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Fishery of brown shrimps (*Crangon crangon*) in
the Danish Wadden Sea area (1963-1993)

by

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1. Abstract

The fishery of brown shrimps (*Crangon crangon*) in the Danish Wadden Sea was initiated in 1963, much later than in the German and Dutch Wadden Sea.

Today four harbours are important for landings of brown shrimps in Denmark: Havneby on Rømø and Esbjerg both close to the Wadden Sea. Both harbours are evenly important landing places with an annual landing between 500 and 1 000 tonnes. At the west-coast of Jutland, minor landings takes place in Hvide Sande and Thorsminde (<500 tonnes).

The Danish brown shrimp fishery was restricted the first 12 years in the period 1963-1974, and the total annual landings were below 176 tonnes. Landings increased gradually from 1975 until 1982, where 3 107 tonnes were landed. The landings dropped again the following years, and decreased down to 744 tonnes in 1985. The annual landings have fluctuated considerably from 1985 to 1993, and between 652 tonnes in 1990 and 2 509 tonnes in 1992.

In 1993, 23 Danish vessels were registered as brown shrimp beam trawlers in the Danish Wadden Sea area outside the restricted area enclosed by the "SHRIMP LINE", which connect the Wadden Sea islands. In August 1977 the "SHRIMP LINE" was enforced to protect the Wadden Sea, east of the line. The highest number of vessels in the Danish brown shrimp fishery was in 1978, where 33 vessels were registered. The number of vessels have the last 10 years been between 21 and 27.

LPUE (landing per unit effort (year)) was in average the first 12 years (1963-1974) 22 tonnes annually per vessel. From 1975-1994 the average LPUE was twice as high, 49 tonnes per vessel per year. In 1994 the annual landing per vessel varied between <50 tonnes and >100 tonnes.

The main fishing seasons are the 2. quarter, and secondary the 4. quarter. The fishing areas are from north of the Horns Reef down to Amrum outside the German Wadden Sea. The fishery in the 1. and 2. quarters normally takes place north of Horns Reef, and in the 3. and 4. quarters the vessels go further south and westwards.

The paper summarizes the available data on the Danish brown shrimp fishery, and landings in Danish harbours by German and Dutch vessels taken in the Danish area of the North Sea (outside the "SHRIMP LINE").

2. Introduction.

The Danish fishery of brown shrimp was initiated on experimental basis in the 60'ties (Madsen, 1980). Danish landings are reported from 1963 (Fig. 2-4). Only two vessels from Rømø participated in the beginning of the fishery. The Danish brown shrimp fishery is described in a series of "Internal Reports" (in Danish) given by Albrechtsen between 1975 and 1982 to the Danish Institute for Fisheries and Marine Research (Internal Report: No.: 44-50, 57-58, 77, 91, 132, 167, 189 and 190, total 15 reports). The reports describe the introduction of the brown shrimp fishery, the by-catch problems (discards) before and after introduction of a sorting (escape) greed in the trawls, the sorting systems on board the vessels, and the boiling facilities.

There has not been reported any surveys or investigations of the Danish brown shrimp stock the last 15 years. In the second quarter in 1994 the Danish Institute of Fisheries Research conducted a discard investigation of the three Danish brown shrimp fleets (Havneby, Esbjerg and Hvide Sande). Data is not yet available and will be reported later.

The Danish landings, the fleets, and the LPUE in the different ICES-squares (and on basis of the in 1994 recommended functional units, of which Denmark covers two; Functional unit 1 and 2) have been reported to ICES (Anon. 1994).

In the Danish Wadden Sea, fishing of *C. crangon* is only allowed outside a restricted area enclosed by the "SHRIMP LINE" enforced since 1977 (Albrechtsen, 1980).

The Danish landings are not as quantitatively important as the Dutch and German landings, which respectively amount to 8 000 tonnes and 9 000 annually (Anon. 1994).

