Update of the Scotian Shelf Shrimp Fishery - 1990

By

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ABSTRACT

The Scotian Shelf shrimp fishery covers three areas with depths greater than 200 m, referred to as SFA13 (Shrimp Fishing Area) or Louisbourg Hole, SFA14 or Misaine Hole, and SFA15 or Canso Hole. These areas have traditionally been fished by Gulf-based vessels. In 1990 only the New Brunswick vessels fished the Eastern Scotian Shelf (99 % of the total catch). Catches were reported from May to September. Over the last several years catches have been very low. In 1990, however, there was a slight increase in the catch.

Effort increased 23.6% from 1989. There was a slight increase in the standardised catch-rate. In the fishery, the dominant by-catch of cod and redfish have usually been substantially above the 10% limit. In 1990 other by-catch species were somewhat less frequent and lower than in other years.

For the last three years, a biologically-derived TAC had been suggested at 2,580 t. Since the CPUEs for the last 3 years are quite similar and the quota was not reached, it seems reasonable to assume that this figure would be adequate for 1991, 1992 and 1993. It will require higher catch-rates and a solution to the by-catch problem to attract vessels from the Gulf, or Nova Scotia vessels from groundfishing. Until this happens, the resource will continue to be underutilized.

RESUME

Sur le plateau néo-écossais la pêche à la crevette se poursuit dans trois endroits à des profondeurs supérieures à 200 m, les cuvettes de Louisbourg ou Région de Pêche à la Crevette 13 (RPC), Misaine (RPC 14), et Canso (RPC 15). Des navires provenant de la région du Golfe ont traditionnellement pêché ces endroits. En 1990 seulement des navires du Nouveau-Brunswick ont pêché le plateau néo-écossais de l'Est (99 % des prises totales).On a rapporté des prises de Mai à Septembre. Les prises des dernières années ont été les plus basses. Cependant les prises ont augmenté légèrement en 1990.

L'effort a augmenté 23.6% depuis l'an passé. Il y a eu une légère élévation dans le taux de capture standardisé. Dans la pêche, les prises accessoires dominantes de morue et de sébaste ont habituellement été largement au-dessus de la limite de 10 %. En 1990 les autres espèces constituant les prises accessoires étaient moins fréquentes et de niveau plus bas que pour les autres années.

Pour les trois dernières années on avait suggéré un TPA dérivé biologiquement à 2,580 t. Etant donné que les PPUEs des quatre dernières années sont fort semblables et que le quota n'a pas été atteint, il semblerait raisonnable d'assumer que ce niveau serait adéquat pour 1991, 1992, et 1993. Des taux de capture plus élevés seront nécessaires pour attirer des navires du Golfe, ou de la flottille mobile de poissons de fond de la Nouvelle-Ecosse. En attendant cette ressource continuera d'être sous-exploitée.

INTRODUCTION

The Scotia-Fundy shrimp (*Pandalus borealis*) fishery has been concentrated primarily in three areas with depths >200m on the Eastern Scotian Shelf (NAFO Areas 4V and 4W) over the last 11 years. These areas are referred to as SFA13 (Shrimp Fishing Area) or Louisbourg Hole, SFA14 or Misaine Hole and SFA15 or Canso Hole (Figure 1). They have been continuously underexploited over the past several years. In 1990 only 104 t of shrimps were caught (Table 1). This amount represented approximately 4% of a quota of 2,580 t. There were no reported landings from NAFO Subarea 4Xs in 1990. The Eastern Scotian Shelf catch can be divided into 90 t from Louisbourg and 14 t from Misaine according to log information (Table 2). Effort increased 23.6%, from that of 1989. The percentage of shrimp in relation to by-catch has increased in 1990. The potential of this fishery is seriously compromised by a 10% by-catch limit which is difficult to abide by in this area, due to heavily fished local cod stocks.

METHODS

Fishery Data

The commercial fishery data was extracted from logs completed and submitted by the fishermen. The total commercial catches found in Table 2 are from both the Scotia-Fundy and Gulf Statistics Branches and Foreign and Domestic Quota Monitoring (Fisheries Operations Branch, Halifax). Almost 100% of the shrimps caught on the Eastern Scotian Shelf are fished by boats from eastern New Brunswick, Gulf Region. These boats land in both Scotia-Fundy and Gulf ports. To obtain reasonably accurate shrimp catch figures, the catches recorded by both the Scotia-Fundy and the Gulf Region Statistics Branches must be combined.

Statistics Branches in both regions compile their statistics by NAFO areas and subareas although it might not always be the best way to sectorise the fisheries for different species. Historically, the three holes fished have been referred to as NAFO subarea 4Vn or SFA 13 for Louisbourg, 4Vs or SFA 14 for Misaine, and 4Wd or SFA15 for Canso. Unfortunately as these fishing holes may overlap NAFO areas and subareas (Butler-Connolly and Robert 1990), Loran bearings or latitude and longitude from the logged catch location must be used to confirm the area in which the catch should be listed from. Foreign and Domestic Quota Monitoring lists the catch according to the named fishing areas instead of just NAFO areas and its figures cover the Atlantic region.

