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Bottom temperature on West Greenland shrimp fishing grounds in 1991 to 2002

by

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**Abstract**

Bottom temperatures on trawl sites were recorded during the West Greenland Bottom Trawl Survey for northern shrimp (and fish) conducted by the Greenland Institute of Natural Resources in 1991-2002. The measurements indicate a substantial increase in bottom temperature in all parts in the survey area during the second half of the 1990's, but with some delay in the northernmost regions. The mean value for the entire survey area increased from 1.7 °C in 1995 to 3.3 °C in 1998 and remained around this level thereafter.

**Introduction**

Changes in the temperature regime at West Greenland are traditionally described on the basis of measurements made on oceanographic standard stations or transects (e.g. Buch and Nielsen, 2002). These data are, however, usually collected too coarsely in space and do not necessarily reflect the conditions faced by demersal fish and shrimp. Bottom temperatures recorded on trawl sites can allow a description of the conditions encountered by ecologically and economically important fish and shellfish species on a finer spatial scale, and this paper presents such results from the West Greenland Bottom Trawl Survey for northern shrimp in 1991-2002 conducted annually by the Greenland Institute of Natural Resources.

**Material and Methods**

Bottom temperatures were measured in 1991 to 2002 during the West Greenland Bottom Trawl Survey for northern shrimp (Kanneworff and Wieland, 2002). The data were collected with a Seabird CTD until 1994. Since 1995 a Seamon temperature sensor mounted on one of the trawl doors with a sampling interval of 30 to 60 s and a resolution of 0.01 °C was used. About 175 to 225 stations at depths between 150 and 600m were covered in each year. These data were mapped using ordinary point kriging, and mean bottom temperatures weighted for the area of the original survey strata were calculated for one inshore and four offshore regions as well as for the entire survey area (Fig. 1).

**Results and Discussion**

Bottom temperatures in 150 to 600 m depth ranged from about 0 to 5.9 °C in the years 1991 to 2002. Their annual geographical distributions are shown in Fig. 2. Bottom temperatures below 1 °C were observed in small areas mainly at depths of appr. 200 m in the northeastern part of the offshore area, in the Disko Bay and southwest from Disko Island during the first half of the 1990's. Bottom temperatures began to increase in 1996 in the area south of 67°30'N in particular in the deeper water (> 300 m). The warming continued thereafter and included since 1997 also the Disko Bay and the northernmost offshore area.

Spatially weighted mean bottom temperatures showed a substantial increase in all of the different regions during the second half of the 1990's, but with some delay in the northernmost regions (Fig. 3A). The values for region 1 and 2 were very similar ranging between 1.1 and 1.4 °C in 1991 to 1996 and between 2.4 and 2.9 °C since 1998. The survey was in 1993 extended to Southwest Greenland (region 5) where the mean bottom temperature decreased intermediately in 1995 to 3.2 °C and fluctuated between 4.5 and 5.4 °C thereafter. Rätz reported (1998) similar results for this area in depths of 200 to 400 m. Mean values for the entire survey area correlated closely with the values from region 3 in the period 1993-2002 (Fig. 3B). Overall spatially weighted mean bottom temperature increased from 1.7 °C in 1995 to 3.3 °C in 1998 and remained around this level thereafter (Fig. 3C).