3. Material and methods.

Data are compiled from statistical information delivered by the Ministry of Agriculture and Fisheries (the Statistical Department, Ministry of Agriculture and Fisheries, 1994), and in a limited extent from the Internal Reports mentioned in the introduction.

4. Data.

4.1 Fishing areas and landing harbours.

Between 1963 and 1977 (August) fishing of *C. crangon* was allowed all over the Danish Wadden Sea. From August 1977 fishing *C. crangon* could only take place outside the enforced "SHRIMP LINE", which was drawn from the southern point of Skallingen and between the Danish Wadden Sea islands (Fig. 1) (Albrechtsen, 1980).

The main fishing areas for the Danish shrimp fleet were and are north of the Horns Reef, from the island Fanø down to the north point of Sylt between the SHRIMP LINE and 20 m of water depth in the North Sea. The fleet normally fish north of the Horns Reef during the first two quarters. Later in the season, the fleet moves further south, and may even fish as far south as Amrum outside the German Wadden Sea during the fourth quarter (Kristensen, 1994; personal communication).

In 1993 the Danish landings of *C. crangon* mainly took place in Esbjerg and Havneby, where respectively 690 tonnes and 592 tonnes were landed. Minor landings took place in Hvide Sande and Thorsminde, and amounted respectively to ca 187 tonnes and ca 5 tonnes.

4.2 The fleet.

The Danish fishery of *C. Crangon* was initiated later than in Holland and in Germany. On experimental basis fishing of *C. crangon* in the Danish Wadden Sea began in 1963, where a couple of vessels started to land small amounts of shrimps. The next five years, from 1973 to 1978, the fleet gradually increased to 33 vessels in 1978 (Fig. 2). The number of vessels decreased between 1982 and 1983 to only 22 vessels, probably because many shrimp vessels chanced from *C. crangon* fishery to mussel fishery. Between 1983 and 1993 the size of the Danish brown shrimp fleet was stable around 22 vessels.

The last ten years, the number of licenses given by the Ministry of Agriculture and Fisheries has been 28. So, six vessels do obviously not exploit their licenses to fish *C. crangon* in Danish waters.

There are three main harbours for the Danish *C. crangon* fleet. Ten vessels are registered at Havneby on Rømø, and nine are registered in Esbjerg. There are three vessels registered in Hvide Sande at Ringkøbing fjord (Fig. 6).

In 1993 five vessels landed < 50 tonnes each. Eleven vessels landed between 50 and 75 tonnes each, and seven vessels landed > 75 tonnes. One vessel landed more than 100 tonnes of *C. crangon* in 1993. The average landing per vessel was ca 65 tonnes in 1993 (Fig. 4).

The Dutch and German vessels normally land their catches in Havneby on Rømø or in Esbjerg.

4.3 The Danish landings and values of *C. crangon*.

In the period 1963 to 1974 the annual landings of *C. crangon* were small, and amounted to maximum 176 tonnes in 1969 and in 1974 (Fig. 3). Between 1974 and 1982 the landings gradually increased from 176 tonnes in 1974 to 3 107 tonnes in 1982. The landings decreased the following year to 1 972 tonnes, probably due to a decrease in the number of vessels. The mussel fishery in the Danish Wadden Sea increased in 1986 from a few hundred tonnes annually to 27 000 tonnes (Munch-Petersen and Kristensen, 1987), and some of the shrimp vessels chanced to the more profitable mussel fishery.

The last ten years the annual Danish *C. crangon* landings have varied between 652 tonnes in 1990 and 2 409 tonnes in 1992. The average landing per vessel were the first seventeen years (1963-79) between 11 tonnes and 47 tonnes (Fig. 4). Between 1980 and 1983 the annual average landing per vessel increased to 90 tonnes (Fig. 4). From 1984 to 1993 the average annual landings per vessel have varied considerably between 25 and 96 tonnes.

