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TRANSLATION

TANNER CRAB SURVEY IN THE BERING SEA BY SCIENTIFIC RESEARCH VESSEL, 1981

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The tanner crab survey by the Japanese research vessel in 1981 was conducted by the R/V Wakatake maru as in 1980. The first cruise from May 16 to June 13 was completed but the second cruise projected from July 19 to August 17 was cancelled because of an accident to the vessel.

In the first cruise, a trawl survey was conducted at 76 stations in the main fishing area; the west region of the area north of 58°N and neighboring areas. East of these survey stations to 168°W, where small-sized C. opilio were abundant, a survey was conducted at five stations. Research was also conducted at 20 stations in the area south of 58°N in 1981 (Fig. 1).

The survey area in the west region was reduced from that in 1980 because two survey stations in the northwest area were excluded in 1981. Preliminary experiments were conducted occasionally in order to obtain estimates of sampling efficiency of pots. In the survey area, oceanographic observations were also made.

At each survey station, a trawl survey was conducted to obtain information on distribution, quantities, growth and maturity, etc., of crab. The compilation and analyses of the survey data are in progress and preliminary results are reported here.

Distribution and species composition of crabs

The number of crabs caught per 30-minute trawl haul at each station, by species, by sex, and by size are shown in Figs. 2-1 to 2-6. The data show that small-sized male C. opilio (less than 100 mm carapace width) and female C. opilio were widely distributed in the survey area north of 58°N. The main areas of distribution of small-sized males were east and north of St. Matthew Islands and north of the Pribilof Islands, and the western end of the east region. Female crab were abundant in the deep water side of the area of distribution of large

male crabs as well as in the areas of small-sized male. In contrast, large-sized male C. opilio (carapace width of 100 mm and greater) were distributed in the western part of the survey area. However, the areas of main distribution were in the west region from 58°N to 59°N and the western end of the east region.

Abundance of large males in 1981 appeared to be lower in the area north of 59°N and higher in the area between 58°N and 59°N, compared with that in 1980. Male and female C. bairdi were restricted primarily to the western region and the main area of distribution was in waters near the edge of the continental shelf.

The percentage occurrence of male C. bairdi in tanner crab populations in the west region by size is shown in Table 1 which is based on the May to June trawl surveys of 1979 to 1981. From the table we can see that the proportion of C. bairdi continued to increase in 1981. The proportion of male C. bairdi under 100 mm carapace width continued to increase slightly while male C. bairdi with carapace width of 100 mm and greater constituted about 60% and became dominant over C. opilio which had been dominant in surveys of 1979 and 1980. C. opilio continued to be dominant in the east region in 1981.

Carapace width composition

The carapace width composition of male tanner crab in trawl surveys in the west region in 1979, 1980, and 1981 is shown in Fig. 3. In male C. opilio, the abundance of crab with carapace width between 60 mm and 100 mm was between that of 1979 and 1981 while crabs larger than 100 mm in 1981 showed a similar trend to that in 1980.

In male C. bairdi, a remarkable change in carapace width composition was observed from 1980 to 1981 following the change from 1979 to 1980. A flat peak in the distribution occurred at 70 to 90 mm in 1981

whereas the peak in 1980 was at 70 to 80 mm and located at 50 to 60 mm in 1979. A portion of male C. bairdi with a peak at 70 to 80 mm in 1980 must begin to be recruited into the commercial sized group with carapace width of 100 mm and greater.

Abundance estimates

The vulnerability of the survey gear, which is indispensable for obtaining estimates of population abundance, was studied in 1979 and 1980 under a joint Japan-U.S. survey program using the ATA method (alternate tail attack method). A value of 0.555 was estimated as the vulnerability of the Japanese survey trawl gear from the results of tagging experiments conducted in 1980 independently by Japanese scientists. The figure 0.555 is considered to have more accuracy than the figure 0.345 which was originally used in the surveys in 1979 and 1980. Thus, the figure 0.555 was used for the 1980 survey (Fujita and Takeshita 1981).

The estimate of abundance of male crab with carapace width of 100 mm and greater in the west region was made as follows. The catch of crab in numbers for each unit area subdivision of the 400 square miles used in 1980 was calculated from the trawl catch at each station and the area swept by the trawl gear for the tow and multiplied by the vulnerability factor mentioned above to obtain a final estimate of abundance.

In 1979 and 1980, the estimated numbers taken in the commercial catch through May (carapace width of 100 mm and greater) were added to the estimated abundance of large males at the beginning of the season (Table 2).

