

Northwest Atlantic



Fisheries Organization

Serial No. N1275

NAFO SCR Doc. 87/07

SCIENTIFIC COUNCIL MEETING - JANUARY 1987

Trial Fishery for Shrimp (Pandalus borealis Kr.) in West Greenland

Waters North of 70°52.5'N in 1986

by

Henrik Lund

Grønlands Fiskeri - og Miljøundersøgelser  
Tagensvej 135, DK-2200 København N., Denmark

INTRODUCTION

In 1985 the Greenland Home Rule Government started an experimental shrimp fishery in West Greenland waters north of latitude 70°52'5N in the wake of earlier discoveries of exploitable shrimp (Pandalus borealis Kr.) stocks in this area.

Years before the "Godthåb"-expedition (1928) had found shrimps in Melville Bay north of 75°N and off Upernavik (72°55'N), but at that time or later (R/V "Adolf Jensen" 1957, M/TR "Nuk" 1978) no one had been able to show the presence of commercially exploitable shrimp stocks in open waters north of approximately 71°N. None of the vessels mentioned had visited the areas in question, though!

At the start in 1985 the experimental area included all Greenland waters north of 70°52'5N (outside the 3 nm limit), but in the light of experiences from this year the area was parted in two in 1986:

Area 1 included areas that were heavily exploited in 1985; in a southerly direction it was bounded by the latitude mentioned above, and to the north it was enclosed by latitude 72°52'5N.

Area 2 included Greenland waters north of area 1.

The fishing fleet was imposed certain restrictions, partly with the purpose of forcing the fleet to seek areas outside those that were already known: Vessels were obliged to visit the northern area for a certain period, before they were allowed to continue the fishery in the southern area. In addition, a limit to catches was fixed at 400 tons per trip, and skippers had to report on different aspects of the fishery (bottom types, gear used, weather, ice, conditions of shrimps). Shrimp catches were sampled for further examination at the Greenland Fisheries and Environmental Research Institute (catches were sampled in 1985 as well).

Both years selected trawlers have been permitted to commence fishery in the beginning of June, about two months before the general start of the fishery on the twentieth of July.

In 1985 and 1986 the experimental area was not considered as part of the shrimping area for which advice on total quota regulation has been given by STACFIS, and hence it was not included in the quota regulation of the fishery in 1986.

For 1987 the Greenland Home Rule Government has moved the southern boundary of the former experimental area to latitude  $71^{\circ}00'N$  and a preliminary TAC has been fixed at 11,580 tons for the area bounded by this latitude and latitude  $72^{\circ}52'5N$  (area 1). North of  $72^{\circ}52'5N$  the fishery will continue by special permission, i.e. no TAC has been proposed for this area, but the original rules still apply here.

It is the aim of the Greenland Home Rule Government that the quota proposed for 'area 1' should principally be fished by the larger vessels (above 200 GRT) whose fishery will then partially be transferred from the West Greenland area to experimental area 1.

The local population, fearing possible negative consequences for the shrimp stocks around the Hare Island and the Nuusuag Peninsula, has objected to the exploitation of this resource by large vessels. It is a common opinion that the shrimps in the experimental area ought to be exploited for the benefit of the local people. Also, there is some concern for the Greenland Halibut fishery since small specimens of this species form a substantial fraction of by-catches in the shrimp fishery.

Local sealers fear the long-term effects of the shrimp fishery, in part because the seals seem to be frightened by the massive activity in the area, in part because Arctic Cod, which is an important food source for the seals, are being fished in great numbers.

The Greenland Home Rule Government has met some of the objections made, by supporting the establishment of local trawling companies in Upernavik and Uummannaq. Furthermore it is the intention of the government that scientific investigations be made of the shrimp stocks and of the fishery.

#### MATERIALS AND METHODS.

Total catches and numbers of vessels participating in the experimental fishery were compiled by area and year on the basis of compulsory reportings by all vessels to Greenland authorities.

Logbook data from twentyseven trawlers were analysed to show the overall distribution of trawling hours and mean catch rates in 1986.

Shrimp samples from one trawler were sorted by stages of sexual development and carapace lengths were measured to the nearest 0.1 mm; on the basis of this, length-frequency diagrams were drawn to analyse the occurrence of sexual stages in the shrimp stock.