The average annual value of the Danish *C. crangon* landings amounted to around DKK 433 000 in the period 1963 to 1974. The value gradually increased between 1975 to 1982 to DKK 28 957 240. The last ten years the annual landing value has on average been DKK 20 million.

4.4 Dutch and German *C. crangon* landings in Danish harbours, caught in Danish Waters.

The last 10 years the Dutch and German *C. crangon* catches in Danish waters have approximately been of the same size as the annual Danish landings (Fig. 3,7 and 8).

From 1981 to 1993, German *C. crangon* vessels have landed between 75 tonnes and 933 tonnes in Danish Harbours caught in Danish waters (Fig. 8). Annually up to nineteen different German vessels have landed shrimps in Danish Harbours.

Between 1987 and 1993, 44 different Dutch vessels have annually landed *C. crangon* in Danish harbours caught in Danish waters. The annual Dutch landings in Danish harbours have been between 169 tonnes and 1 067 tonnes (Fig. 7). There is no Danish statistical information on Dutch and German landings of *C. crangon*, fished in Danish waters before 1981.

5. Discussion.

The enforcement of the "SHRIMP LINE" in August 1977 have protected the Danish Wadden Sea east of the barrier islands from impact from the shrimp beam trawlers. Prohibition of fishery of *C. crangon* east of the "SHRIMP LINE" has especially prevented catches of 0-I-group plaice. The effect of this enforcement, and the influence on the survival of the different fauna species in the Danish Wadden Sea, has not yet been investigated. Denmark is alone on prohibition of brown shrimp fishery east of the Wadden Sea islands.

The Danish brown shrimp fishing fleet is small compared to the German and Dutch brown shrimp fleets. The size of the Danish fleet has been reasonable stable the last ten years, although the size of brown shrimp landings have varied considerably over the years.

The value of the Danish brown shrimp landings depends to a large extent on the landings from German and Dutch vessels. All the Danish *C. crangon* landings are exported. Dutch commercial companies have established receiver facilities, for instance on the Wadden Sea island Rømø (in Havneby).

6. Literature.

- Albrechtsen, K. 1980. 12. Rapport over de fortsatte undersøgelser af fiskeriet på kystrejer (*Crangon crangon*). Intern Rapport til Danm. Fisk.- og Havun. No. 132. pp 48.
- Anon., 1994. Report of the Study Group on the Life History, Population Biology, and Assessment of Crangon. ICES, Shellfish Committee. C.M. 1994/K: 3. pp 71.
- Kristensen, O.S. 1994. Fishermen (*C. crangon*). Personal communication.
- Madsen, K. P., 1980. Forsøgsfiskeriet på hestereje langs den danske vestkyst. Intern Rapport til Danm. Fisk.- og Havun. No 128. pp 24.
- Munch-Petersen S. and P.S. Kristensen. 1987. Assessment of the stocks of mussels in the Danish Wadden Sea. ICES, Shellfish Committee. K: 24. pp 16.
- Statistical Department, 1994. Ministry of Agriculture and Fisheries.

7. Figures.

- Figure 1. The *C. crangon* fishing areas in the Danish Wadden Sea. The "SHRIMP LINE" is shown, and has been enforced since August 1977. The shaded areas are the most important fishing areas outside the SHRIMP LINE in the Danish Wadden Sea (After Albrechtsen, 1980).
- Figure 2. The number of active (with license to fish *C. crangon*) vessels in the Danish *C. crangon* fishery, 1963-1993.
- Figure 3. The annual landing in tonnes of boiled *C. crangon* by Danish vessels caught in Danish waters, 1963-1993.
- Figure 4. The annual landing of *C. crangon* per vessel in tonnes, 1963-1993.
- Figure 5. The total values in DKK of the Danish landings of *C. crangon*, 1963-1993.
- Figure 6. The main Danish landing harbours for *C. crangon* in 1993.
- Figure 7. The Dutch *C. crangon* landings in Danish Harbours of catches taken in Danish waters, 1987-1993.
- Figure 8. The German *C. crangon* landings in Danish Harbours of catches taken in Danish waters, 1981-1993.