The abundance estimate for the west region in 1981 might be underestimated because the two areas where crab were abundant in 1979 and 1980 were excluded from the survey area in 1981 but even with such

an assumption, the estimated abundance of large male C. opilio in the west region at the beginning of the season was approximately 17.3 million crabs. This figure was almost the same as the 19.7 million estimated in 1980. On the other hand, the estimated abundance of large male C. bairdi with carapace width of 100 mm and larger, at the beginning of the season, was 3.2 million in 1979, 7.1 million in 1980, and 27.7 million in 1981, a remarkable increase in each of the past two years. The 27.7 million estimated for 1981 was almost four times that of 1980.

Large male tanner crab with carapace width of 100 mm and larger are also distributed in the east region. The abundance estimate of large male tanner crab with carapace width of 100 mm and larger in the whole survey area north of 58°N in 1981 was 55.4 million C. opilio and 45.1 million C. bairdi.

As mentioned above, when comparing the size composition and abundance of male tanner crab of the west region in 1981 with that in 1980, there was no great difference in C. opilio but there was a remarkable difference in C. bairdi. In particular, an increase of large C. bairdi with carapace width of 100 mm and larger was considered to have occurred as a result of recruitment of a portion of the size group which had a peak at 70 to 80 mm in 1980. We can, therefore, expect much more recruitment in 1982. The results of the 1980 survey showed that the area of distribution of large male C. opilio with carapace width of 100 mm and larger was extended to the east region, and the 1981 survey showed similar results for C. bairdi as well as C. opilio. This result suggests that fluctuations of abundance in the west region will be under some influence of the abundance in the east region. It is preferable, therefore, that survey programs in the future be conducted in the east region in the same systematic manner as in the west.

References

Fujita, Hitoshi and Koji Takeshita. 1981. Estimation of vulnerability of survey trawl gear by tagging experiments. Unpublished MS.

