also resulted in movement of lobster fishers within LFA 26B, increasing exploitation rates in localized areas. Because the molting process is affecting catchability in LFA 25 (summer-fall fishing season) and the absence of CPUE decline in LFA 26A, Leslie analyses were not conducted in these two LFAs.

In areas where seasonal declines in CPUE were evident, exploitation rates varied between 63% and 87%. These values are within the range of exploitation rates obtained previously (DFO, 1996).

### Sources of Uncertainty

The methods available to estimate fishing mortality cannot take into consideration the multiple factors that may influence lobster catchability (i.e. water temperature and seasonal change in fishing effort), and the basic assumptions are often not met.

Variability in lobster distribution and characteristics within an LFA are not considered in the assessment. LFAs are not biological areas but management units. The stock assessment would improve with better definition of the different biological entities and the identification of highly sensitive regions in terms of recruitment and general stock changes.

#### Exploitation rate estimates using the Leslie method

LFA	Area (combined ports)	Exploitation rate %			
		1994	1995	1996	1997
23	Anse-Bleue, Stonehaven, Miller Brook	-	-	-	63
23	Miscou, Pigeon-Hill	-	-	78	-
23	Ste-Marie, St-Raphael, Savoie Landing, LeGoulet	-	79	69	78
23	Tracadie, Val Comeau, Tabusintac	70	-	-	-
24	Morel, Naufrage, North Lake, Red Head	72	-	69	-
24	Alberton, Seacow Pond, Tignish, Northport, Black Bank, Jude's Point	65	-	74	83
26B	Chéticamp, Grand Étang La Pointe, Margaree	83	-	86	-
26B	Inverness, Little Judique Harbour, Murphy's Pond, Baxter's Cove, Mabou Harbour, Port Hood	82	-	75	-

The monitoring of lobster population size distribution is not sufficient to measure the seasonal and small geographical scale variability.

The lobster larval drift, distribution and interactions between the different LFAs are not well understood. LFAs with higher E/R

may contribute to the recruitment success of neighboring LFAs.

Exceptional years for ice condition and weather affect lobster movements and catchability (i.e. 1995 was characterized by a late ice departure). These events create variability in population responses, which is difficult to monitor and assess.

Illegal fishing, misreporting of catches and ghost fishing (lost traps that still fish) exist and will affect estimation of exploitation rate.

### ***Outlook***

With minimum carapace size increases in all LFA's (with the exception of LFA 26B) in the spring of 1998, catches in the southern Gulf were expected to be lower than in 1997. However, based on preliminary catch and effort data, overall landings for the 1998 spring fisheries are as good, if not better than in 1997. There are indications that this trend may not last very long. On a large geographical scale (southern Gulf and over the entire distribution of the species), the trend has been for a steady decrease in catches since the extremely high landings of the early 1990's. The concerns about the high fishing mortality, high fishing effort, increasing fishing power and low egg production still exist.

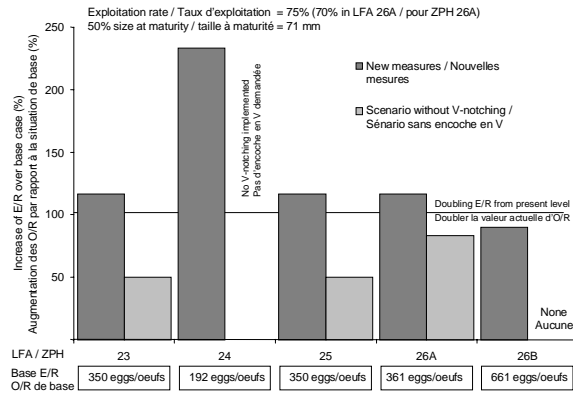
### ***Management Considerations***

The FRCC (1995) advised that there was a risk of recruitment failure in the lobster fishery unless measures were taken to increase egg production, specifically to increase egg per recruit. Despite general agreement by industry for the need to change, there was no agreement on the FRCC target and as a result doubling of egg per recruit was selected.

Over the longer term, the management changes announced in 1998 should help increase the egg production of the lobster population and reduce the risk of recruitment declines if environmental conditions become unfavorable.

**Egg per recruit (E/R)** values calculated for the 1997 fishing season range from 0.3% to 1.0% in LFA 24 and 26B respectively. These values are expected to increase with the introduction of new management measures in the spring of 1998. The objective of the new measures is to modify the management regime over the next four years so that the lobster population would be in a position to at least double its egg production (E/R). The introduction of new management measures will allow the doubling target to be met in all LFAs. However, without V-notching in LFAs 23, 25, 26A and 26B, the doubling target will not be achieved.

The E/R estimates presented above are different from the values presented in the FRCC report (FRCC, 1995). Since the publication of the report, adjustments to the E/R model and improvements in the parameter estimations have been made. Further studies on lobster growth and mortality were conducted and resulted in new values that are believed to better reflect the fishery in the southern Gulf. Nevertheless, estimates of fishing mortality (F) are a source in uncertainty. Although there is confidence of the relative levels of mortality in the different areas, the absolute levels are imprecise and require further research.



In addition to carapace size increases, **V-notching** on 50% of the egg bearing females has been announced for the 1998 to 2001 fishing seasons. The notching activity was never part of the fishing industry's proposed management plan and fishers of the southern Gulf have raised concerns on the potential induced mortality and enforcement problem of a V-notching program.

At the end of the 1998 lobster spring fisheries and after discussions with fishers, it has been concluded that no V-notching had been conducted. This situation will require further assessment since a portion of the predicted egg production is attributed to the V-notching measure.

### For more Information

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## ***Erratum***

*Please note the following corrections in regards to certain references in the Stock Status Report:*

### Document Referenced:

Lanteigne, M, M. Comeau M. Mallet, G. Robichaud and F. Savoie, 1998. The American Lobster, *Homarus americanus*, in the Southern Gulf of St. Lawrence (Lobster Fishing Areas 23, 24, 25, 26A and 26B). DFO Can. Stock Assess. Sec. Res. Doc. **98/72**.

### Correction:

Document number should be **98/123**.