#### RESULTS AND DISCUSSION.

##### Geographical distribution of the fishery.

In 1986 the fishery was hindered by ice in experimental area 2 in

june and july. From august onwards the fishery seems to have been hampered by local occurrences of field ice only. The weather has been of no major inconvenience to the fishery.

The lack of reliable charts has been a problem to the fishery; it has impeded the search of the western and northern parts of area 2 in particular and it has partly contributed to a concentration of the fishing effort in rather well-defined areas.

Four fishing areas can be identified (figures 1 and 2):

Tugtorgortoq: Fishing depth 300-400 meters; very soft bottom.

Bottom temperatures:

August (375-400m): 0.8-1.0°C

September (350m) : 1.8-2.0°C

Søndre Upernavik: This is by far the largest fishing area with fishing depths about 200-400 meters; the bottom is variable but generally it seems to be rather soft.

Bottom temperatures:

August (east of 57°W; 260-360m): 0.4-.07°C

September: 2.2°C

Svarten Huk: The fishing ground is situated at the gently sloping sides of a 'hole'; fishing depths 300-400 meters; the bottom seems to be well suited to trawling.

Uummannag: The bottom is even but very soft and in some areas stones are prevalent.

These areas are the most heavily exploited north of 70° 52' 5" N - a fact which is certainly due to the presence of acceptable catch rates and suitable trawling ground. In some statistical units higher than average catch rates have been obtained but the lack of heavy fishing in some of these areas is probably caused by rough or very soft bottom.

It appears to be a common feature of the experimental areas that the bottom is soft; it seems to get harder towards the coast, though, but in general it is necessary to adjust the gear to make trawling possible (lighter bobbins, more floats on the head line).

Trawlers frequently change their trawling gear because of differences of bottom types and variations in strength of undercurrents. This circumstance makes a comparison of catch rates between statistical units rather complicated: Some skippers state that two trawl types may differ in catch rates upwards of 100%, which is probably due primarily to differences of net rise.

Mean yearly catch rates (upper figure in fig. 1 and 2; kg/hour) show a slight increase from north to south. Within statistical units CPUE-values fluctuate throughout the months of trawling but a down-going trend from the beginning to the end of the season is evident (figure 3). This is similar to the situation at trawling grounds south of

70°52,5'N and it presumably reflects a decline in abundance. Given the few data available until now, no further conclusions as to the implications of this can be drawn, though.

#### Biological samples.

Figure 4 shows length frequency distribution of 3 shrimp samples from commercial trawl catches in september 1986. Table 1 shows a more extensive break-down of samples by stages of sexual development.

Males were dominating by numbers, making up about 65% in most samples. Transitionals generally made up less than 1%, which is to be expected, the time of the year considered. Only about 50% of the females were berried, and since many of the females without roe had no sternal spines (pers.obs.) this may indicate that a large fraction of the females spawn only every second year. Almost no females had head roe.

Within the trial area shrimps tend to get bigger in a northern direction, which is indicated by a shift to the right of the dominating modes of both sexes. Given the few data available no further conclusions of this can be drawn.

#### Shrimp quality.

Fishermen have reported that soft-shelled shrimps are common in catches at Tugtorqortoq and at Søndre Upernavik fishing grounds in July and August. During August and September the amounts of inferior quality shrimps seem to be lessening so that the catches generally are of first quality in the middle of September.

Shrimps that are 'black in the head' when boiled are found in all areas; few have been reported from Uummannaq fishing ground but at Tugtorqortoq upwards of 75% of the shrimps caught may be black-headed. At Søndre Upernavik fishing ground, maximum values appear to be intermediate (15-25%) or low. In general there seems to be no evident seasonal trend in the occurrence of 'black-headed' shrimps, but there may be a geographical tendency.

#### By-catches and fauna.

The fish fauna is very homogeneous - at least in the three northern areas (Tugtorqortoq-Søndre Upernavik-Svarten Huk): Nybelin's Sculpin and Arctic Cod are totally dominating in the catches; besides, small specimens of Greenland Halibut are numerous in most places. In some hauls bycatch represents more than half of the total catch.