TABLES 1 AND 2 AND FIGS. 1 TO 3 ARE IN ENGLISH IN THE JAPANESE DOCUMENT

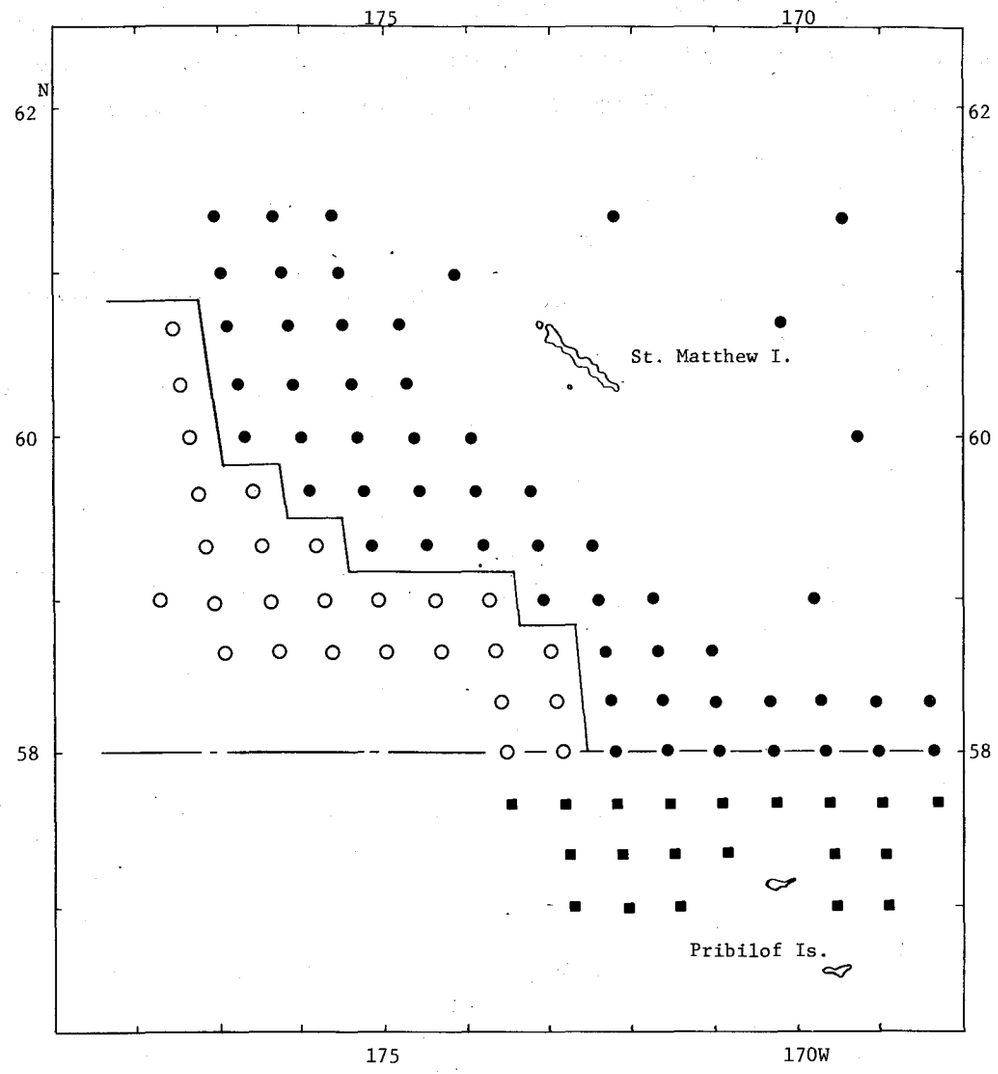

Fig.1 Survey stations of R/V Wakatake maru in May-June, 1981

○ Stations for West region
● Stations for East region
■ Stations for south of 58°N

