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Geographical changes in the fishing pattern of Greenlandic shrimp trawlers  
in the Davis Strait, 1987-1996.

by

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*Introduction*

The Greenlandic offshore fishery for shrimp (*Pandalus borealis*) in the Davis Strait began around 1970.

This fishery is primarily conducted by vessels above 50GRT. Based on vessel logs that were mandatory since 1985 and a fully incorporated routine since 1987, this fleet component has accounted for about 75% of the total annual Greenlandic landings from Subarea 1 in the years 1987 to 1996 (Hvingel, Siegstad and Folmer, 1996).

The West Greenland shrimp stock is primarily assessed by evaluating biomass or abundance indices based on the Greenlandic survey (Folmer, Carlsson, Hvingel and Kannevorff, 1996) and on standardized catch rates from the commercial fleet (Hvingel, Lassen and Parsons, 1996).

The standardized catch rates of the commercial fleet may among other things be biased by changes in fishing pattern.

Concerns have been made that the catch rate indices in the later years were overestimating abundance due to the fleet's ability to track concentrations of shrimp and thus maintain high catch rates in spite of a decreasing stock. Such compensatory response by the fleet to decreasing stock abundance should be traceable in the geographical distribution of fishing effort.

A geographical change in the form of a southward movement of the fishery has been indicated in the catch statistics (Siegstad, Hvingel & Folmer, 1995), but never subjected to a closer investigation.

This paper examines the allocation of effort by Greenland vessels above 50 GRT along the west coast of Greenland in the years 1987 to 1996.

*Materials and methods*

Logbook data from 1987-1996 including haul to haul information on about 375,000 sets were analyzed.

Among other things position and time at start and termination of each haul is registered in the logbooks.

Trawling position was calculated as the midpoint of a straight line between start and finish of the haul, effort as the trawling time in hours.

To examine the annual distribution of effort, trawling hours were summed by 0.5 degrees of latitude for the years 1987-1996. An annual mean degree of latitude of effort allocation was calculated by weighting the latitude of each haul by the effort.

### ***Results and Discussion***

Figure 1 shows the annual distribution of effort in percent by 0.5 degrees of latitude and figure 4 puts the positions on scale by showing the fishing grounds at West Greenland. As the effort in figure 1 is a calculated annual percentage, the total effort by year is given in figure 3, as a reference.

In 1987-1988 practically no fishing is taking place south of about 65°N and a great deal of the annual effort (40% and 27% respectively) is spent north of 70°N (fig. 1).

In general the area north of 70°N gets less important to the overall fishery over the ten years examined. This is especially due to the northernmost areas north of 72°N being completely abandoned by the fishery, but in the later years also caused by the area between 70°N and 72°N receiving a smaller part of the overall effort.

From 1989 the fishery starts expanding southward by initiation of the fishery around Nuuk (about 64°N). In the following years this expansion southward continues all the way down to Cap Farewell.

The annual mean degree of latitude of effort allocation is shown in figure 2. This figure further illustrates an ongoing southward movement of the fishery from 1987-1996. On average the "center" of the fishery has moved by more than 20 nautical miles/year and over the whole time period by more than 3 degrees of latitude.

Accounted in degrees of latitude the north-south extension of the fishery is more or less constant over the years in spite of the general southward movement (fig. 1). However, the southward movement of the fishery may indicate that the effort is being concentrated on smaller areas as the continental shelf gets narrower further south.

Survey results indicate a relatively stable stock biomass in the Davis Strait since 1988 (Folmer *et al.* 1996). Thus, the southward displacement of the fishery is apparently not a compensatory response to an overall decreasing stock. The change in fishing pattern may be due to the fleet tracing a southward shift in the distribution of the stock. However, this could not be verified in the survey results

### ***Conclusion***

Since 1987 an ongoing movement of the Greenlandic fishery southward has taken place. In this time period the mathematical center of the fishery has moved more than 3 degrees of latitude southward.

A geographical concentration of the fishery is indicated, but not confirmed.

Most likely the displacement of the fishery is explained by the fleet tracing a southward shift in the areal distribution of the stock and/or targeting new concentrations of shrimp in the southern regions.

