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The small vessel shrimp fishery in West Greenland

by

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INTRODUCTION

The fishing grounds for shrimp (*Pandalus borealis*) in West Greenland are located between 60°N and 72°30'N, offshore as well as inshore. NAFO advices a TAC for offshore areas outside the Greenland 3 nautical mile territorial limit, South of 71°N.

Two fleet components, ingeniously named; the **offshore (or sea-going) fleet** and the **inshore (or close-shore) fleet**, exploit the stock. The separation is based on vessel size only and does not necessarily reflect main fishing grounds. Total landings from the two fleets over the last years has amounted to approx. 70.000 tons of which 20-25.000 tons are landed by the inshore fleet. This amount, plus a compulsory 25 % of the catch from the seagoing fleet, provides the basis for the onshore shrimp production.

Vessels above 75 GRT belong, by definition, to the offshore fleet and are restricted by quotas. They have onboard production and are only allowed to fish in offshore areas. An exception from the "offshore-only" rule applies to eight 79 GRT vessels, which have a small quota in inshore areas.

The inshore fleet consists of old wooden cutters and newer stern trawlers in a wide variety of sizes, but always below 75 GRT. Therefore, the term "smaller vessels" will be used here to describe vessels belonging to the fleet. The fleet is not regulated by quotas or areas, and it is allowed to use mesh sizes below the 40 mm that applies as a minimum to the gear used by the offshore fleet. Codend mesh sizes used in the inshore fleet ranges from 37 to 45 mm. No onboard production is allowed and the catch is sold to onshore factories. Vessels above 50 GRT have a mandatory logbook, similar to the offshore fleet, whereas catch from vessels below 50 GRT can only be calculated from sales slips.

The total catch of the smaller vessels can be allocated to areas, based on information of fishing field on the sales slips. When this is done, based on sales slips that give catch locality in the traditional statistical unit system only, a part of the landings remain unidentifiable (with regard to catch location). These landings have been divided between areas proportionally to those that can be allocated.

Since 1990, a decreasing number of sales slips have given information of fishing field in the standard system - accordingly, an increasing amount of the catch is divided between areas by proportion.

Interviews with fishermen and factory-employees have revealed that a terminology of reporting catch locality, with abbreviations different from those used in the field code system, is frequently being used, particularly for catches from offshore areas. As a consequence the proportion of unidentified catch, in a system that divide landings by field codes only, has increased. The increase introduces a skewness in the allocation of catches, as it is mainly catch from the offshore areas that is reported with the alternative terminology.

This paper presents catch statistics of the fishery from the smaller vessels since 1990, suggests a new approach to allocation of catch, and describes the catch from inshore areas.

MATERIALS AND METHODS

All landings from vessels below 75 GRT are sold to the same company, and it is possible to calculate the total catch from the company's sales slips. The sales slips relate to each landing and contain information on vessel, port of landing, amount landed, and position where catch was taken.

Shrimp landings are broken down in three size categories:

Small 2,0 - 5,9 grams
Medium 6,0 - 9,1 grams
Large > 9,1 grams

Position where catch was taken should be given in statistical units of 7.5° latitude and 15° longitude (the field code system), but is often lacking or given in other units.

As vessels below 75 GRT are not regulated by quotas or areas, it is reasonable to assume that no significant discard takes place. Furthermore, with no onboard production, catch and landing can be regarded as equal.

In analyzing the fishing pattern and catches of the smaller vessels two inputs are available:

A) from vessels above 50 GRT: Logbook data with reference to each haul and sales slips from each trip.

B) from vessels below 50 GRT: Sales slips from each trip.

To get a full picture of the fishery in **inshore areas** a third input is necessary:

C) Logbook data from the eight 79'ers.

Inshore areas are defined as fishing fields located inside the 3 nautical mile limit.

Catch has been allocated to inshore or offshore areas, if the information on fishing field on the sales slip enables identification in units that can be related to those areas.