Figure 1.

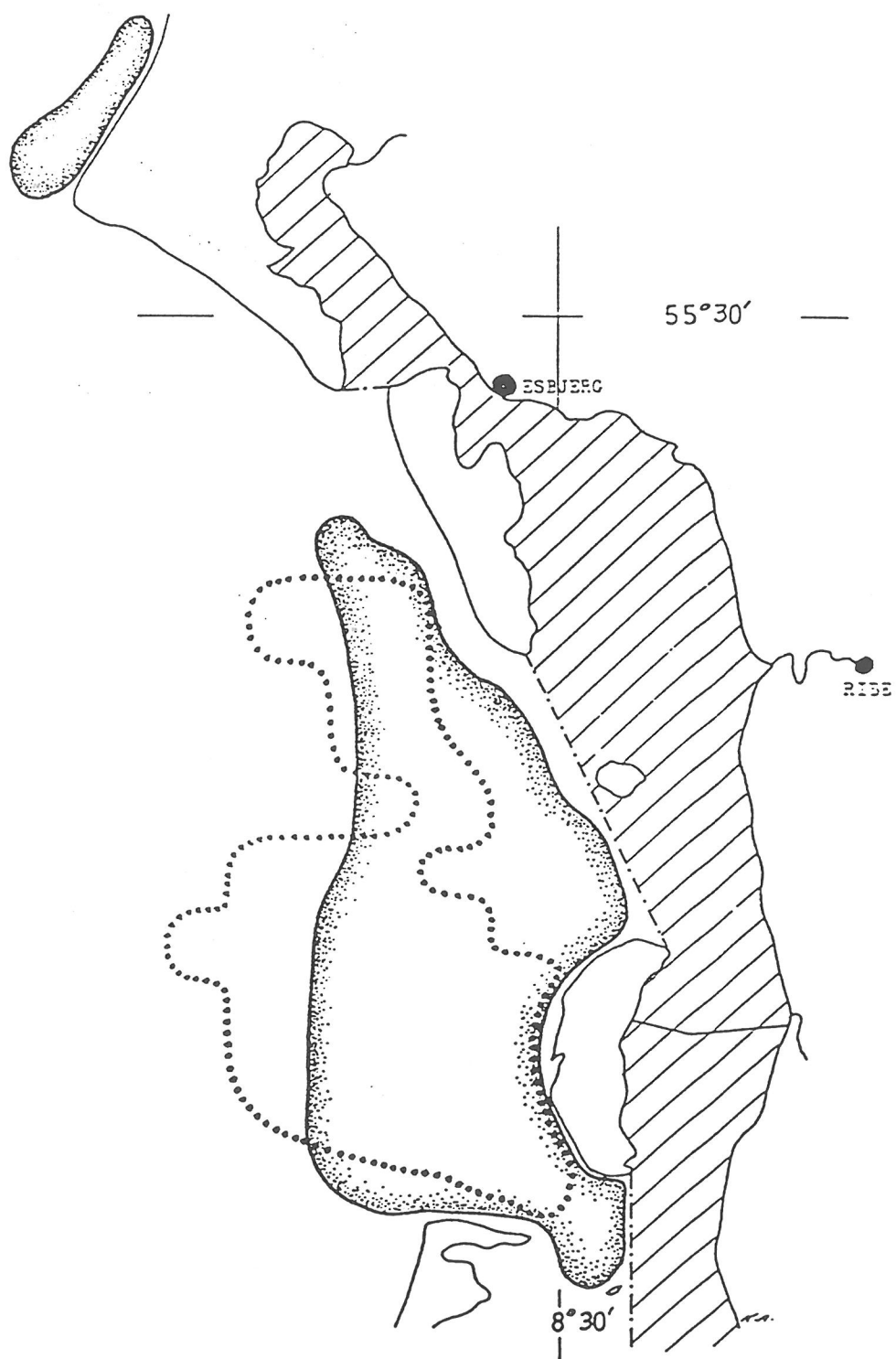


Figure 2.