A Yankee 36 trawl was used during the previous shrimp surveys (Etter and Mohn 1989). The commercial data had to be standardized for the comparison of results from past years and to compare with the survey results from previous years. For comparisons of commercial gear types the effort also had to be standardized. Each gear type was standardized to a Yankee 36 trawl and the correction factors used to standardize the effort before calculating the catch-rates.

In 1990 the commercial vessels used two types of gear, a Sputnik trawl and a Nord Sea 938 trawl (Butler-Connolly and Robert 1990). When both are standardized to a Yankee 36 the correction factors are the same (Table 3).

Table 3 indicates a difference in catch-rates between gear types. This could be attributed to the difference in size of the trawls or, as had been indicated in past years, an overcorrection when standardizing for a Yankee 36 which is a much smaller trawl than the ones used commercially. There has been a tendency towards fishing with trawls that are much larger than the Yankee 36 in the past few years. It is quite possible that the correction factors need a re-evaluation and that trawl efficiency should be researched.

RESULTS

The Scotia-Fundy Region issued 21 shrimp licenses in 1990 (Table 4). All the licenses issued were for boats <19.8m L.O.A. (length over all). The licenses were limited to fishing in specific areas. There were 4 licenses issued for the NAFO areas 4V and 4W; 14 licenses issued for NAFO area 4X only; and 3 licenses issued for areas 4V, 4W and 4X. The number of licenses has decreased slightly over the last few years (Table 4). These licenses are usually renewed along with other licenses each year. A few may have been eliminated as they were not used for several years. There were 12 'exploratory' shrimp licenses issued in 1990, 5 licenses were renewed from 1989 and an additional 7 new licenses were issued.

The Gulf Region issued 21 shrimp licenses in New Brunswick in 1990. These licenses were issued for eastern Scotian Shelf areas 4Vn, 4Vs, and 4W (Shrimp Fishing Areas 13, 14, and 15). Of that number, 5 licenses were issued for boats <19.8m L.O.A. and 16 licenses issued for boats 19.8m to 30.5m L.O.A. The number of licenses has remained constant from 1984 to 1990 with one exception and that was 1989 when 17 licenses were issued for boats 19.8m to 30.5 m L.O.A. In recent years only the 19.8m to 30.5m L.O.A. have landed shrimps from Scotian Shelf.

The shrimp fishery continues to maintain catches well below the yearly quotas. As the quotas have decreased, the catches have generally stayed below 1,000 t. The 1990 catch as the ones for recent years are only fractions of the actual quotas set. (Figure 2). The 1990 catches have increased by approximately 23% from the 1989 figure and the fishery effort in 1990 has also increased almost 24% from 1989. This may be a positive indication if the gear standardization is correct.

Boats from New Brunswick in the 19.8m to 30.5m L.O.A. category logged catches in the Eastern Shelf areas. These boats accounted for 99% of the total catch. Of an Eastern Scotian Shelf total of 104 t, 90 t were logged catches reported from Louisbourg hole and 14 t logged catches from Misaine hole. There was no reported fishing in Canso. The average yearly catch-rate for the Cape Breton area was 44.9 kg/h corrected for a Yankee 36 trawl (Table 5).This is an increase of 1.1% from the 1989 catch-rate of 44.4 kg/h. The yearly catch-rate uncorrected for 1990 was 134.5 kg/h. This was a slight increase from the 1989 uncorrected catch-rate of 133.4 kg/h. The yearly CPUE has been steadily decreasing through the years 1979 to 1989 (Figure 3). The minimal increase in the 1990 catch-rate along with the proportional changes in each the catch and effort figures for 1990 might indicate a relatively stable biomass.

The Louisbourg hole had a yearly catch-rate of 43.8 kg/h from fishing in May, July, August and September. Misaine's yearly catch-rate was 53.5 kg/h (Table 5). However this rate was based on one trip in July, only two days of fishing in the month of August, and one day of fishing in September. All values were calculated using effort corrected for gear type.

The monthly CPUEs for the years 1985 through 1990 are shown in Figure 4. The general trend indicates lower catch-rates during the early months of the year with the catch-rates peaking during the months of June and July and then decreasing toward the end of the year. This may be attributed to increased fishing effort during peak months. In some cases monthly CPUE has been based on only one or two fishing days in that month which may also account for low values before and after those peak months. The month of July for 1988 when CPUE decreased below that of either June or August is an exception to the general trend but then a minimum of commercial fishing took place during those particular months. Months with no reported fishing activity (zero CPUE in graphs) have increased over the years.