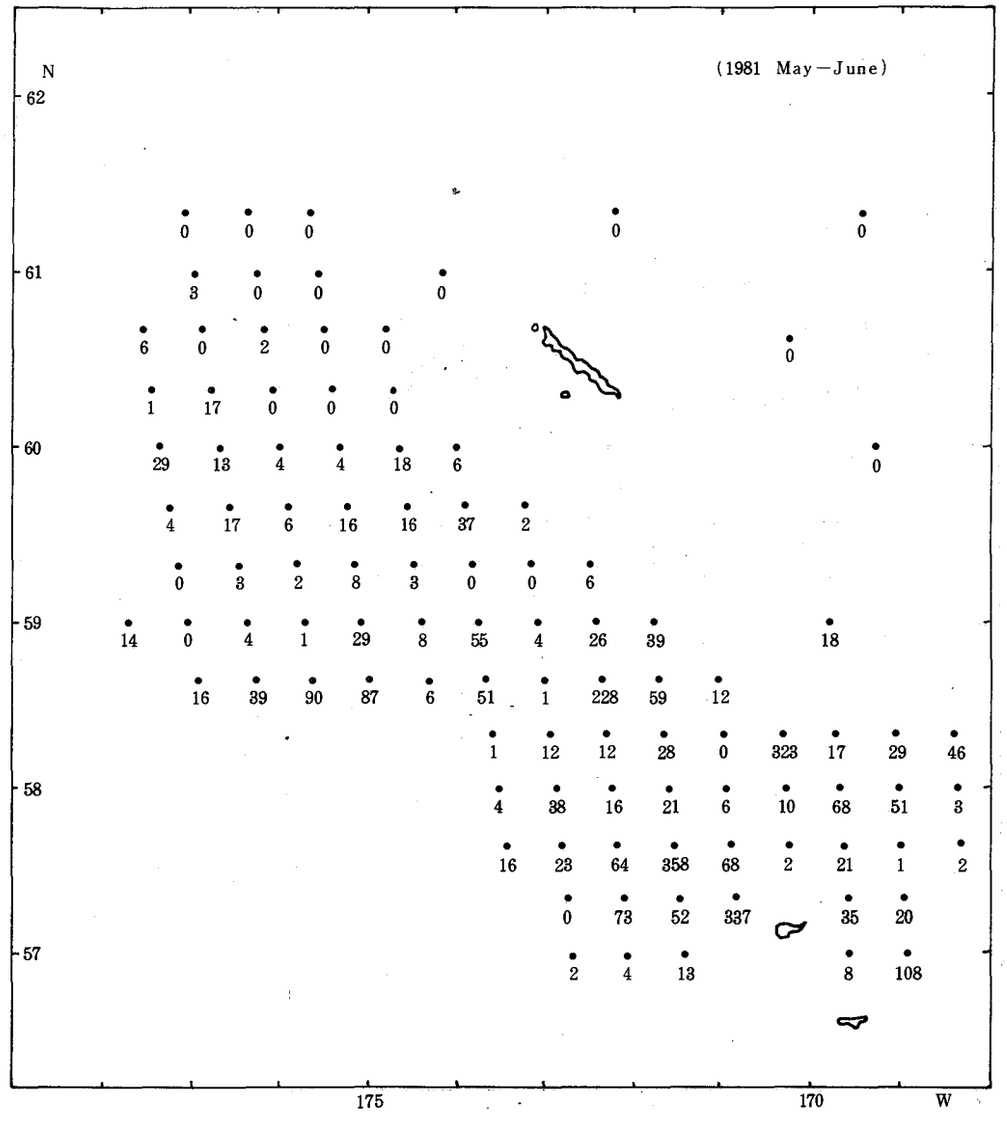

Fig. 2—1 Number of large sized (≧100㎜) male C. opilio caught per tow

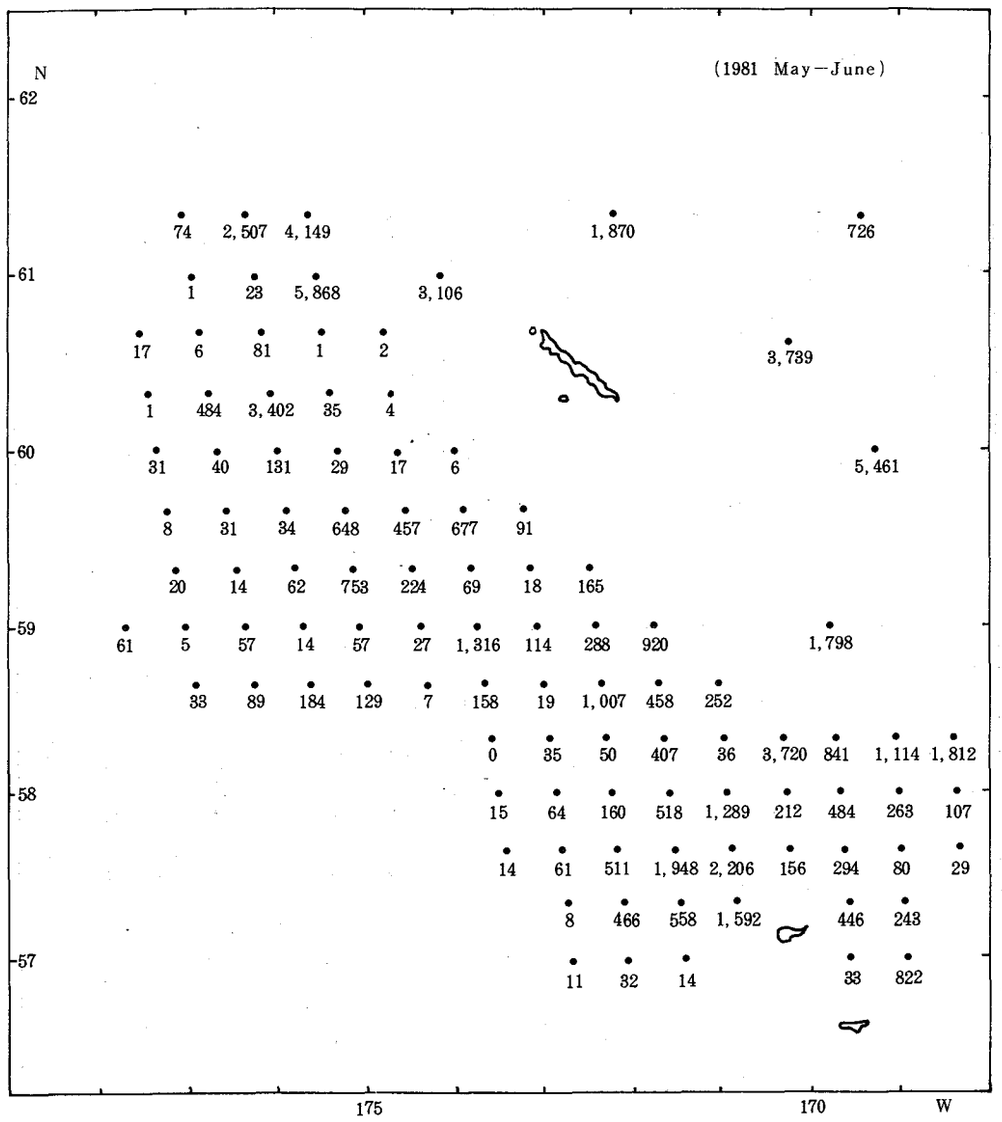

Fig. 2–2 Number of small sized (< 100 mm) male C. opilio caught per tow

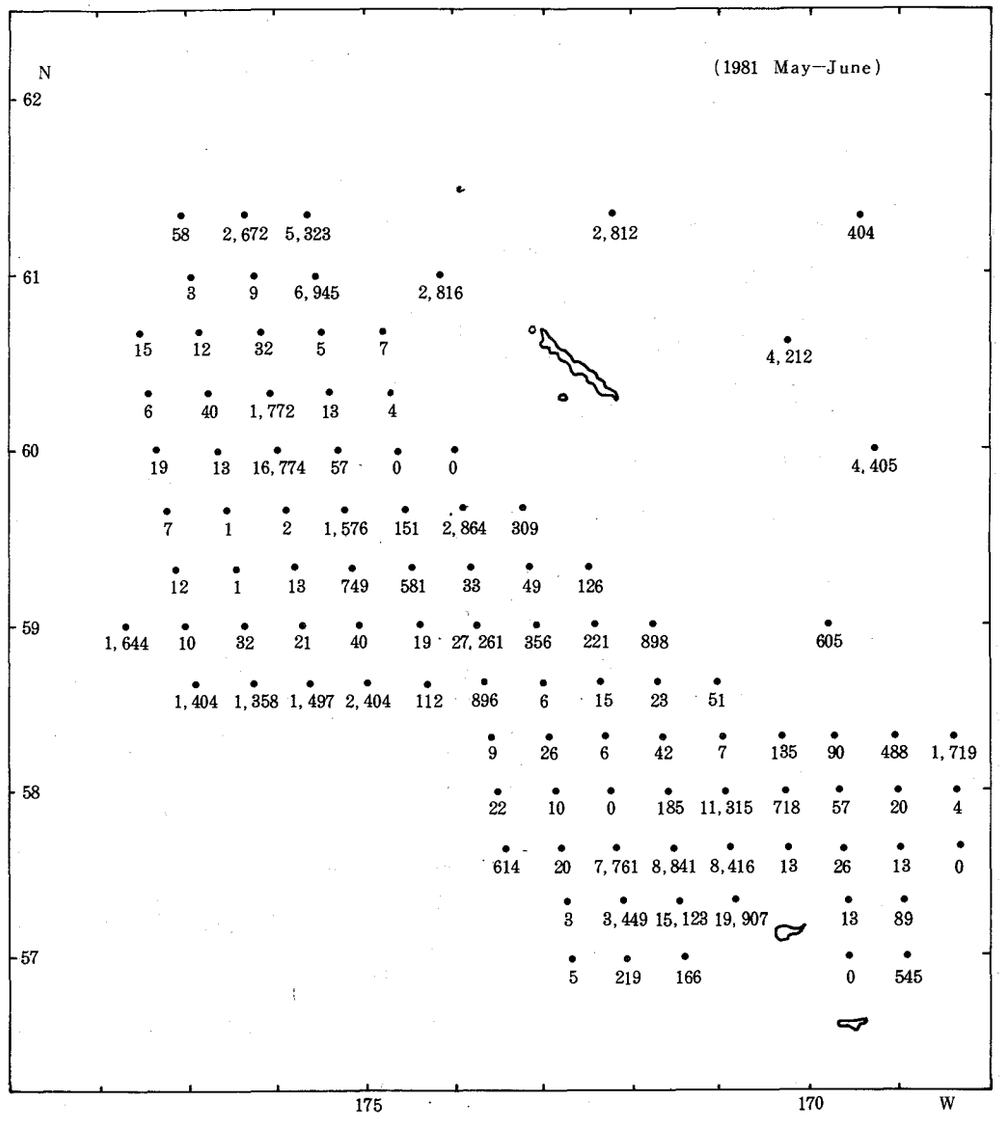

Fig. 2–3 Number of female C. opilio caught per tow