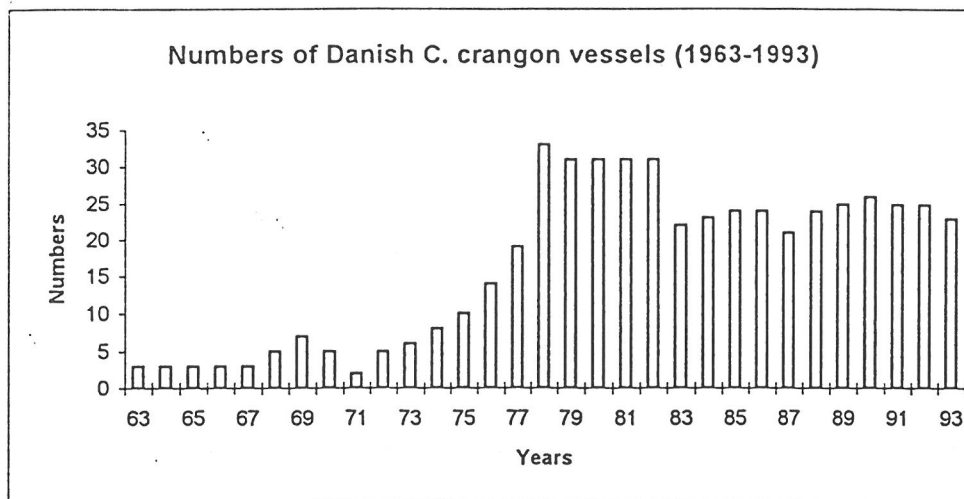


Figure 3.