The percentage of shrimp in the 1990 monthly catch increased from the similar period of the year fished in 1989 and is much higher than that of 1988. (Table 6). The percentage composition of the by-catch showed a general decrease again, this year, in the primary species, cod and redfish. There has also been a decrease in the number of different species caught as by-

catch over the last few years. This might be attributed to the continued lack of availability of groundfish in 1990. It could also be due to the efficiency of the newer, larger gear or the captains could be directing more for shrimp. Some of the by-catch species are usually found only in specific areas, on a seasonal basis. For years of peak abundance the catch of these species increases above that of shrimp. This is illustrated in Table 6 for specific months for the years 1985 and 1986.

The shrimp fishery takes place during different months each year (Table 6). This makes comparisons of shrimp and by-catch for different years difficult. Due to much reduced or nearly nonexistant by-catches of redfish during the months fished in 1990, it is not possible to give an accurate comparison of shrimp with cod and redfish.

During 1990 there were no reported shrimp catches from the Bay of Fundy (NAFO Subarea 4Xs).

Of the 12 'exploratory' shrimp licenses Scotia-Fundy issued in 1990 only 3 were active. A modified otter trawl was used to land less than 1 t of shrimp and associated by-catch from Louisbourg (SFA 13).

DISCUSSION

The recommended quota for shrimp in 1991 is 2,580 t (Table 1). This is the same figure used for 1988, 1989, and 1990. Since the CPUEs for the last four years are quite similar and the quota was not reached in the past, it seems reasonable to assume this figure will be adequate for 1991, 1992 and 1993. As no research survey work took place in 1990 to obtain a biomass estimate, it is difficult to derive a better quota figure as had been done in previous years (Etter and Mohn 1988).

The steady, gradual decline in CPUE's from 1984 to 1989 with a small increase in 1990 should be interpreted with caution. This performance does not necessarily reflect a state of low stock abundance and if it was, the recent low landings could not be blamed for the low biomass. The decreased levels of fishing activity generates little effort data which is used to generate catch-rates. Its representativity therefore may be inadequate.

This potentially valuable resource will likely continue to be underexploited unless there are some changes in the near future. The present catch-rates are not high enough to entice participation by current license holders. The by-catch limit poses a major problem, since it seems to be very difficult to adhere to the 10% limit when directing for shrimp, and there is no cod quota available to buffer the situation. Mortalities of juvenile groundfish which can get trapped in the small mesh of the trawl, should be drastically reduced. The development of more selective trawls is required.

In 1990 the Development Branch of the Department Fisheries and Oceans, Scotia-Fundy Region continued to develop a separator trawl with the Nordmore grate sorting system (Figure 5). This sorting system using the Nordmore grate has a guiding funnel to direct the shrimp and fish towards the bottom of the grate. The shrimp then have more openings in the grate to pass through into the cod-end. This way, less shrimp are lost through the fish release opening. The fish by-catch is guided upward along the grate and exits through the fish release opening (Anon. 1991).

Development Branch personnel conducted two research experiments using a three bridled shrimp trawl that was modified to accept two cod-ends. One was a regular 40mm mesh shrimp cod-end while the other contained the Nordmore grate. The first experiment, conducted on a research vessel, indicated that the Nordmore Grate reduced the groundfish by-catch to 4.16% of the shrimp catch while the groundfish by-catch of the cod-end without the grate was 47.64% of the shrimp catch.The cod-end without the grate caught 2.3% more shrimp than the one with the grate. The second experiment conducted on a fishing vessel indicated improved results with a

1.7% by-catch of groundfish in the cod-end with the grate. The by-catch in the cod-end without the grate was 39.07% of the shrimp catch. During this experiment the cod-end with the Nordmore grate caught 9% more shrimp than the cod-end without the grate (Anon. 1991).

As the enforcement regulations limit by-catch of major groundfish species to 10%, the results of the Nordmore grate are very encouraging for the development of the shrimp fishery on the Scotian Shelf. Further research is being planned for 1991. More experiments may be indicated to explain the increased shrimp catch in the cod-end with the grate during the tows on the fishing vessel. It is proposed to add a second grate to sort the shrimp before it reaches the cod-end (Chris Cooper pers. comm).

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Table 1. Shrimp quotas (t) and actual catches (t) for Scotian Shelf (Shrimp Fishing Areas 13, 14 and 15), (NAFO Area 4V and 4W) 1980-1991.

Year	Quotas (t)				Actual Catch (t)
	SFA 13 (Louisbourg)	SFA 14 (Misaine)	SFA 15 (Canso)	Total	
1980	1553	2382	1086	5021	984
1981	---	---	---	---	454
1982	1400	1800	1000	4200	569
1983	2000	2400	1400	5800	1010
1984	1800	2500	1400	5700	928
1985	1790	2420	1350	5560	133
1986	1460	1600	740	3800	126
1987	1070	860	210	2140	152
1988	1160	1050	370	2580	82
1989	1160	1050	370	2580	82
1990	1160	1050	370	2580	104
1991*	1160	1050	370	2580	

* Proposed values.

Table 2. Eastern Scotian Shelf (NAFO 4V, 4W) commercial shrimp landings and CPUE.