### ***References***

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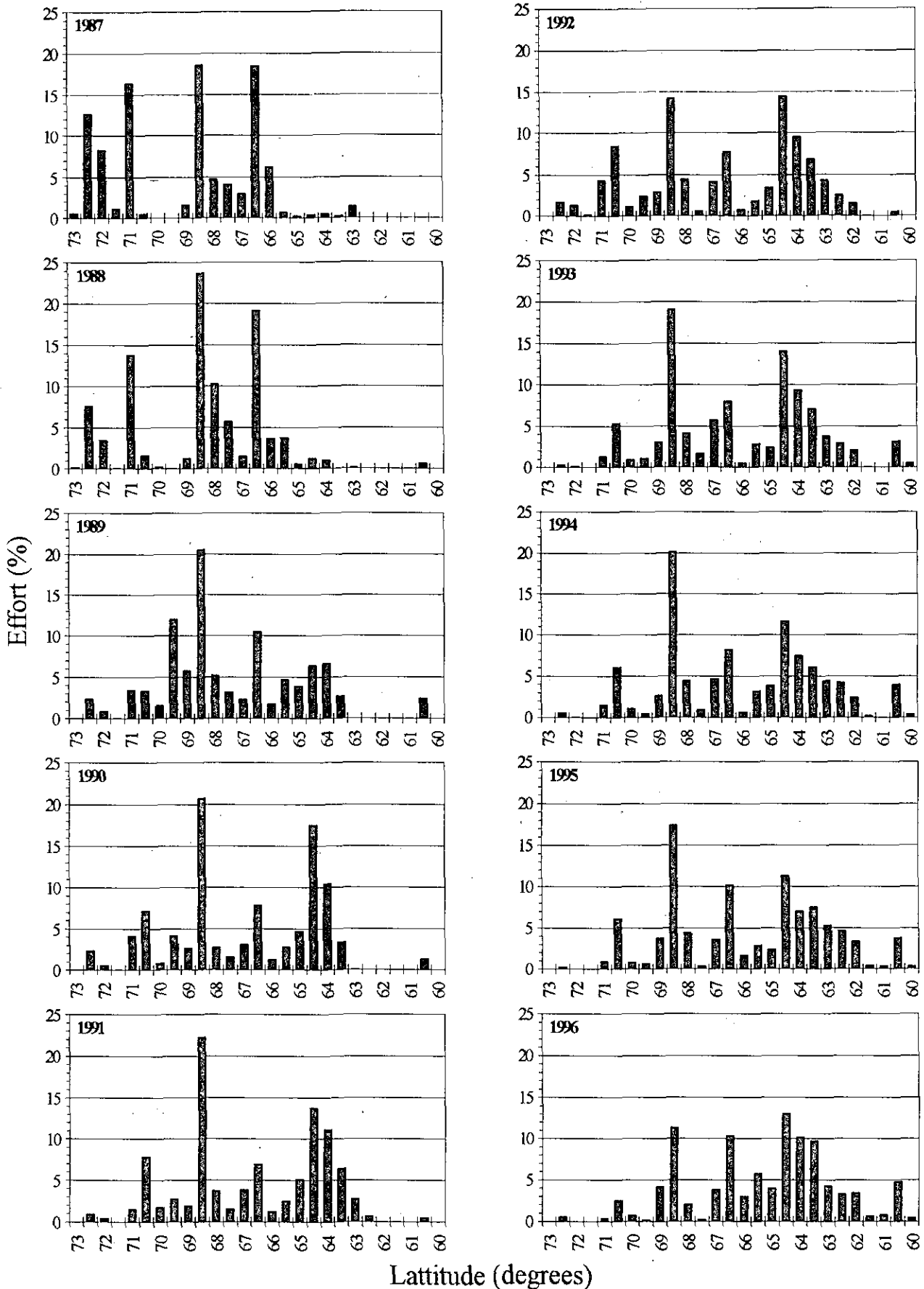