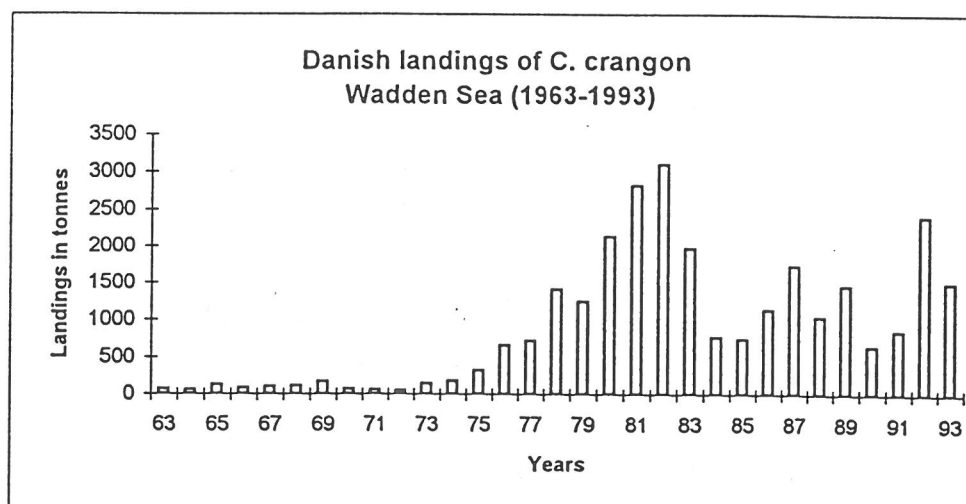


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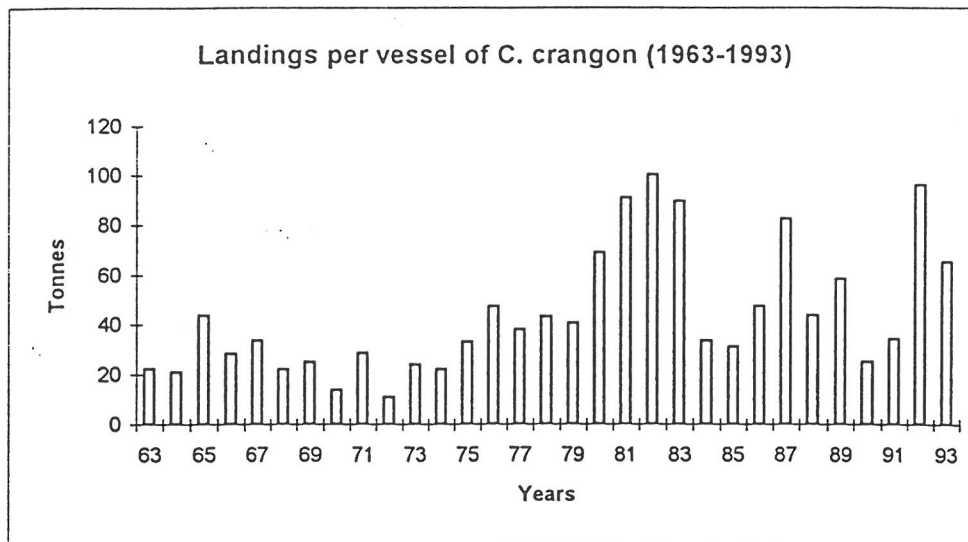


Figure 5.