Year	Catch (t)				CPUE (kg/h)	
	Louisbourg	Misaine	Canso	Total	Unstd.	Std.*
1977	---	---	---	269	128.5	104.5
1978	---	---	---	306	121.9	97.3
1979	295	8	534	838	174.6	128.0
1980	491	133	360	984	130.9	97.3
1981	418	26	10	454	131.8	92.8
1982	316	52	201	569	128.0	80.4
1983	483	15	512	1010	127.7	81.2
1984	600	10	318	928	109.5	77.6
1985	118	---	15	133	75.4	40.7
1986	126	---	---	126	87.3	58.1
1987	148	4	---	152	90.7	39.9
1988	75	6	1	82	85.1	51.0
1989	77	3	---	80	133.4	44.4
1990	90	14	---	104	134.5	44.9

* Standardized to a Yankee 36 trawl.

Table 3. Corrected catch-rates (kg/h) for commercial boats off southeastern Cape Breton, 1990.

No. of boats	Gear type	Louisbourg Area	Misaine Area	Correction factor
1	Sputnik	49.6	49.4	3.0
2	Nord Sea 938	38.4	58.0	3.0

Table 4. Shrimp licenses issued in Scotia-Fundy for 1985 to 1990 according to designated fishing areas.

	NAFO Area			
Year	4V, 4W	4X	4V, 4W, 4X	Total
1985	7	17	2	26
1986	6	18	3	27
1987	4	17	3	24
1988	5	15	3	23
1989	5	15	3	23
1990	4	14	3	21

Source: Licensing Unit, Department of Fisheries & Oceans, Scotia-Fundy Region.

Table 5. Monthly commercial shrimp fishery statistics for the Louisbourg and Misaine areas in 1990.

		May	July	August	September	Total
Louisbourg:	Catch (kg)	17,543	23,308	35,119	13,765	89,735
	Effort (uncor)	90	146	300	148	684
	Effort (cor)	270	437	900	443	2,050
	CPUE (kg/h)	64.9	53.3	39.0	31.5	43.8
Misaine:	Catch (kg)		7,401	5,264	1,402	14,067
	Effort (uncor)		43	30	15	88
	Effort (cor)		128	90	45	263
	CPUE (kg/h)		57.8	58.5	31.2	53.5
Both areas:	Catch (kg)					103,802
	Effort (uncor)					772
	Effort (cor)					2,313
	CPUE (kg/h)					44.9

Table 6. Percentage of the catch composition of commerical shrimp trips from Eastern Scotian Shelf on a monthly basis when available for the last 7 years (Etter and Mohn 1985, 1986, 1987, 1988, 1989 and Butler-Connolly and Robert 1990).

1984 Species	April	May	June	July	August	September	October
Shrimp	94.3	66.4	60.5	57.8	60.3	75.6	59.3
Cod	5.5	12.4	7.9	12.4	7.2	15.7	6.6
Redfish	---	19.5	29.0	26.6	28.8	7.1	29.2
Flatfish	---	1.1	1.2	1.5	2.2	1.6	4.0
Hake	---	0.1	0.1	---	0.4	---	0.8
Halibut	---	----	---	---	---	---	---
Haddock	0.3	0.2	0.9	0.7	1.1	---	0.1
Pollock	---	0.3	0.3	0.8	---	---	---
Misc	---	---	0.1	---	---	---	---
Total shrimp catch (kg)	2,862	181,226	244,622	134,058	92,731	11,119	9,429

1985 Species	April	May	June	July	October
Shrimp	55.1	64.8	32.6	24.6	55.3
Cod	23.3	10.6	3.2	2.4	5.5
Redfish	0.7	21.3	56.9	70.9	34.5
Flatfish	19.6	2.4	0.8	1.2	3.2
Hake	---	0.2	0.1	0.1	0.9
Halibut	1.0	----	4.7	0.2	---
Haddock	0.3	0.5	---	0.5	0.6
Pollock	---	0.2	1.7	0.1	---
Misc	15.9	----	---	---	---
Total shrimp catch (kg)	756	17,903	10,593	2,455	8,429

1986 Species	May	June	September	October
Shrimp	54.8	40.8	64.5	40.6
Cod	5.5	4.3	7.5	2.1
Redfish	34.2	52.6	23.3	51.5
Flatfish	1.8	1.1	3.0	3.5
Hake	---	0.1	0.5	0.6
Halibut	---	0.5	---	---
Haddock	0.1	0.1	1.0	1.4
Pollock	3.6	0.6	0.1	0.2
Misc	---	----	---	---
Total shrimp catch (kg)	37,554	9,902	7,630	2,354

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Table 6. continued.