Catch remaining unidentified, either lacks information of fishing field, or has information in abbreviations that does not indicate whether it was taken Inshore or offshore. This catch has been divided between areas by proportion.

The identifiable catch of the smaller vessels is further divided in three regions, namely;

Disko, covering the southern part of NAFO Div. 1A and that part of Div. 1B that lies north of 68°N

West, covering Div. 1B, south of 68°N plus Div.s 1C & 1D

South, covering Div.s 1E & 1F

Prior to 1990 the data are too inaccurate for detailed analysis. 1994 data include landings until end of September.

RESULTS AND DISCUSSION

The fishery of the smaller vessels

The landings of shrimp from the smaller vessels, calculated from sales slips, show an increase since 1990 (Fig. 1). As data from 1994 only cover the period January to September, catch in that period is shown for the years 1990-93 also.

Table I shows the catch of vessels < 50 GRT and 50-75 GRT, in 1993 and 1994, and the number of vessels active. Prior to 1993 it is not possible to distingulsh between the two size classes of vessels.

Figure 2 and table II show how catches are distributed between inshore and offshore areas and indicate the proportion of unidentified catch.

Cross checking with the logbooks from vessels between 50 and 75 GRT confirms that a major part of the catch, unidentifiable in the field code system, can be allocated to offshore areas if the new reporting therminology is considered.

A shift from Inshore to offshore fishery is seen from 1992 to 1993. Preliminary statistics from 1994 indicate that the shift to offshore areas still prevails this year, and that total catches will be at the same level as in 1993.

Table III shows how the identifiable catch of the smaller vessels is distributed in the three main regions.

The most important region for the inshore fishery is Disko, where 85 to 97 % of the total inshore catch is taken. Disko is the only region where inshore catch accounts for a significant part of total landings (25 to 60 % of the landings in that region).

Inshore catches from Disko have more than halved from a steady level of some 7-8000 tons annually to less than 3.000 tons in 1993. Offshore catches have increased accordingly, so that the total catch from the area has remained stable.

In region West the inshore component of the catch is at a low level, except in 1991-92. Offshore catches have been relatively stable until 1993, when they increased. The subsequent decline in West in 1994, may reflect a movement of effort towards north, as the catch from offshore Disko has reached the 1993 level already in September.

In region South an increase in landings of shrimp, caught in offshore areas, is evident, without a subsequent decline in inshore catches, which, at any rate, have always been insignificant.

The large number of landings that can not be identified with respect to catch locality, presents a problem that is not easily handled. As the problem is particularly pronounced in certain regions in some years, and

other regions in other years, the variations may reflect negligent reporting customs, as well as actual changes in fishing pattern.

As a consequence, the decline in region West, in landings from inshore areas, from 1992 to 1993, can not be analyzed in detail.

A more detailed analysis of the unidentified catches will not be presented here. However, as it is usually possible to identify some of the parameters relating to the landing (e.g. vessel type, port of landing, etc.) it is also possible to determine the catch locality with some accuracy. There is no indication in these data that contradicts the general impression that a shift, from inshore to offshore fishing grounds, has taken place in 1993, and that this pattern also prevails in 1994. The shift is, naturally, most obvious in the Disko region, but is also seen in other areas.

It can thus be concluded that the increase in landings, observed in the period 1990 to 1993, reflects an increase in landings from offshore areas only, and that these areas yield more than previously supposed.

One other problem, in interpreting the results from this kind of commercial data, is that the observed changes do not necessarily reflect changes in abundance of the stock, but may be adaptions to a system where one company sets the rules. Even if the smallest vessels do not usually fish far away from their home port, a temporary close down of a factory may force them to fish in areas they would not otherwise exploit.

This is, however, merely speculations as to the cause of the changes. The consequences are that the fishery in the offshore areas has increased considerably since 1992, and until then, catches have been underestimated by 5.000 tons annually. Subsequently, catches from inshore areas have been overestimated.