With regard to invertebrate animals medusae (2 or 3 species) are very common. Shrimp species other than Pandalus borealis frequently appear in the catches, but compared to Pandalus borealis they are few in numbers; however, Eualus macilentus is rather common at Søndre Upernavik fishing ground. In descending order of frequency, species occurring are: Lebbeus polaris, Eualus belcheri, Sabinea septemcarinata, Sclerocrangon ferox and Argis lar.

TABLE 1

Commercial shrimp samples from NAFO Subarea 1  
north of 72°52'5N in 1986

Station no.	Area kode	Number of specimens in groups, %								Totals, %			Nos.
		1	2	3	4	5	6	7	8	Mal	Tran	Fem	
911TR01	ND438	71.3	0.6	0.0	15.9	0.0	0.0	12.2	0.0	71.3	0.6	28.0	328
912TR01	ND439	55.2	0.0	0.0	21.1	0.7	0.0	22.6	0.4	55.2	0.0	44.8	279
912TR02	NB438	73.4	0.0	0.0	10.9	0.0	0.0	15.2	0.4	73.4	0.0	26.6	448
912TR03	ND438	77.0	0.6	0.0	12.4	0.0	0.0	10.0	0.0	77.0	0.6	22.4	482
912TR04	ND438	75.4	0.5	0.0	9.9	0.0	0.0	13.4	0.9	75.4	0.5	24.2	426
912TR05	ND438	61.3	1.3	0.0	20.5	0.0	0.0	16.5	0.5	61.3	1.3	37.5	400
913TR01	ND438	64.7	1.3	0.0	17.2	0.0	0.0	16.5	0.2	64.7	1.3	33.9	448
913TR02	ND438	73.7	0.0	0.0	13.6	0.0	0.0	12.2	0.4	73.7	0.0	26.3	449
913TR03	ND438	81.6	0.4	0.0	12.0	0.0	0.0	5.9	0.2	81.6	0.4	18.0	510
913TR05	ND438	72.0	1.1	0.0	13.7	0.0	0.0	12.6	0.6	72.0	1.1	26.9	468
914TR01	ND438	69.0	0.2	0.0	17.3	0.0	0.0	13.3	0.2	69.0	0.2	30.8	422
914TR02	ND438	67.6	0.2	0.0	13.9	0.7	0.0	17.3	0.2	67.6	0.2	32.1	411
914TR03	ND438	75.4	0.0	0.0	13.8	0.0	0.0	10.8	0.0	75.4	0.0	24.6	333
914TR04	ND438	83.6	0.0	0.0	8.0	0.0	0.0	7.7	0.7	83.6	0.0	16.4	426
914TR05	ND438	2.4	2.4	0.0	43.1	0.0	0.0	52.0	0.0	2.4	2.4	95.1	123
916TR04	ND438	47.9	0.2	0.0	23.5	0.2	0.0	27.2	0.9	47.9	0.2	51.9	426
921TR01	MM001	69.4	0.0	0.0	16.2	0.0	0.0	14.2	0.2	69.4	0.0	30.6	507
921TR03	MM439	73.2	0.4	0.0	12.1	0.0	0.0	14.3	0.0	73.2	0.4	26.4	519
922TR01	MM438	51.0	0.7	0.0	25.4	0.0	0.0	22.9	0.0	51.0	0.7	48.3	437
922TR02	MM438	41.7	0.2	0.0	21.1	0.0	0.0	36.3	0.6	41.7	0.2	58.1	465
922TR03	MM438	67.9	1.0	0.0	16.1	0.0	0.0	14.6	0.4	67.9	1.0	31.1	492
922TR05	MM438	83.2	0.9	0.0	6.5	0.0	0.0	9.1	0.3	83.2	0.9	15.9	573
923TR02	MG007	67.2	1.6	0.0	13.4	0.0	0.0	16.8	1.0	67.2	1.6	31.2	619
923TR03	MG007	76.8	0.3	0.0	10.9	0.0	0.0	11.7	0.3	76.8	0.3	22.9	608
923TR04	MG007	63.2	0.3	0.0	11.8	0.0	0.0	23.5	1.2	63.2	0.3	36.5	595
923TR05	MG007	55.4	1.1	0.0	20.2	0.0	0.0	21.9	1.3	55.4	1.1	43.4	525

Table 1. Composition by stages of sexual development (% by number) of samples of P. borealis from the trial shrimp fishery in Division 1A in September 1986.