1967	Species	June	July	September
	Shrimp	56.7	69.8	49.1
	Cod	32.8	20.7	3.3
	Redfish	5.4	2.9	43.8
	Flatfish	3.1	2.0	1.8
	Hake	0.1	---	0.4
	Halibut	0.6	0.1	---
	Haddock	0.1	---	0.2
	Pollock	0.9	4.2	0.7
	Misc	0.3	0.4	0.8
	Total shrimp catch (kg)	14,889	34,766	11,793

1968	Species	June	July	August	September	November	December
	Shrimp	84.4	82.0	80.3	49.9	47.6	67.7
	Cod	12.3	3.5	4.3	49.3	14.1	32.3
	Redfish	0.8	7.6	7.8	0.8	38.4	---
	Flatfish	2.1	6.7	7.6	---	---	---
	Hake	---	---	---	---	---	---
	Halibut	---	0.2	---	---	---	---
	Haddock	---	---	---	---	---	---
	Pollock	0.4	---	---	---	---	---
	Misc	---	---	---	---	---	---
	Total shrimp catch (kg)	44,182	28,828	1,471	4,284	2,465	635

1969	Species	May	June	July
	Shrimp	71.8	88.2	87.4
	Cod	5.2	9.4	0.9
	Redfish	20.7	2.4	6.2
	Flatfish	0.8	---	0.6
	Hake	---	---	---
	Halibut	1.0	---	4.9
	Haddock	---	---	---
	Pollock	0.5	---	---
	Misc	---	---	---
	Total shrimp catch (kg)	10,083	52,268	16,231

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Table 6. continued.

1990	Species	May	July	August	September
	Shrimp	91.2	92.8	89.5	82.7
	Cod	8.0	4.0	6.9	11.7
	Redfish	0.8	2.8	2.5	0.3
	Flatfish	---	0.1	0.4	5.3
	Hake	---	---	---	---
	Halibut	---	0.3	0.7	---
	Haddock	---	---	---	---
	Pollock	---	---	---	---
	Misc	---	---	---	---
	Total shrimp catch (kg)	17,543	30,709	40,382	15,166