The fishery in inshore areas

The total fishery in inshore areas includes the inshore catch from the 79'ers. Since 1992 these vessels have been allowed to fish on an inshore quota. The catches presented here are those reported to Greenland authorities. Table IV shows the amount of shrimp caught by the smaller vessels in inshore areas, including the amount allocated by proportion, and the inshore catch from the 79'ers. The figures presented in this table are, at present, the best estimates available of the total inshore catch.

The inclusion of the 79'ers changes the impression of a fairly stable level of inshore catches, from 1990 to 1992, to that of an increase. The subsequent decline is, however, still evident.

The catch in inshore areas in all years is considerably lower than previously estimated (Carlsson *et al.*, 1993). This is caused by the increase in landings that can be identified as originating from offshore areas, and the subsequently decreased amount of unidentifiable catch, distributed by proportion.

Actual length frequency distributions from the inshore stock component are not available, but some information can be deducted from the information about quantities of small, medium, and large shrimp in landings.

When compared to composition of catches from the offshore area, catches from inshore areas, in general have a smaller proportion of large shrimp.

As large shrimp are more valuable, some of the increased effort in offshore areas can be explained by the introduction of new and larger vessels (but still below 75 GRT - no restrictions), able to operate further offshore. Even so, the amount of shrimp from inshore areas, landed by the old vessels, has also decreased.

Figure 3 shows the size composition of the inshore catches, for the three regions over the years 1990-94. As total landings have changed in this period, the distributions are shown as relative amounts.

Compared to other regions, catches from Disko have the highest proportions of large shrimp, regardless of year. The inshore catches from the area resemble catches from offshore areas of those latitudes, with a slightly smaller proportion of large shrimp.

In all three regions the proportion of small shrimp was higher in 1990 than in the succeeding years. This probably reflects the recruitment and subsequent growth of the 1985 year-class. In good agreement with this, the highest proportions of small shrimp are found in the two southernmost regions where abundance of this year-class was high in 1990 (Carlsson and Kanneworff, 1991).

From 1992 to 1994 no obvious changes in composition of catches can be seen within regions. If catch rates have decreased inshore, reduced abundance, rather than changes in size distribution, would be the cause.

Catch rate indices for inshore areas can not yet be established, as the temporal and spatial distribution of vessels that keep logbooks is discontinuous.

CONCLUSION

From a gradual increase over the years 1990 to 1992 from 10.000 to more than 13.000 tons, landings of shrimp from inshore areas have declined abruptly in 1993 to less than 6.000 tons.

Complementary to the reduced landings of inshore shrimp, landings from offshore areas, from smaller vessels, have increased.

The increased importance of offshore areas to the smaller vessels can not be explained by changes in size distribution of the inshore stock. The most likely explanation of the shift in effort is that shrimp have become less abundant inshore. It is not possible to determine wether this is caused by overfishing.

The results indicate that the proportion of unidentified catch can be reduced if two systems of reporting catch location are included in the allocation of landings. This leads to the conclusion that catch in offshore areas since 1990 has been underestimated by approx. 5.000 tons annually.

A change in the catch statistics given in NAFO (1994) is suggested, and the proposed values are given in Table V.

REFERENCES

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Carlsson, D.M., and P. Kanneworff, 1991. Report on stratified- random trawl surveys for shrimp (*Pandalus borealis*) in NAFO Subarea 0+1 in July-August 1990, and a comparison with earlier surveys. NAFO SCR Doc. 91/70. Serial No. N1954.

NAFO, 1994: Scientific Council Reports, 1993.

Table I. Landings of shrimp by smaller vessels and # of vessels. 1994-data from jan.sep.

	1993		1994	
	Tons	# vessels	Tons	# vessels
< 50 GRT	12561	94	9588	91
50-75 GRT	13338	24	10452	24
Total	25899	118	20040	115

Table II. Landings of shrimp by the smaller vessels, 1990 to 1994. Distributed by fishing field, as reported on sales slips. 1994-data from jan-sep.

