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Forecasting the landings of Brown Shrimp (Crangon crangon)in the Netherlands

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Landings in October.

In 1966 a method was described to forecast the total landings of Brown Shrimp (Crangon crangon) in the Netherlands in the month of October 1). This method was based on a correlation between the temperature of the sea-water in January and February and the total shrimp catches in October. Rees 2) found a sharp peak in the production of larvae of Crangon crangon in January. His findings correspond very well with the results of our work on the life-cycle of the Brouwn Shrimp 3). The larvae born in January reach the size of consumption shrimps (alive 54 mm, boiled 51 mm) in about eight months; they dominate in the catch in October. The negative correlation between the succes of this group of shrimp larvae and the temperature of the seawater in the month they were born reveals a remarkable aspect: the colder the seawater the greater the success of these shrimp larvae. (fig. 1). If this correlation should be based on a direct influence of water temperature on the development of eggs and/or larvae, one wonders what the optimal temperature for reproduction in Brown Shrimp might be. The very large shrimp catches in the autumn of 1963 following the extremely long and cold winter of 1962-1963 do not make it very probable that such a well-defined optimal temperature for reproduction exists. Besides that, shrimp larvae are not only born in the months of January-February, but appear in sea throughout the period December-August. This precludes that their requirements for a very special temperature of the seawater is the principle factor involved.

An explanation for this negative correlation can perhaps be found in the offshore migration of adult shrimps in the period of October-December. This migration is directly influenced by water temperature. In a cold winter the shrimps move further offshore than in a mild winter. In the severe winter 1962-1963 Dutch shrimpers operated as far as 50 miles off the Dutch coast which was unusually far. 4). Fishing for shrimp larvae with a high speed townet in January and February,1967 and 1968, gave the biggest catches some 18-30 miles offshore, even though these winters were mild, that of 1966-1967 especially. Adult shrimps do not migrate very far offshore in a mild winter. The virtual absence of shrimp larvae at a distance of only 1 mile offshore and the scarceness of larvae up till 10 miles offshore was a surprising result of these shrimp larvae surveys. 5).

Considering these facts it seems probable that the conditions for the development of the Brown Shrimp larvae are in the coastal waters of the Netherlands unfavourable in the inshore area and more favourable 15 or more miles offshore. For an accurate forecast of the landings of Brown Shrimp in the month of October not only the water temperature in January and February but also two other factors must taken into account, i.e. the number of working days in October in a particular year, and the gradually increasing protection of undersized shrimps in the last four years. 6).
For October, 1968, the landing of some 1400 tons of consumption shrimps is forecasted. 7).

Landings in November.

Shortly after the hatching of the eggs in January another spawning takes place. These eggs hatch in March-April and bring about a second peak in the production of shrimp larvae. This second wave of shrimp larvae is of lesser importance for the fishery than the January peak. In a relatively cool summer these shrimps do not reach the marketable size before next winter. Up till recently their numbers were every year drastically reduced, either by landing the undersized shrimps for the fish-meal plants, or by their being killed incidentally by the old, now obsolete, shrimp sieve on board of the shrimpers.

- After -

After a relatively cool summer the fishery in November depends almost entirely on the shrimps born in January, of which the numbers are already diminished by the fishing in previous months. The continuing growth of these shrimps gives some compensation for their decrease in number. The temperature of the sea water has in general a noticeable influence on the growth of marine animals. In the case of the Brown Shrimp, it can be observed that, according as the temperature of the sea water is higher, a greater part of the shrimps born in March-April reaches the marketable size in November.

After a relatively warm summer their contribution to the stock of marketable shrimps can be so considerable, that the landings in November can surpass the October landings. Fig. 2 shows the positive correlation between the temperature of the sea water in summer (Lightship Texel) (June-October) and the landings in November minus the landings in October. The greater the stock in October the more shrimps remain after the fishing in that month and determines the level of the catch in November. Therefore the subtraction "landings in November minus landings in October" reflects the contribution of the second wave of larvae (born in March-April) to the catch in November, independent from the level of that catch.

Based on the expected landings in October (1400 tons) and the below average temperature of the seawater in the period June-July, 1968, the landing of some 1100 tons in November,1968 is forecasted. The slow growth of the shrimps born in March-April and the increasing protection of the undersized shrimps make the prospects for the shrimp fishing in the first half of the year 1969 brighter than in 1967 and 1968 when the fishing in spring was very poor.