### References

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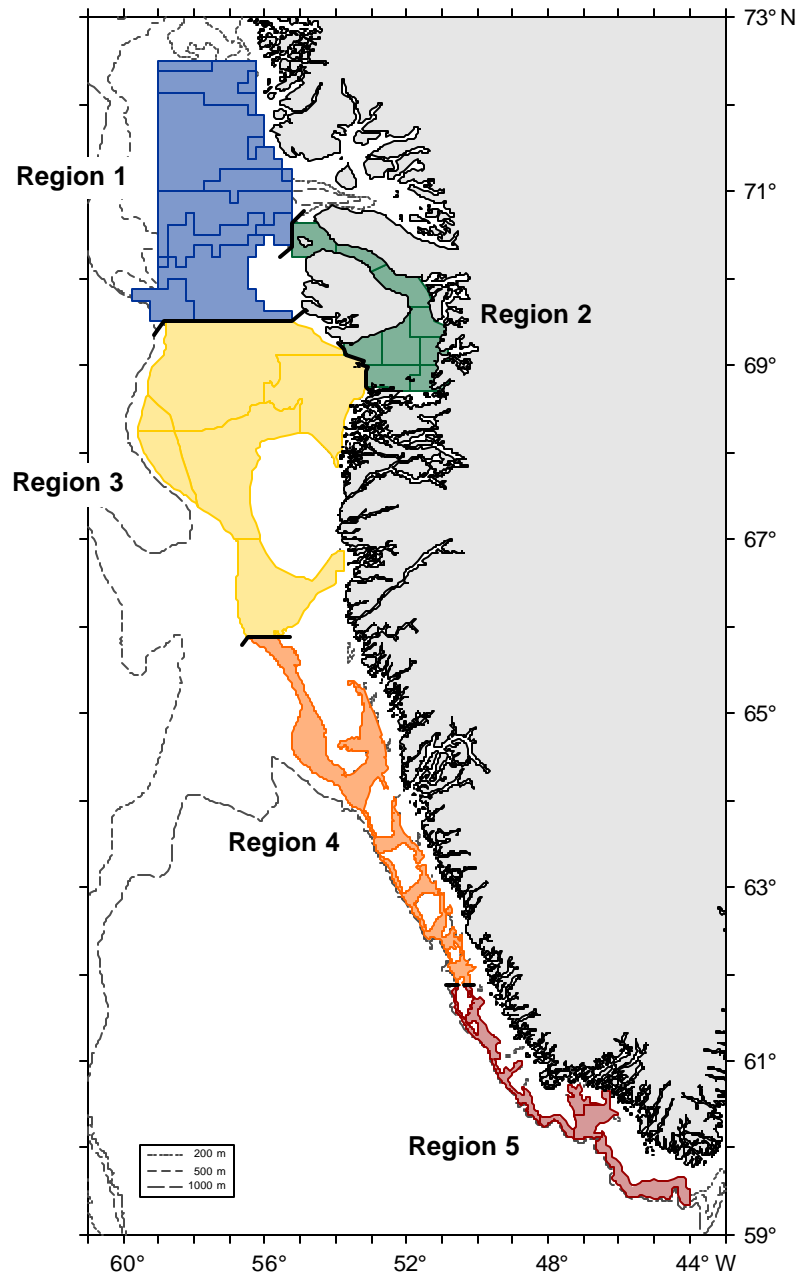


Fig. 1. Survey area and stratification.