	1990	1991	1992	1993	1994
Inshore	8059	8317	8273	2959	2602
Offshore	8738	8761	9104	16342	12912
Unidentified	4739	5872	6569	6598	4526
Total	21536	22950	23946	25899	20040

Table III. Landings of shrimp by the West Greenland smaller vessels, 1990 to 1994, distributed by region. 1994-data from jan-sep.

	1990		1991		1992		1993		1994	
	Offshore	Inshore	Offshore	Inshore	Offshore	Inshore	Offshore	Inshore	Offshore	Inshore
Disko	4876	7844	4745	6512	4629	6922	7614	2550	7255	2225
West	3173	108	3215	1739	3808	1294	6700	340	3347	339
South	689	107	801	66	667	57	2028	69	2310	38
Sum	8738	8059	8761	8317	9104	8273	16342	2959	12912	2602
Unidentified	4739		5872		6569		6598		4526	
Total	21536		22950		23946		25899		20040	

Table IV. Landings, by fleet, of shrimp from inshore areas, including catch allocated by proportion. 1994-data from jan-sep.

	1990	1991	1992	1993	1994
Vessels < 75 GRT	10333	11177	11400	3971	3361
79'ers	0	0	2012	1770	720
Total	10333	11177	13412	5741	4081

Table V. Shrimp in Subarea 1. Total nominal catches (tons). 1994 incomplete.

	1990	1991	1992	1993	1994
SA 1 Offsh. S.o. 71°	52020	56264	61324	62680	48505
Greenl. N.o. 71°N	2121	1077	2647	641	378
Greenl. Inshore	10333	11177	13412	5741	4081
SA 1 Total	64474	68518	77383	69062	52964

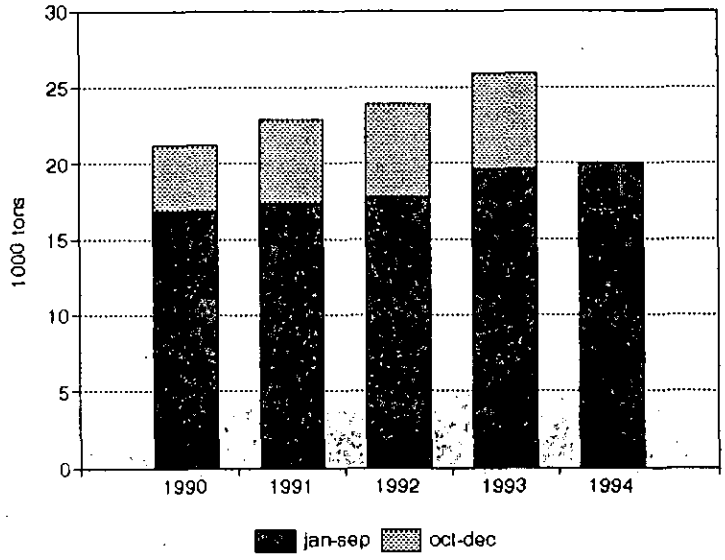

Figure 1. Landings of shrimp by the West Greenland smaller vessels, 1990 to 1994. 1994-data only complete until end of September.

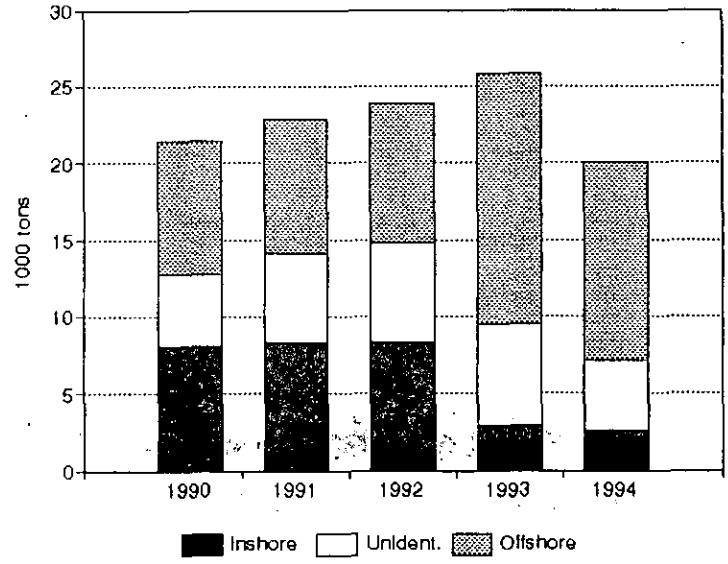

Figure 2. Landings of shrimp by the West Greenland smaller vessels,1990 to 1994, distributed by information of fishing field, as reported on sales slips. 1994-data only complete until end of September.