Fishing intensity

The above described correlations only hold good if the total landings give a realistic reflection of the stock. During the last eight years, the fishing for shrimps along the Netherlands coast has become so intensive and the fleet has such a great catching-capacity that factors like minor fluctuations in the fishing effort, in weather conditions, and in the stock of predators of the Brown Shrimp do not have a marked influence on the landings any more. Predators of the Brown Shrimp such as dab and whiting, suffer more from the intensive fishing than the shrimps themselves, because of their bigger size and slower growth. These vulnerable fishes do not survive the catch by a shrimper. If bad weather makes fishing impossible for one or more days, catches are so much higher in the following days that the landings over a longer period (e.g. a month) are not influenced. The intensity of the fishing is also well demonstrated by the decrease in catches from Monday till Friday during a week with favourable weather conditions. During some days of rest, the decimated stock on the fishing grounds is replenished by shrimps from places where fishing is not possible (f.i. shallows).

Literature

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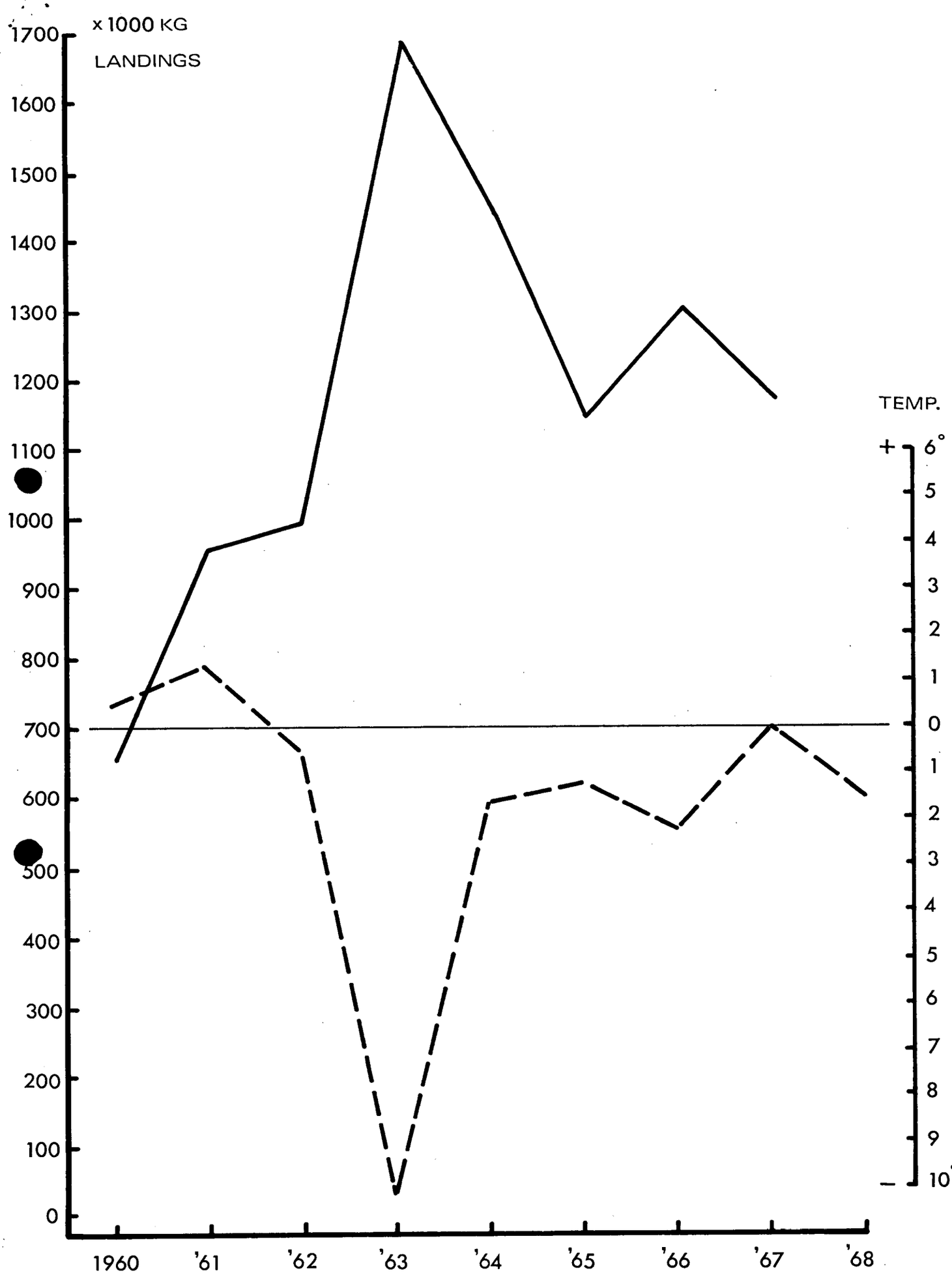
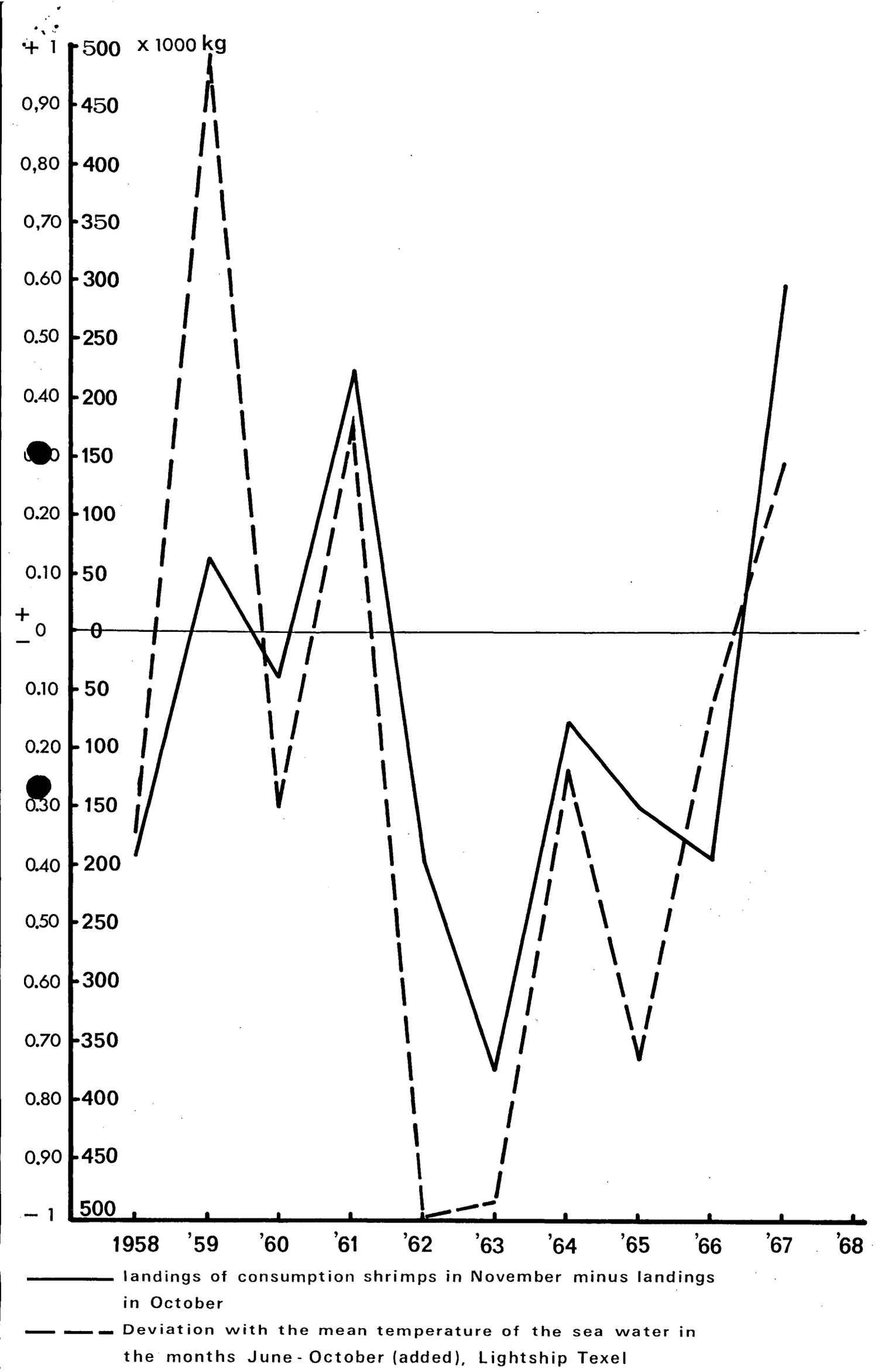


total landings of consumption shrimps in October

Deviation with the mean temperature of the sea water in January and February (Lightship Texel)


x 1000 kg
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0,70
0.60
0.50
0.40
0.20
0.10
+
− 0
0.10
0.20
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1958
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'68
landings of consumption shrimps in November minus landings in October
Deviation with the mean temperature of the sea water in the months June - October (added), Lightship Texel