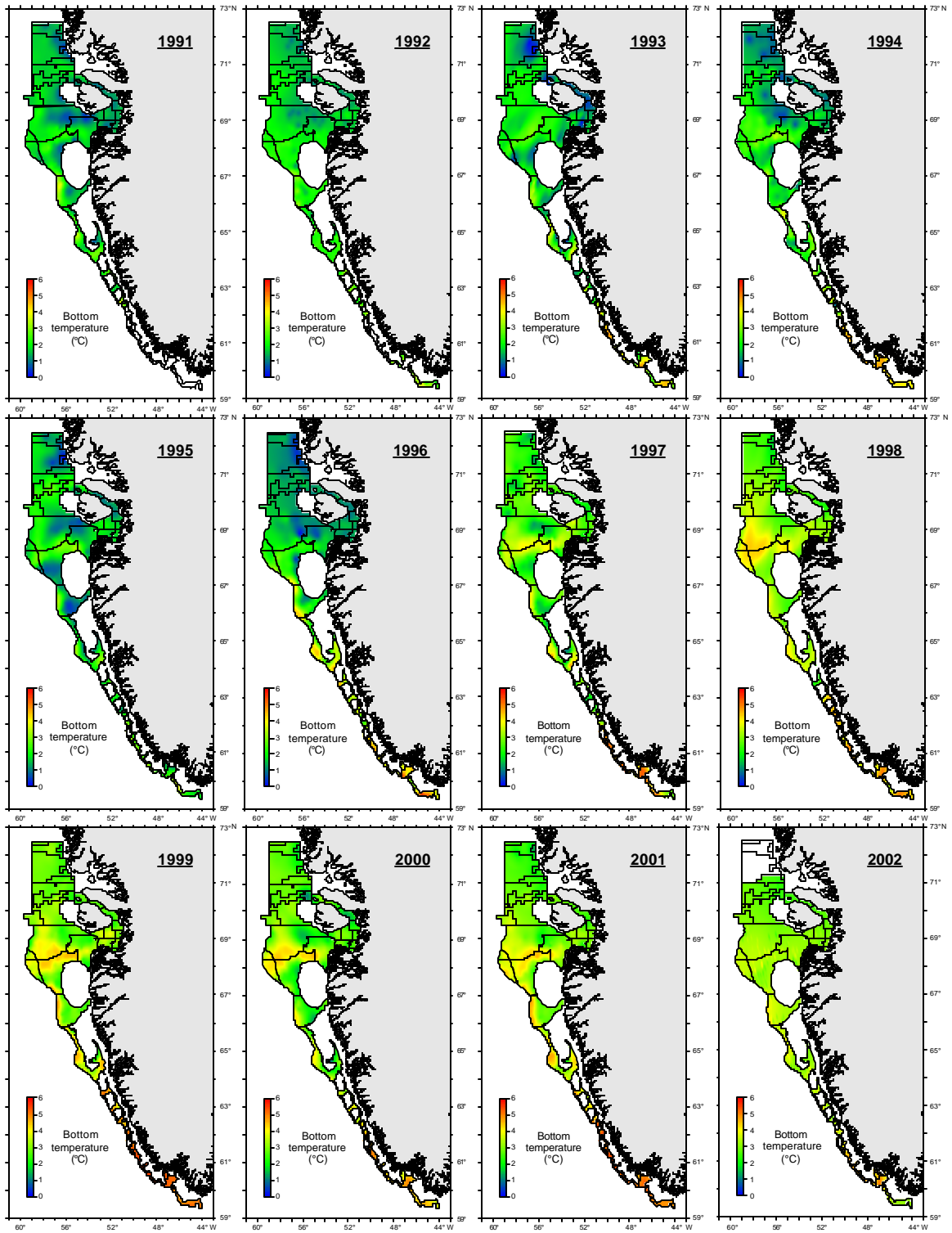


Fig. 2. Bottom temperatures on West Greenland shrimp fishing ground (150-600 m depth) 1991-2002.

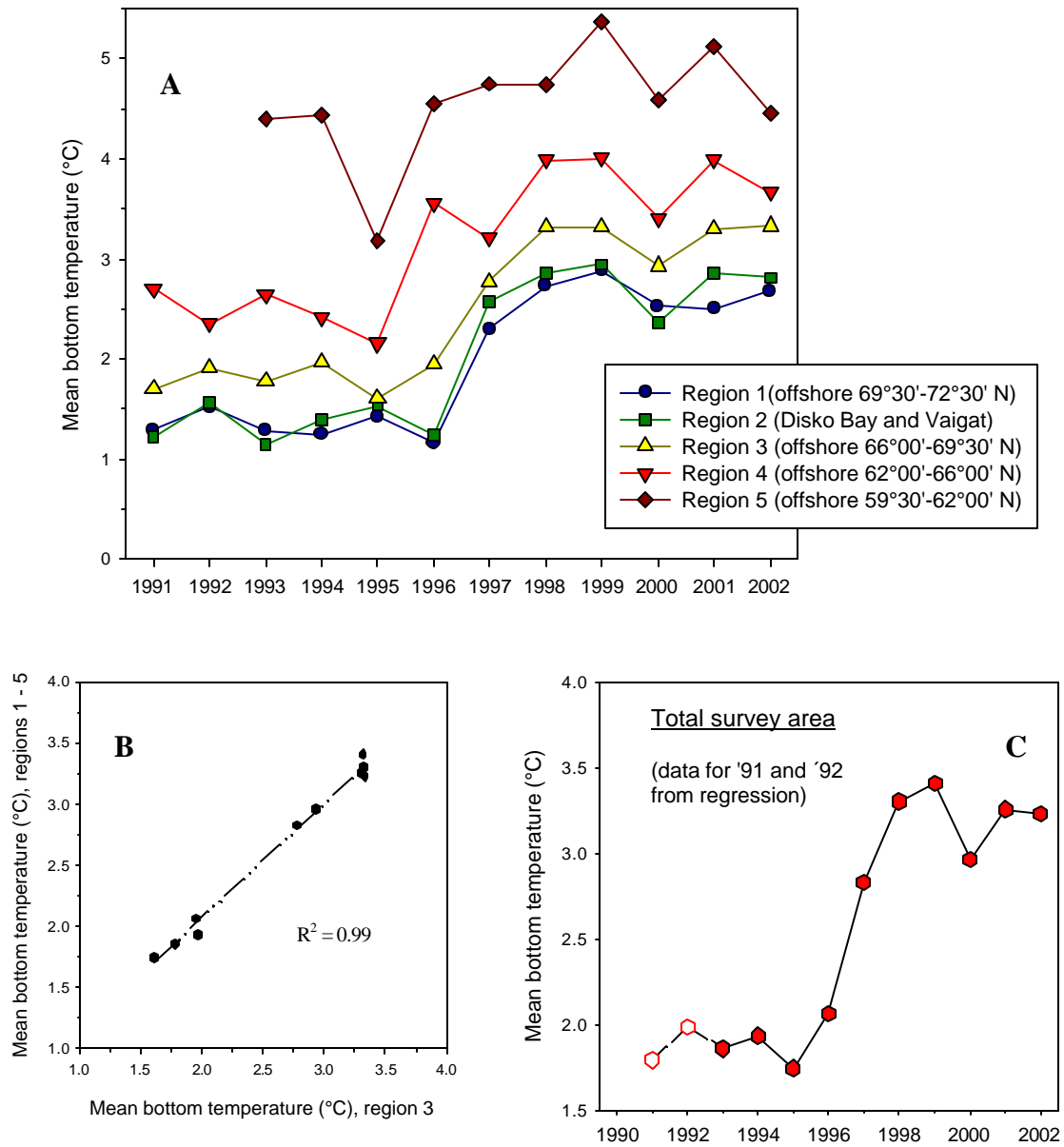


Fig. 3. Mean bottom temperature in different regions and the total survey area.