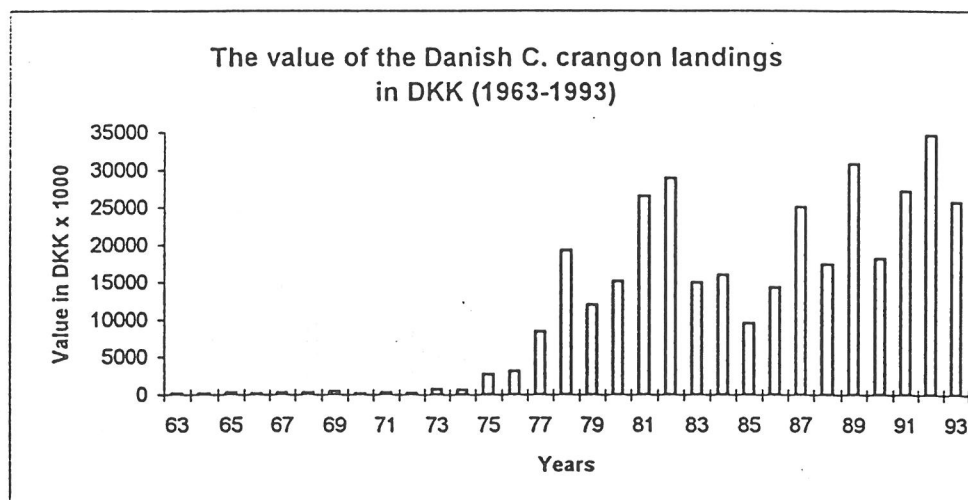


Figure 6

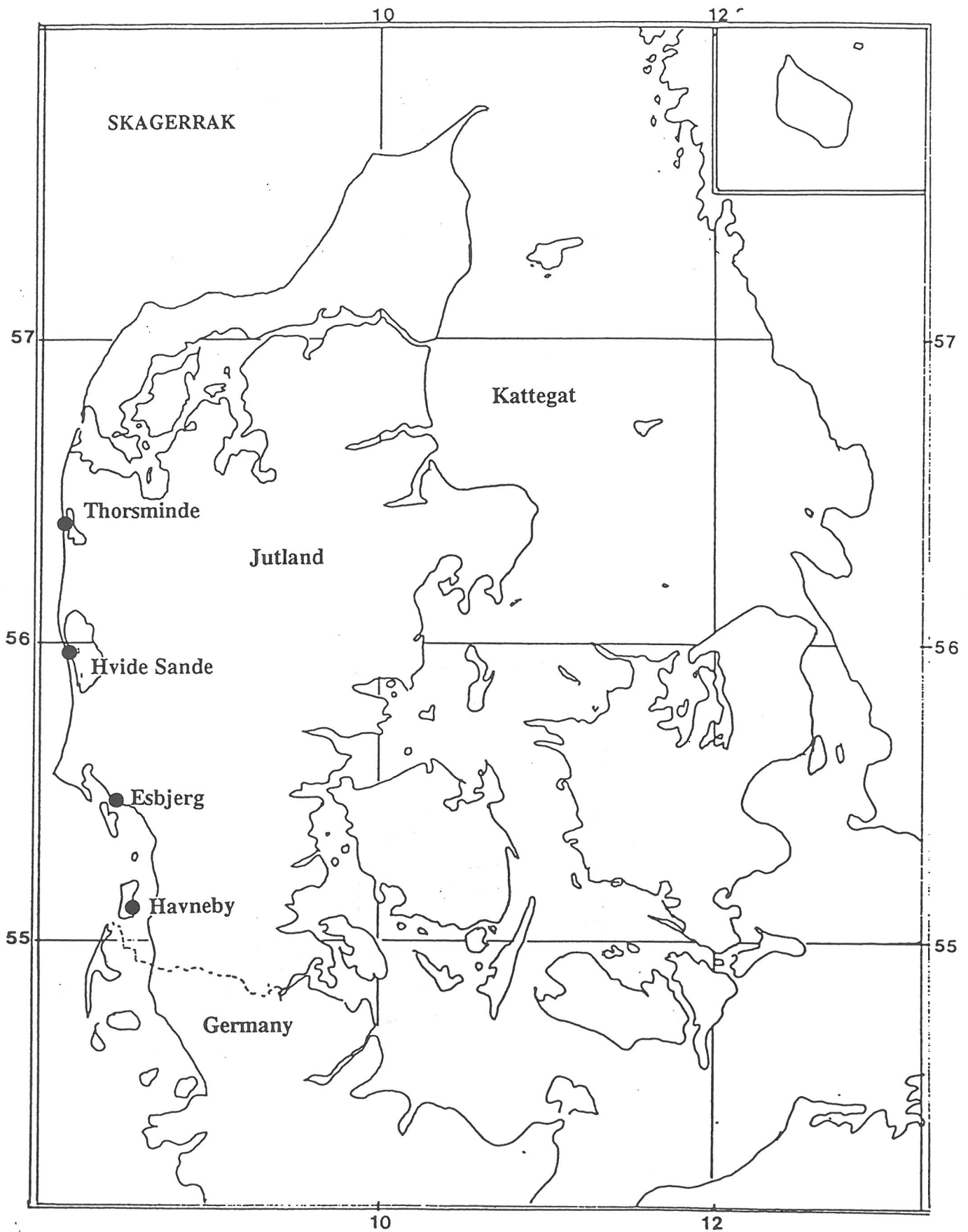


Figure 7.

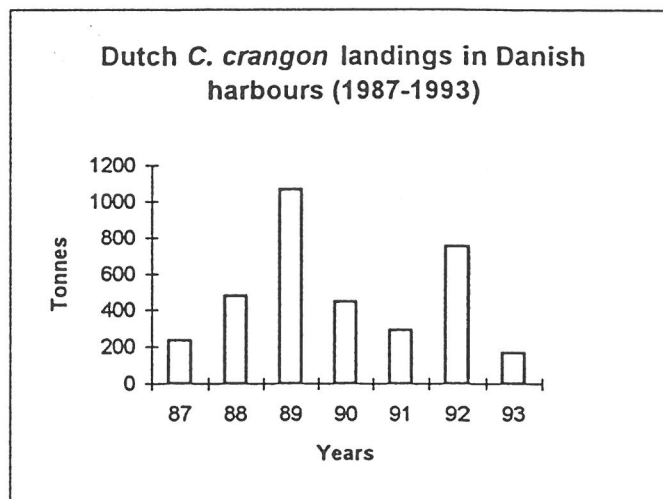


Figure 8.