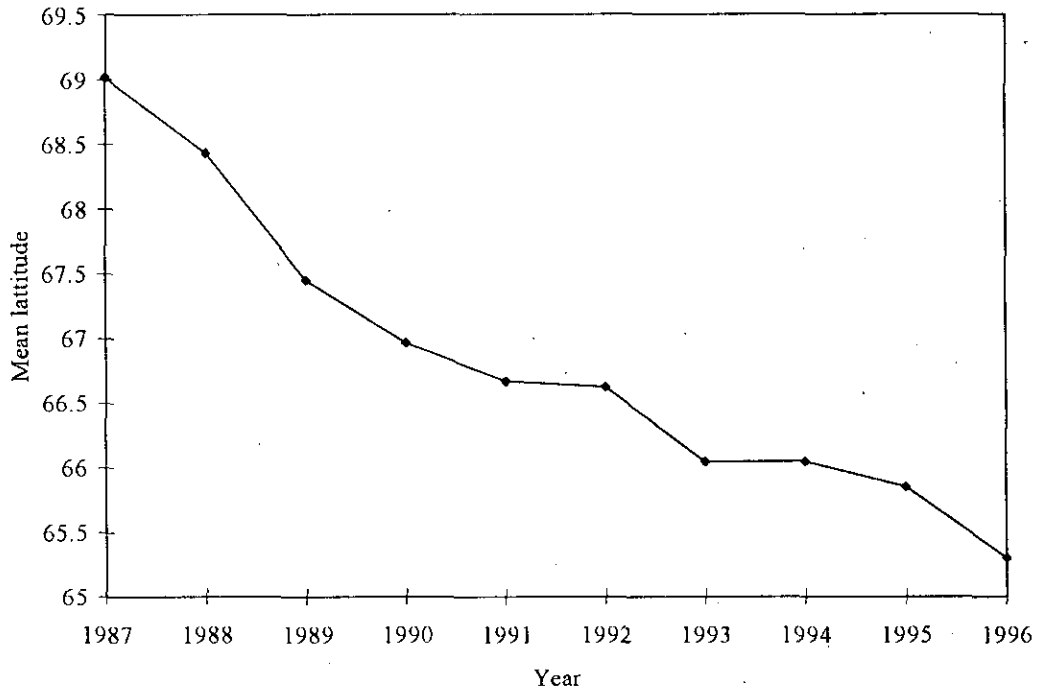
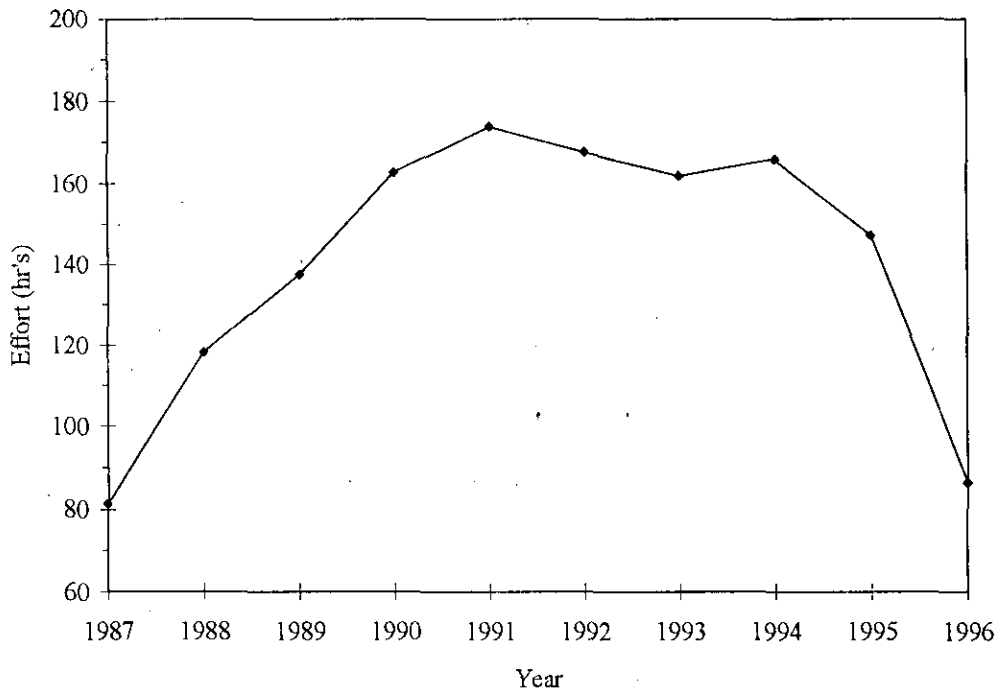