- Group 1. Juveniles and males.
- 2. Transitionals without roe.
- 3. Transitionals with head roe.
- 4. Females without roe.
- 5. Females with head roe.
- 6. Females, berried, with head roe.
- 7. Females, berried.
- 8. Females with egg hairs.

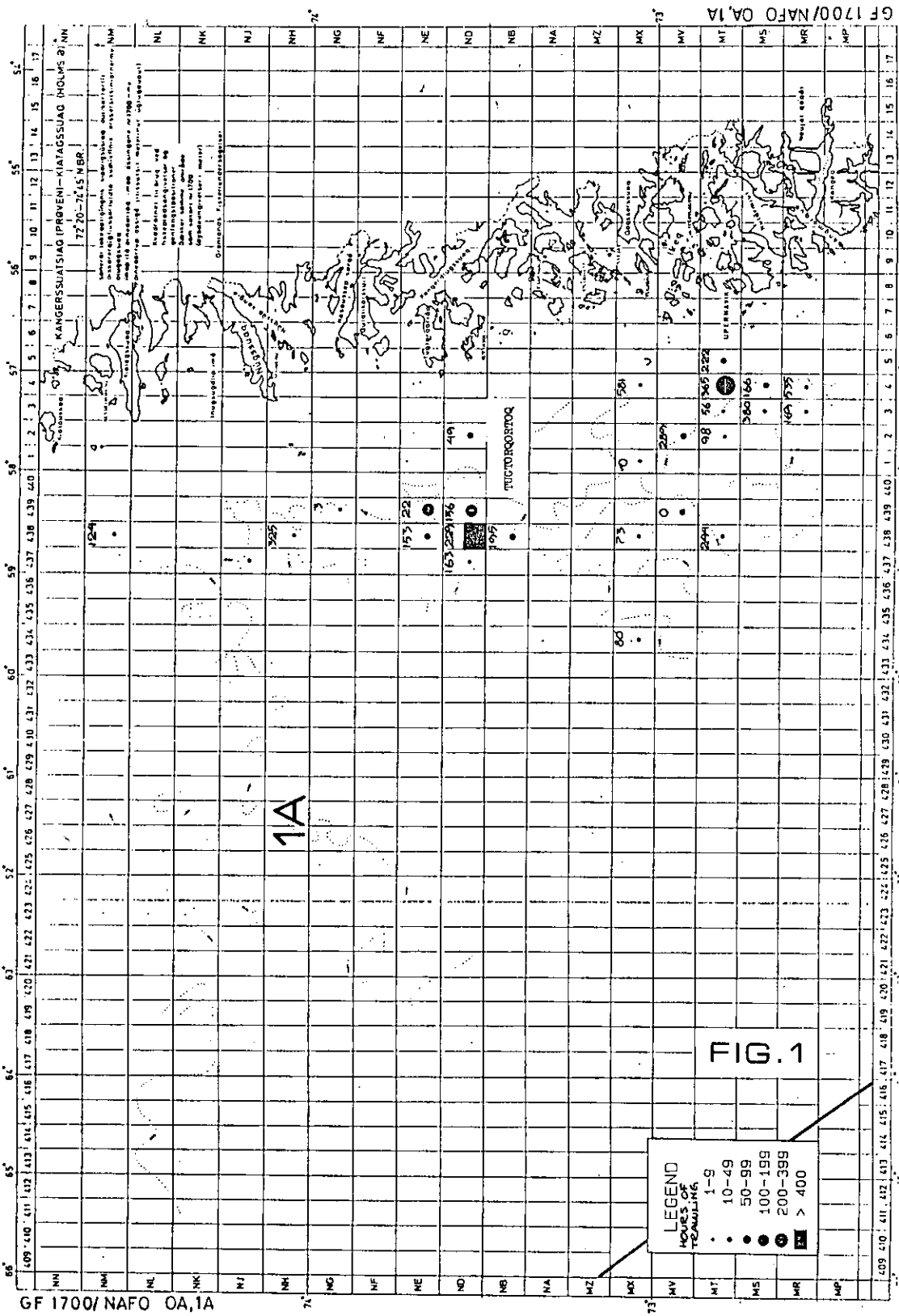
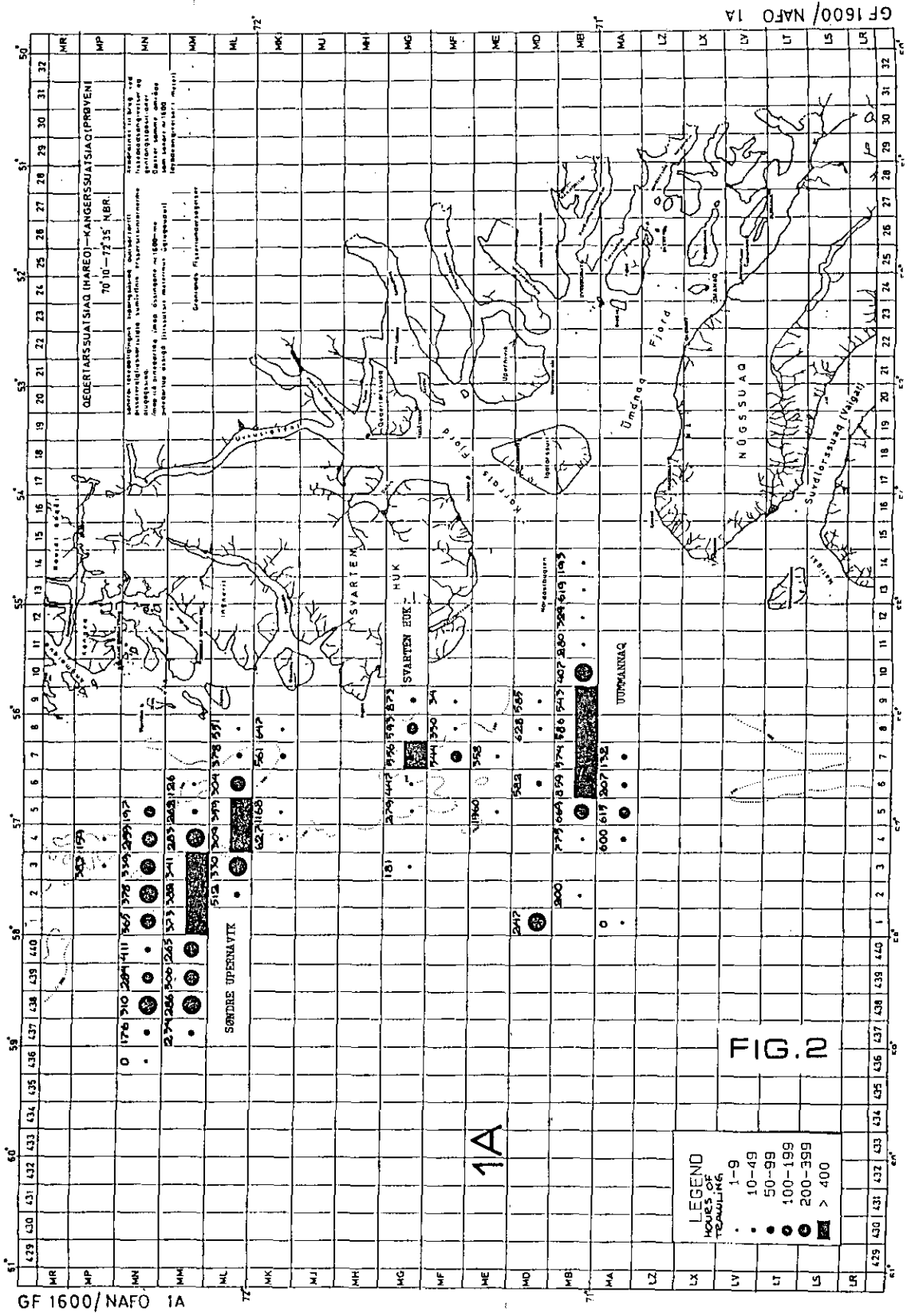