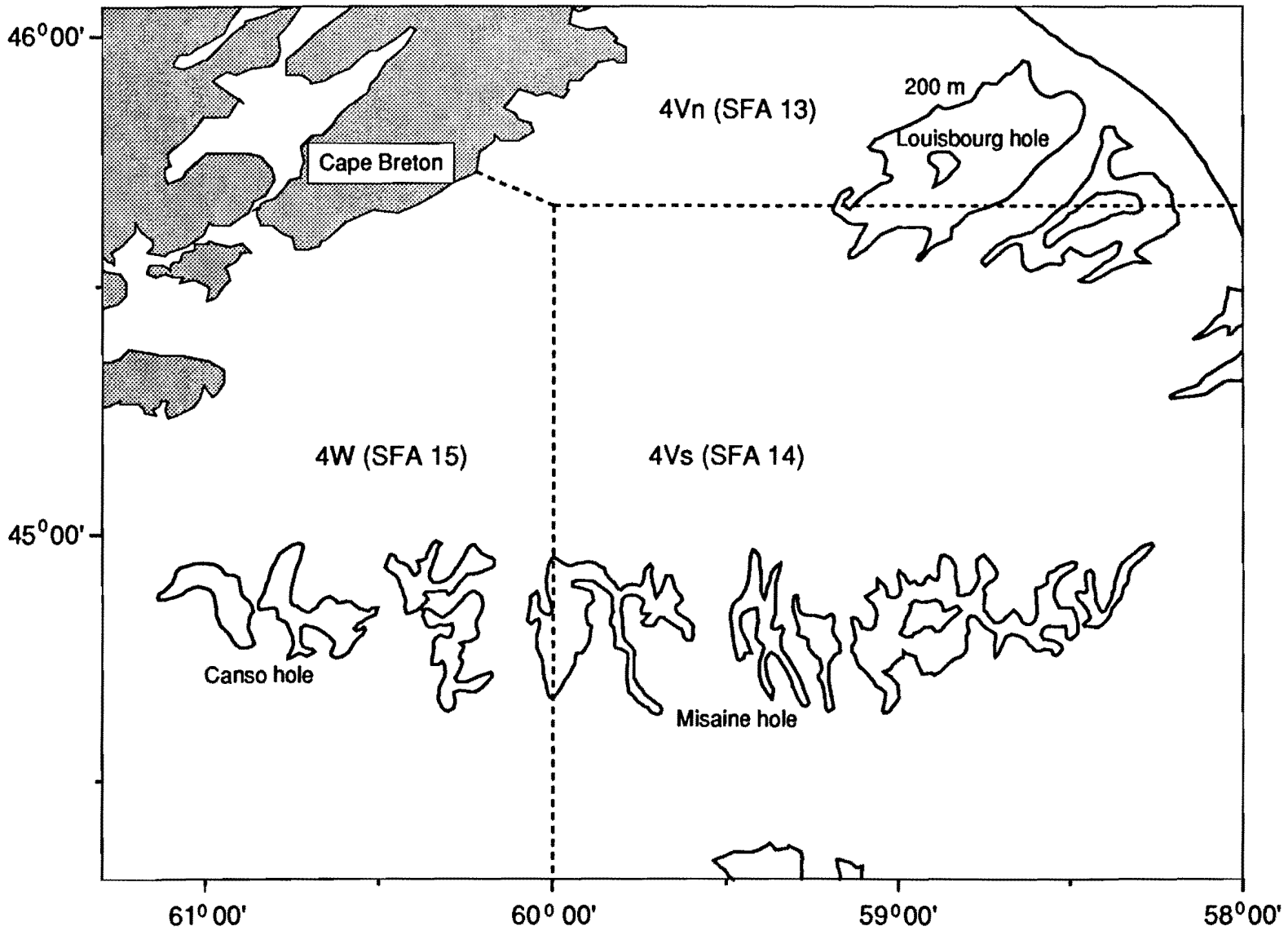


Figure 1. Eastern Scotian Shelf shrimp fishing areas.

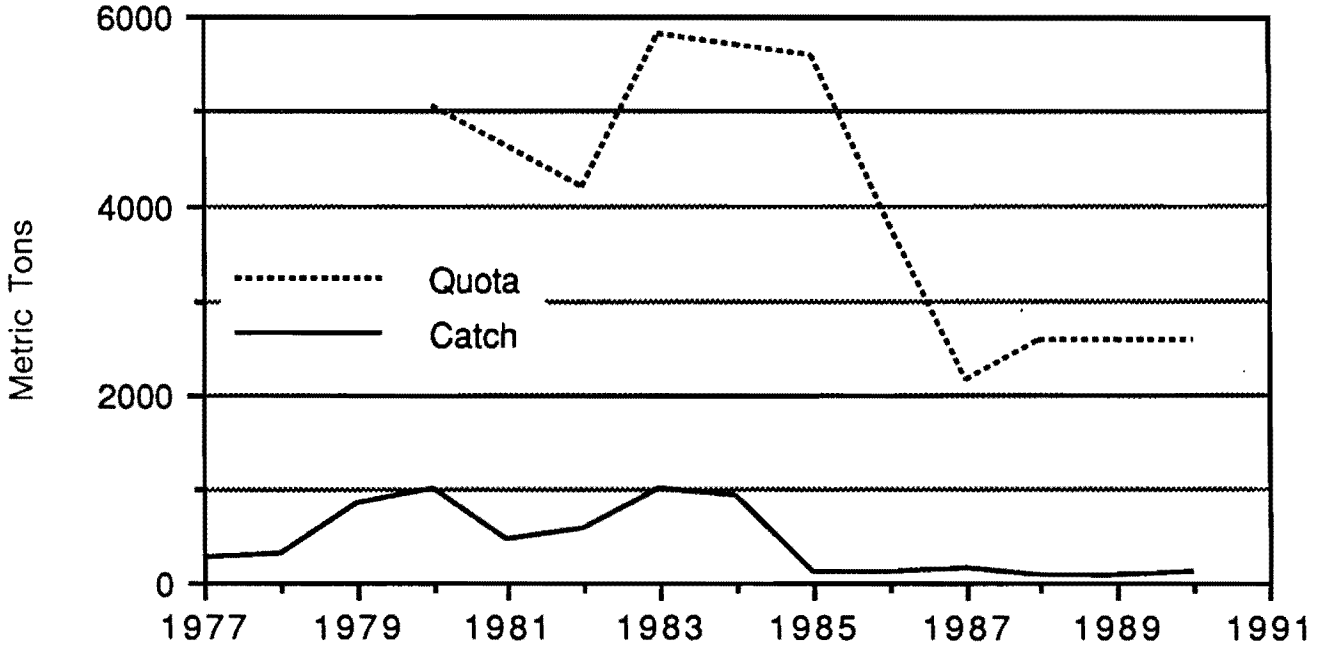


Figure 2. Eastern Scotian Shelf shrimp quotas (t) and catches (t) for the years 1977 to 1990 inclusive.