Figure 1. Effort (hr's) in percent of years total spent in the Davis Strait by Greenland vessels summed by 0.5 degrees of latitude in the years 1987-1996. (In 1996 only data until October is included).



**Figure 2.** Mean latitude weighted by effort of 375,000 hauls as reported in Greenland logbooks 1987-1996.



**Figure 3.** Total effort spent by Greenlandic vessels above 50GRT in Davis Strait 1987-1996. (1996 only includes data until October).

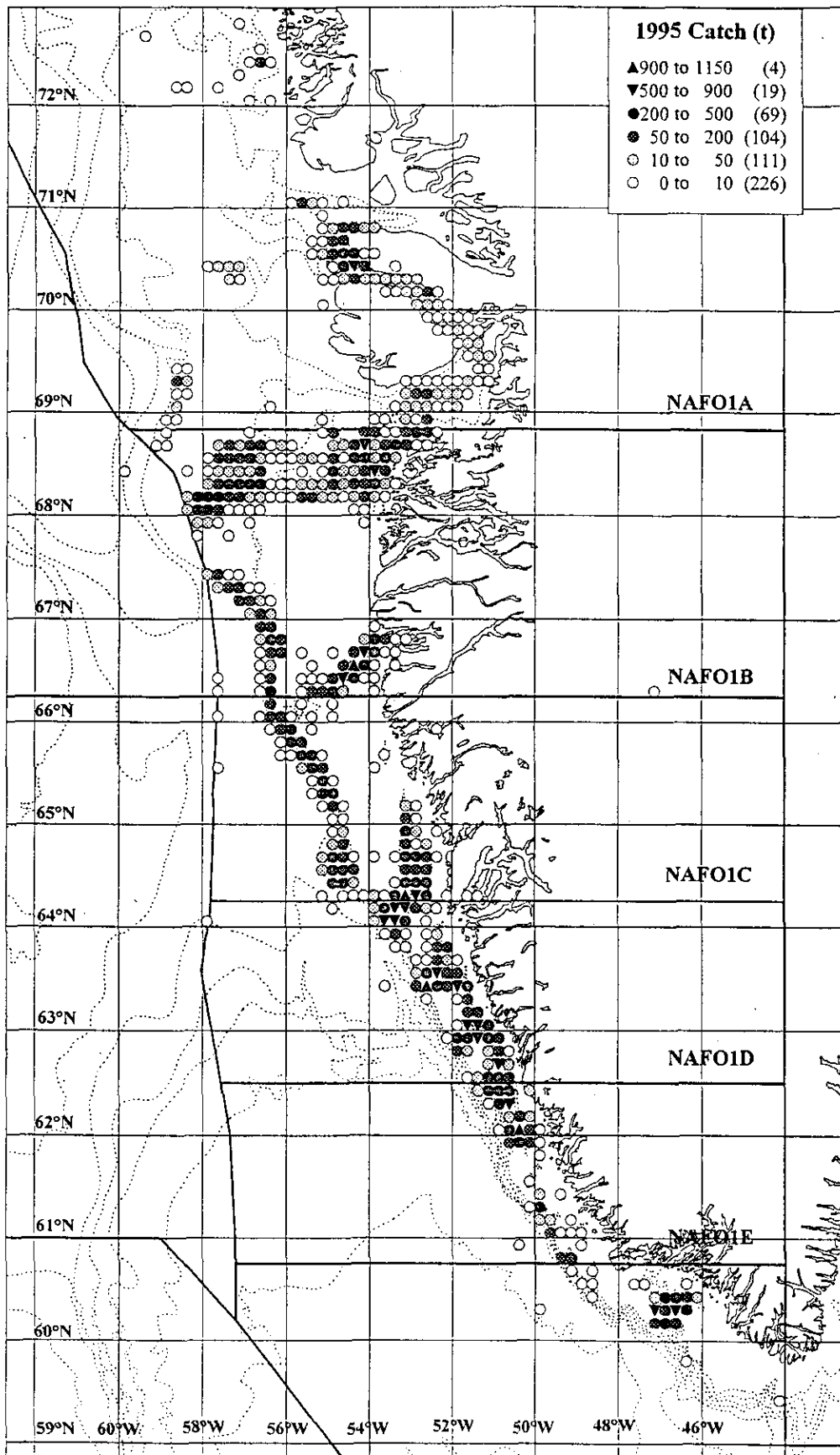


Figure 4. Geographical distribution of catches taken by Greenland vessels above 50GRT in 1995.