FIG. 1



GF 1600/NAFO 1A

GF 1600/NAFO 1A

# MEAN CPUE - VALUES IN FISHING AREAS

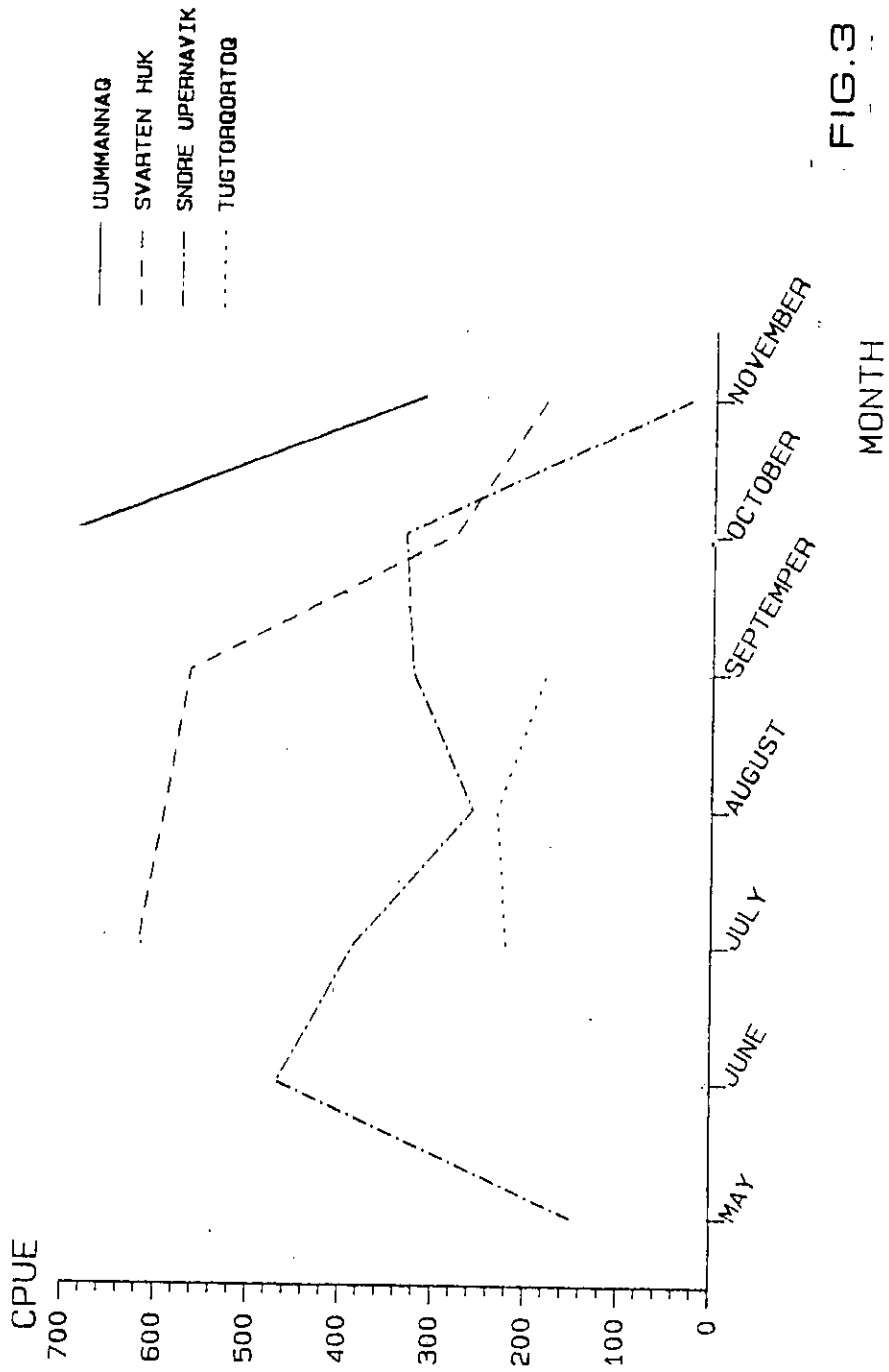


FIG. 3



FIG. 4