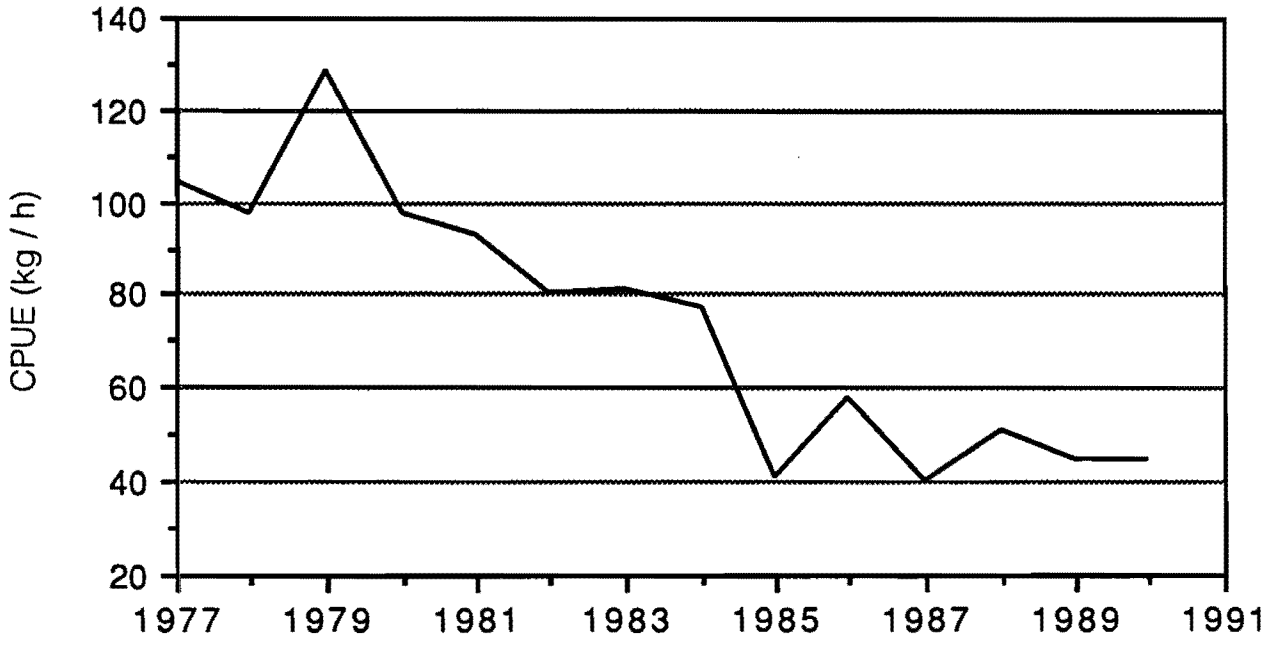
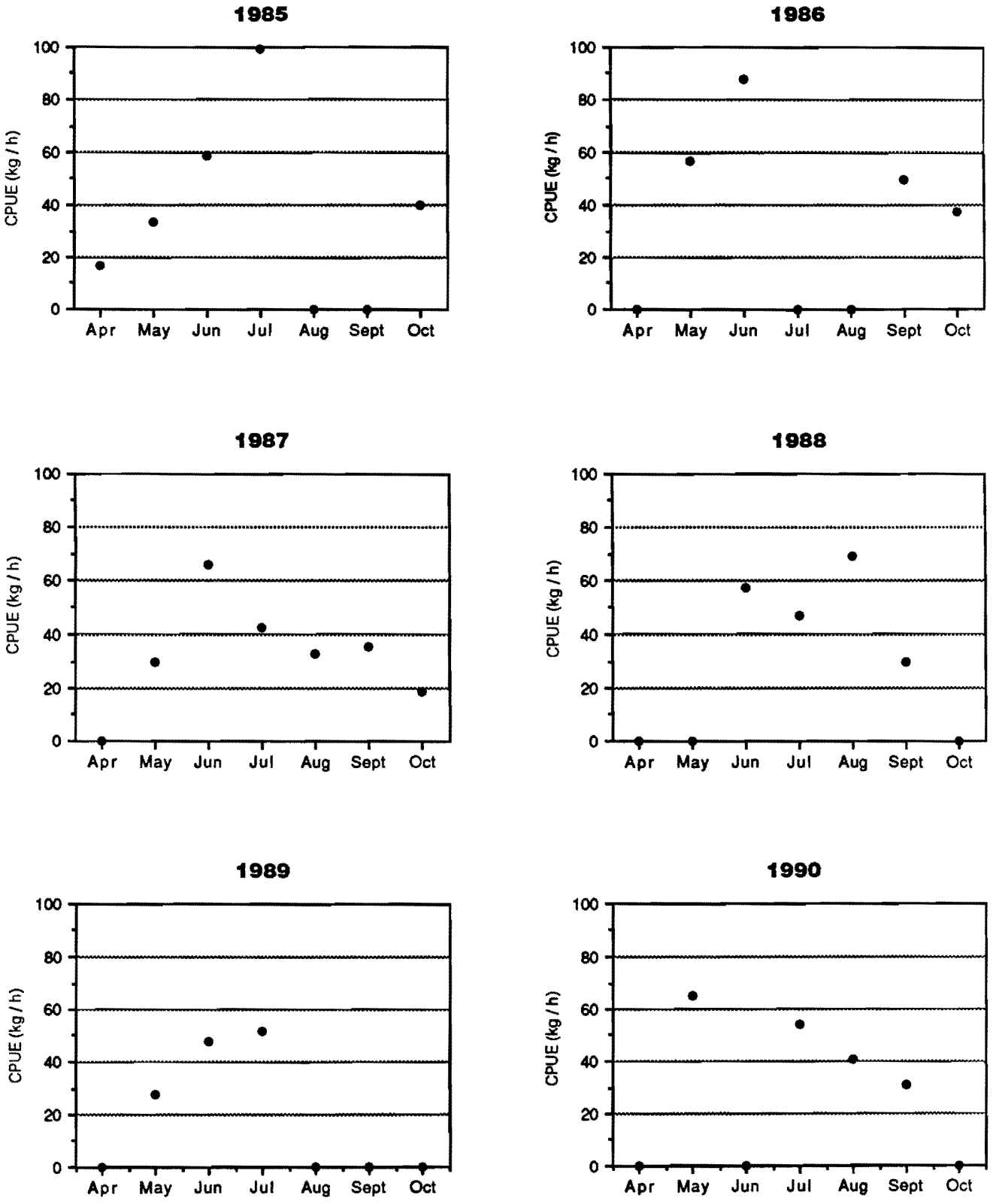