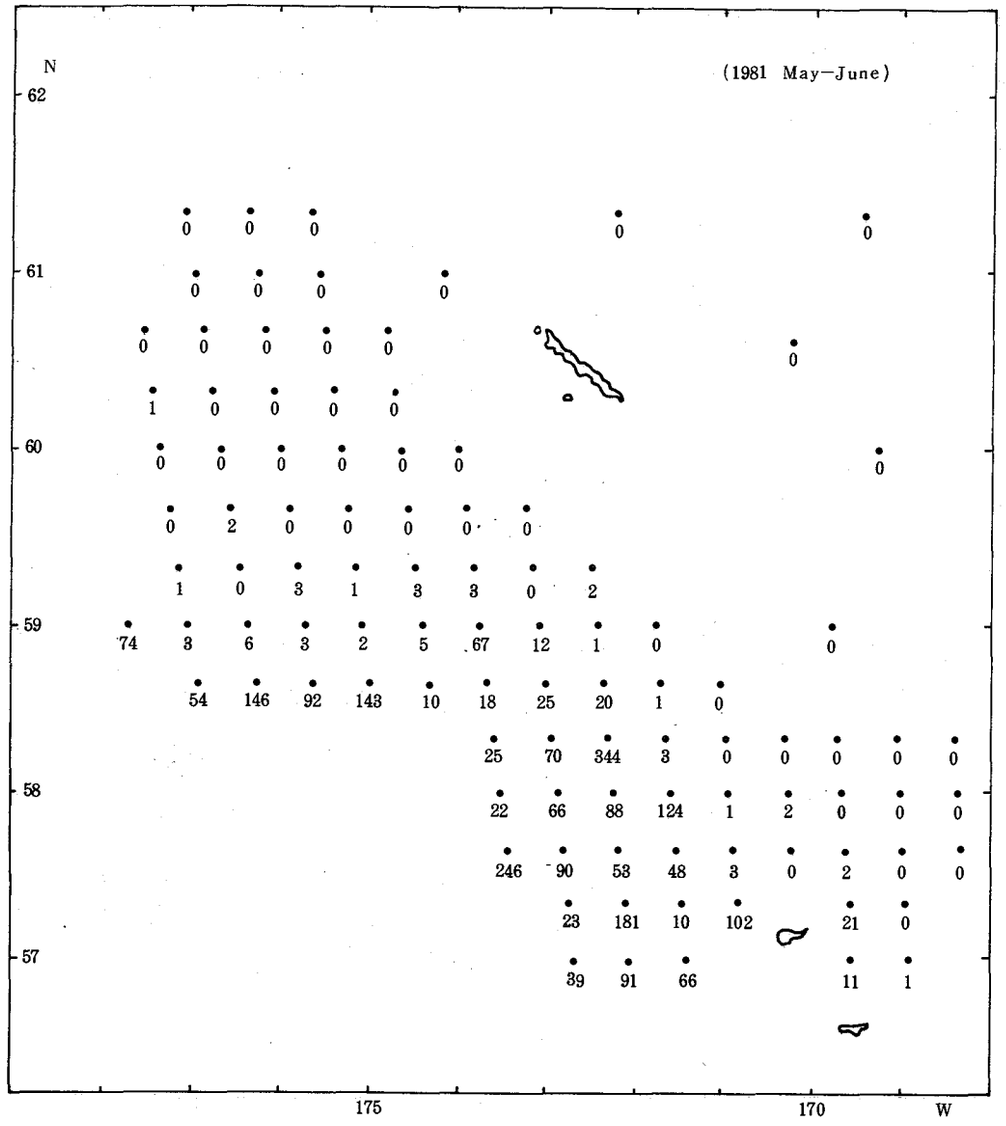

Fig. 2–4 Number of large sized (≧100 ㎜) male C. bairdi caught per tow

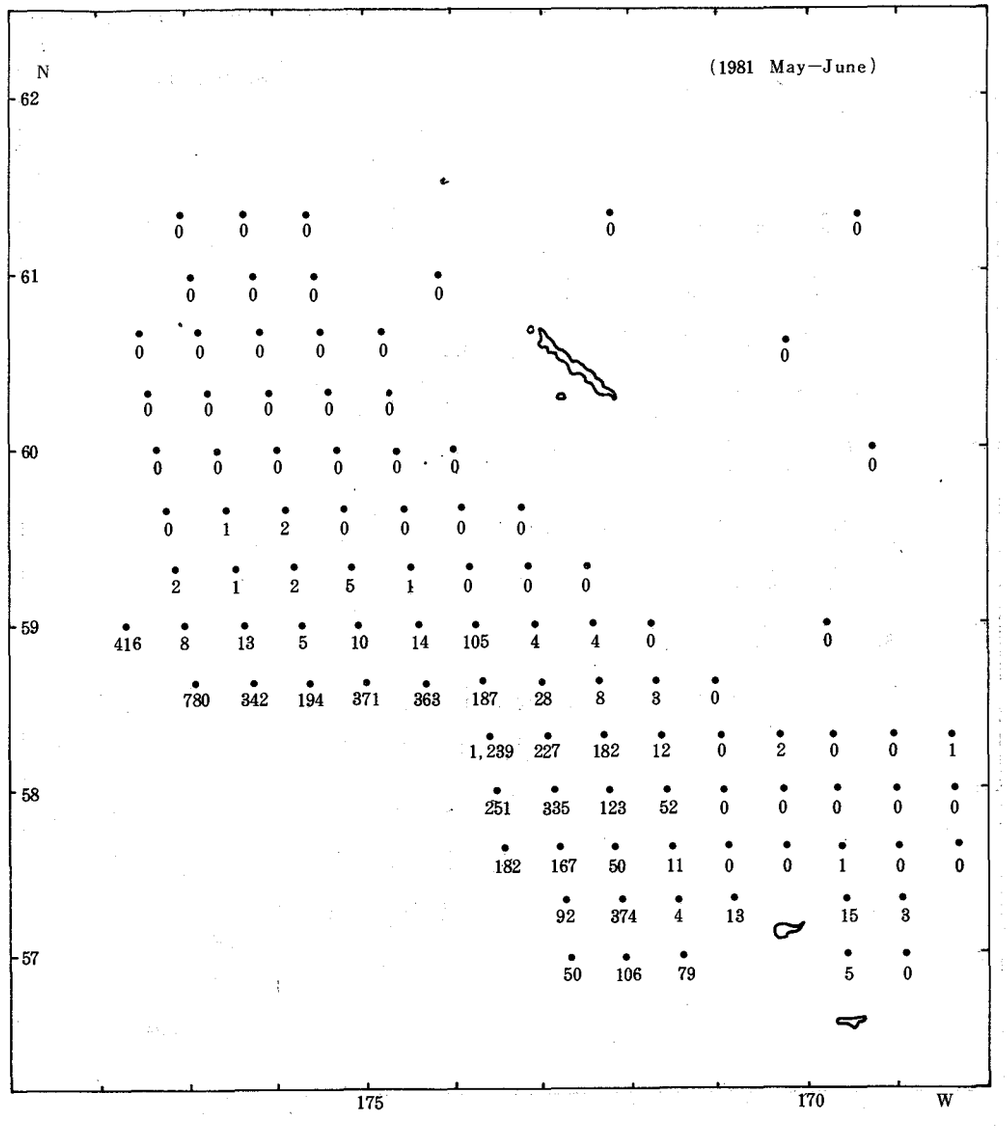

Fig. 2–5 Number of small sized (< 100 ㎜) male C. bairdi caught per tow

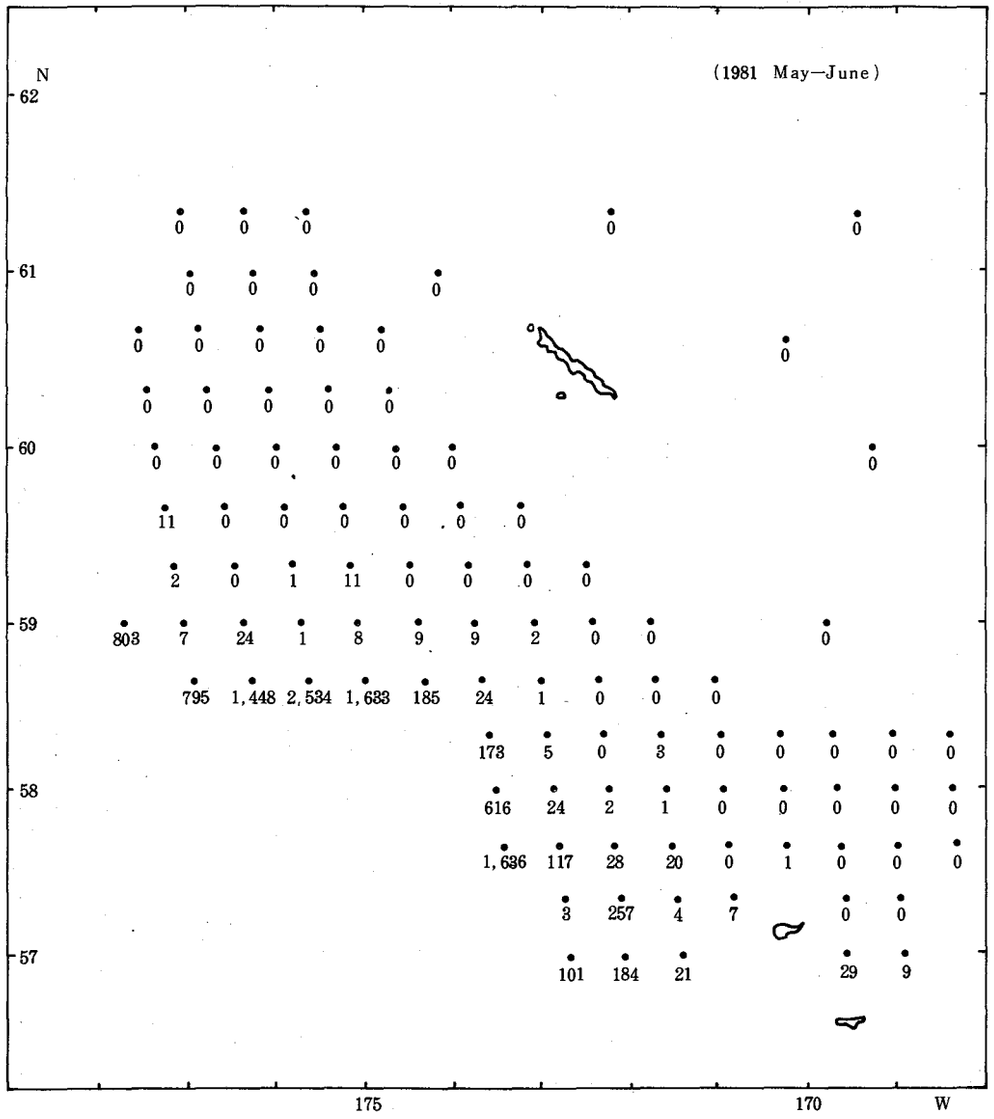