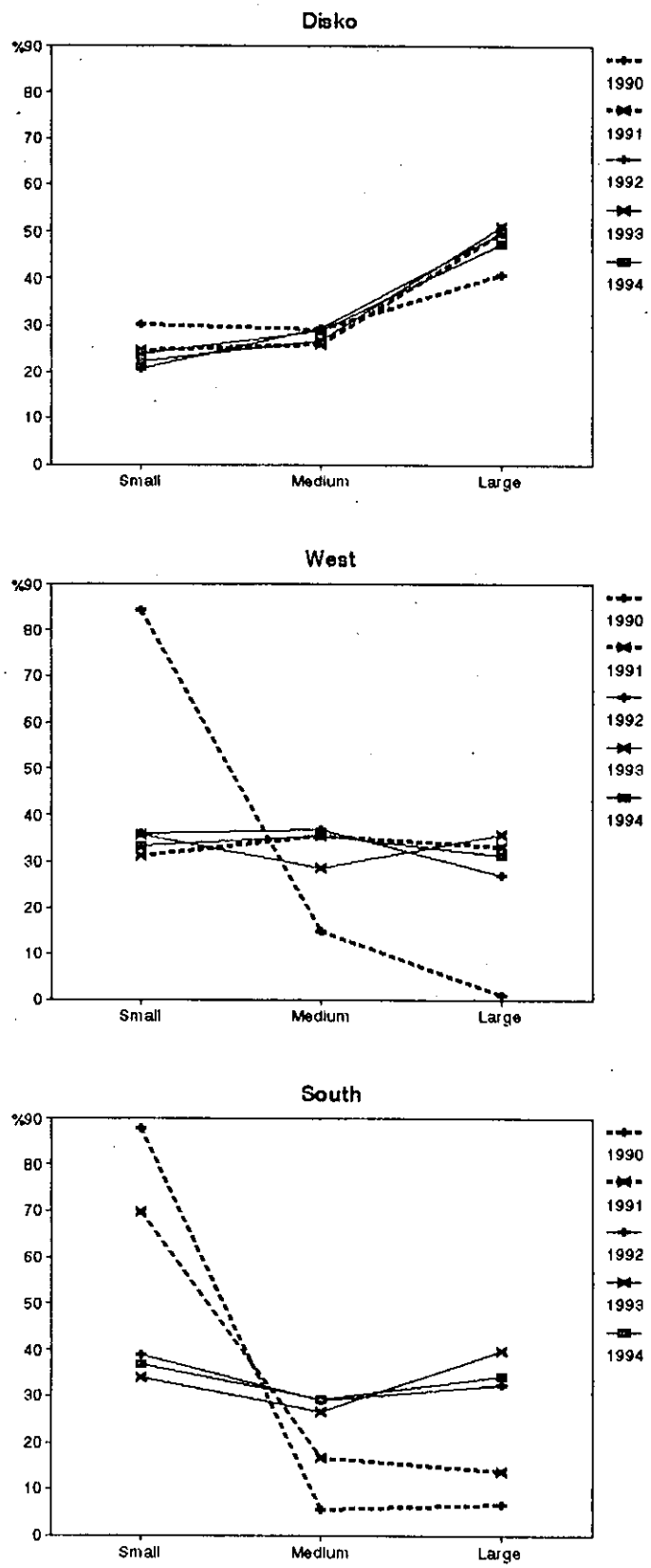

Figure 3. Relative size distributions, by region, in landings of inshore shrimp.