Figure 3. Eastern Scotian Shelf shrimp CPUE (kg/h) for the years 1977 to 1990 inclusive.



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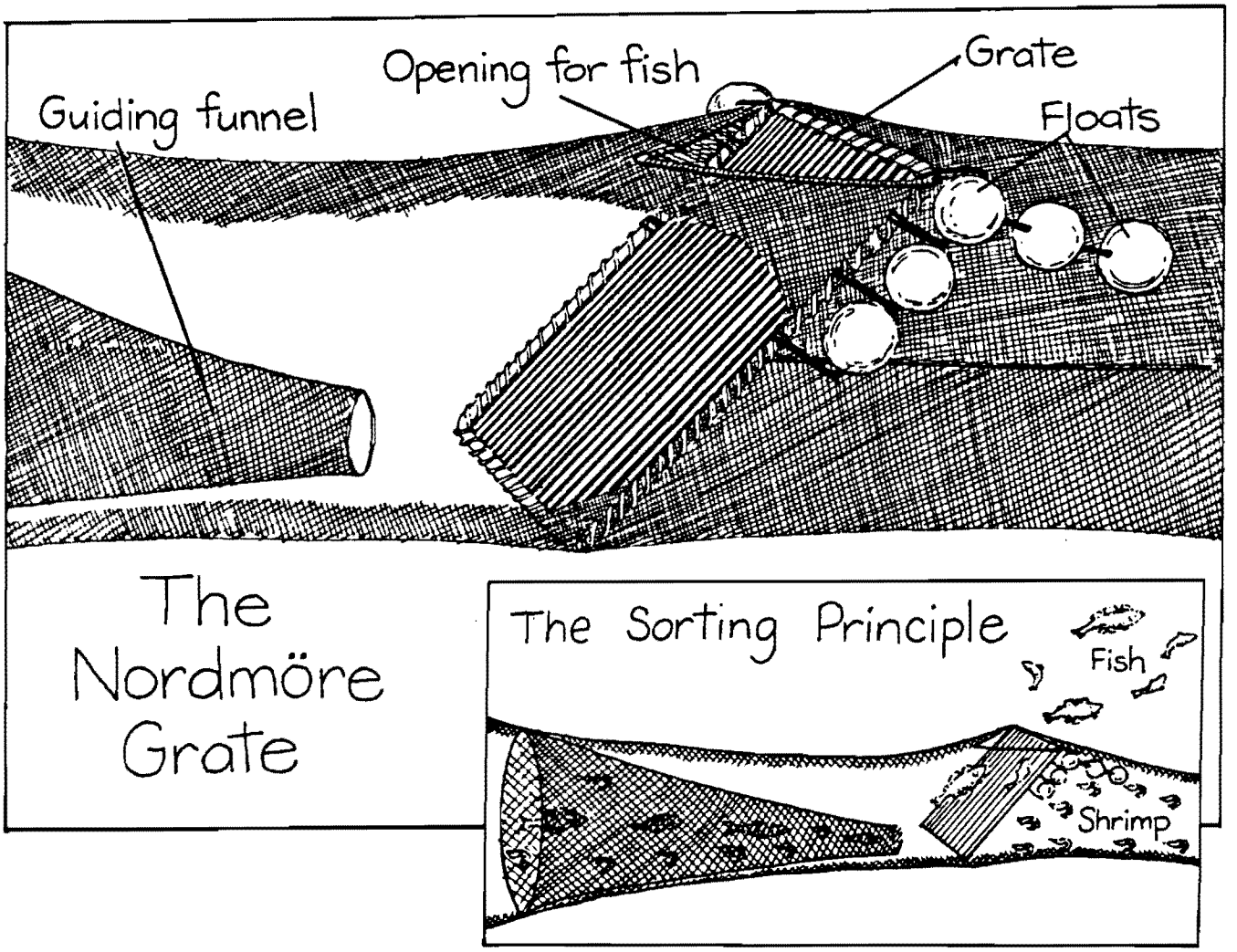

Figure 5. The Nordmore grate as used in the separator trawl experiments with an illustration of the sorting principle (Project Summary No. 25, 1991.Atl.Fish.Dev.).