Fig. 2—6 Number of female C. bairdi caught per tow

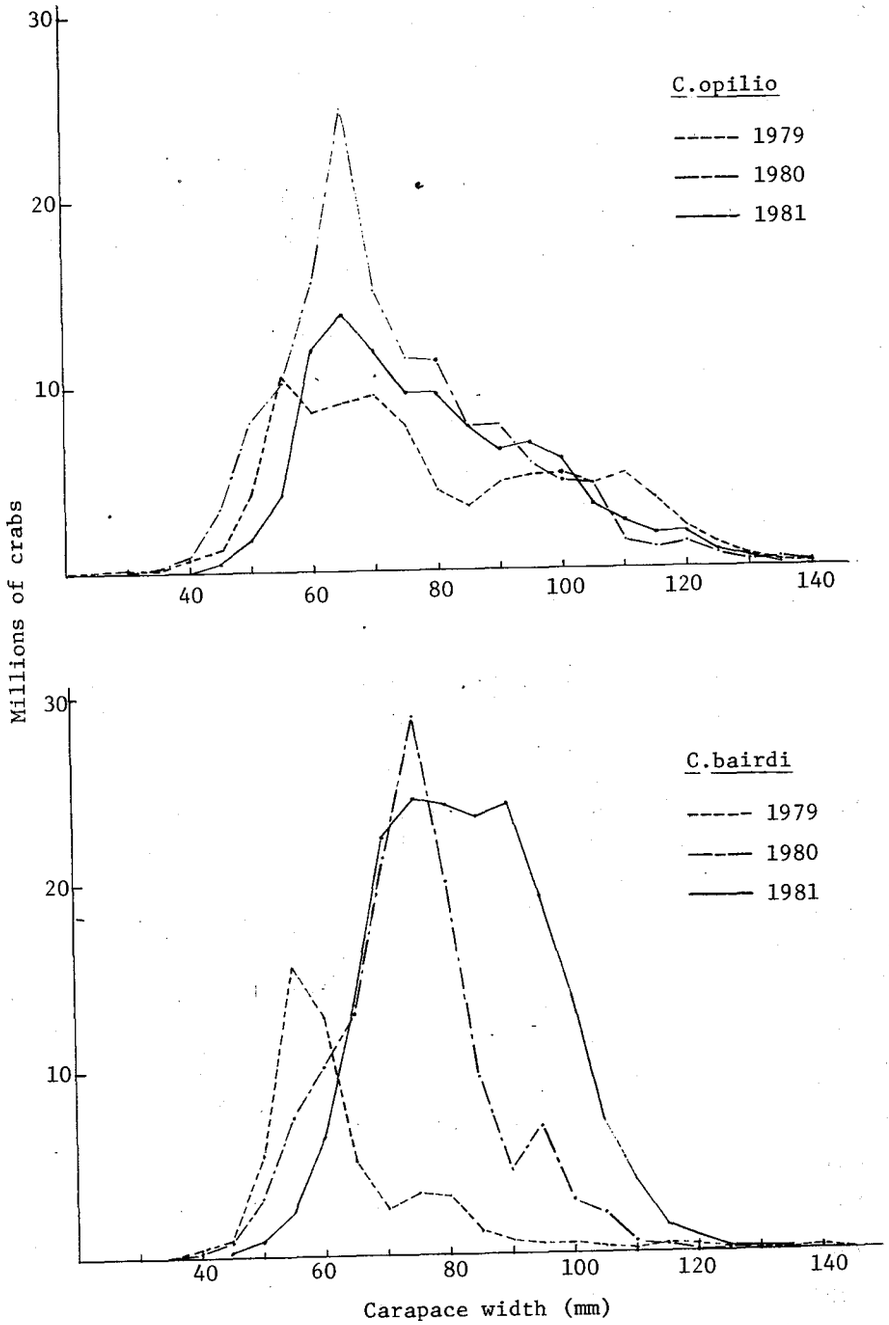

Fig.3 Carapace width composition of tanner crabs, based on trawl survey, north of 58°N (west region shown in Fig.1). Crab abundance is estimated at 0.555 of vulnerability

Table 1. Occurrence of C.bairdi for different size groups of male in the West region*, based on May-June trawl surveys, 1979-1981

Carapace width	1979	1980	1981
mm	%	%	%
< 80	46.9	48.9	56.6
80-99	24.6	55.7	74.8
≧100	9.3	30.1	61.5

* See Fig.1

Table 2. Abundance estimates (millions of crabs) for male tanner crab, ≧100mm width, in the trawl survey area*

Year	Abundance estimate**	Commercial catch through May	Population size at beginning of season
C.opilio			
1979	23.4	8.7	32.1
1980	15.1	4.7	19.8
1981	17.3	0	17.3
C.bairdi			
1979	2.4	0.8	3.2
1980	6.5	0.6	7.1
1981	27.7	0	27.7

* West region, see Fig.1

** Estimates at 0.555 of vulnerability