International Commission for the Northwest Atlantic Fisheries

Serial No. 5346

ICNAF Res. Doc. 79/II/20

SPECIAL MEETING OF STACRES - FEBRUARY 1979

Estimation of the *Illex* Biomass on the Edge along the Scotian Shelf, 1978

by

T. Nagai and S. Kawahara
Far Seas Fisheries Research Laboratory
1000 Orido, Shimizu 424, Japan

Japanese squid fishery off Canada for 1978 expanded greatly because of quota arrangement between Canadian and Japanese fishing industries. Japanese squid fishery covered almost all areas on the southern edge of the Scotian Shelf. The present report estimates Illex biomass by means of areal expansion method on the basis of haul-by-haul data reported from Japanese vessels.

Twenty one Japanese trawlers operated mainly directing squid for July-November, 1978, along the slope of continental shelf in subarea 4 and a part of subarea 3. These operations were carried out under the quota allocated to Japan (4500 tons) and a part of the Canadian quota (23,250 tons). Since the majority of the catches were from subarea 4, haul-by-haul data from 19 vessels operating in this area were used to calculate CPUE values by the following 8 categories : month , time period of a day (every four hours), division , depth zone (12 zones), quota (two different type of quota), company (5), tonnage class (5), and type of gear (2).

Within each of five categories, namely, time periods of a day, quotas, companies, tonnage classes, types of gear, the ratio of the CPUE values of various strata to that of the designated standard are calculated.

a) time periods of a day

Changes of CPUE by the time periods indicate that regardless months, tonnage classes and types of gear, CPUE are highest in early morning from 4 to 8 hours. In day time hours from 8 to 20, values are still high but droppes to about 1/8 of those in early morning during night time (Fig. 1). Therefore, all of the night operations are excluded and the CPUE values in every four hours from 8 to 20 hours are adjusted on the vasis of those in early morning.

b) quotas

In both cases of the off-bottom and the bottom trawls, no significant differences are observed between the Japanese quota and the Canadian quota (Fig.2).

c) companies

Significant differences in CPUE values between campanies are observed only in the off-bottom trawl gear of 1500 tons vessel class. However, no significant difference between different companies are found in any tonnage class and type of gear (Fig.3).

d) tonnage classes and types of gear

These two categories are combined and treated together. No difference are observed in CPUE between gears within any tonnage class but significant difference between tonnage class within any type of gear (Fig.4). The CPUE values, therefore, by type of gear and tonnage class are calculated in the term of relative value when the CPUE by off-bottom gear of 2,500 tons class is designated as unity.

CPUE values thus standardised within each category are again recalculated by conversion factors bewtween categories when the CPUE value by off-bottom gear of 2,500 tons vessel is designated as unity. These calculated values are listed on Table 1.

Based on these ratios shown on Table 1, original catch data are standardized and the adjusted CPUE values are calculated. Area by fishing block (30' square) and by depth are calculated by planimeter on the following four charts: L-8007, L-8008, L-4012 and Professional Paper 529-C.

In the off-bottom trawl gear of 2,500 ton class vessel, used as the standard, the average distance between wing net are 26 m and the speed of towing is usually 3.5 knots. Therefore, area of 0.049 square miles are covered by one hour haul. All squids in the area covered are assumed to be caught.

Based on standardized CPUE by fishing block and depth, area covered by one hour haul and area by depth by fishing blocks, squid biomass are estimated by month. The results are shown in Table 2, together with cerresponding area.

The fishing grounds covered by Japanese squid fishery for 1978 are depicted in Fig. 5. The fishing grounds covered are about 60-200 fathoms in depth. The total area with this depth range is 6,776 square miles which is about 7 times wider than the area where biomass are estimated. Therefore, estimated values of biomass given in Table 2 are fairly underestimated because wider area on the southern edge of the Scotian Shelf are not taken into calculation.

Table 1. Conversion factors in terms of relative values of cpue for the estimation of standing biomass of Illex.

1) Concerning the time periods of a day

Time interval	00-04	04-08	08-12	12-16	16-20	20-24
Conv. factor	-	1.00	0.87	0.62	0.48	-

2) Concerning tonnage class, gear, company and quota

Tonnage	Gear	Comp.	Quota	Conv.factor	Tonnage	Gear	Comp.	Quota	Conv.factor
500	OBT	03	JAPAN	0.40	1500	OBT	04	JAPAN	0.99
500	OBT	03	CANADA	o.40	1500	OBT	04	CANADA	0.99
500	BT	03	JAPAN	0.52	1500	BT	01	JAPAN	0.61
500	BT	03	CANADA	0.52	1500	BT	01	CANADA	0.61
1000	OBT	03	JAPAN	0.73	1500	BT	02	JAPAN	0.61
1000	OBT	03	CANADA	0.73	1500	BT	02	CANADA	0.61
1000	OBT	04	JAPAN	0.73	1500	BT	03	JAPAN	0.61
1000	OBT	04	CANADA	0.73	1500	BT	03	CANADA	0.61
1000	OBT	05	JAPAN	0.73	1500	BT	04	JAPAN	0.61
1000	OBT	05	CANADA	0.73	1500	BT	04	CANADA	0.61
1000	BT	03	JAPAN	0.63	2000	OBT	02	JAPAN	0.96
1000	BT	03	CANADA	0.63	2000	OBT	02	CANADA	0.96
1000	BT	04	JAPAN	0.63	2000	BT	02	JAPAN	1.03
1000	BT	04	CANADA	0.63	2000	BT	02	CANADA	1.03
1000	BT	05	JAPAN	0.63	2500	OBT	01	JAPAN	1.00
1000	BT	05	CANADA	0.63	2500	OBT	01	CANADA	1.00
1500	OBT	01	JAPAN	o.44	2500	OBT	05	JAPAN	1.00
1500	OBT	01	CANADA	0.44	2500	OBT	05	CANADA	1.00
1500	OBT	02	JAPAN	0.99	2500	BT	01	JAPAN	0.82
1500	OBT	02	CANADA	0.99	2500	BT	01	CANADA	0.82
1500	OBT	03	JAPAN	0.99	2500	BT	05	JAPAN	0.82
1500	OBT	03	CANADA	0.99	2500	BT	05	CANADA	0.82

OBT: Dangling chain off the bottom trawl, BT: Bottom trawl

Table 2. Estimated standing biomass of Illex on the southern edge of the Scotian shelf.

Depth zone (fathom)	July		Aug.		Sept.		Oct.	
	Area*	Biomass**	Area*	Biomass**	Area*	Biomass**	Area*	Biomass**
60 - 100	764	7604	356	14495	482	18758	880	13839
100 - 200	369	5781	461	18844	353	24093	415	15518
Total	1133	13385	817	33339	835	42851	1295	29357

*: Areas fished by Japanese trawlers ($mile^2$)

**: Standing biomass estimated (metric ton)

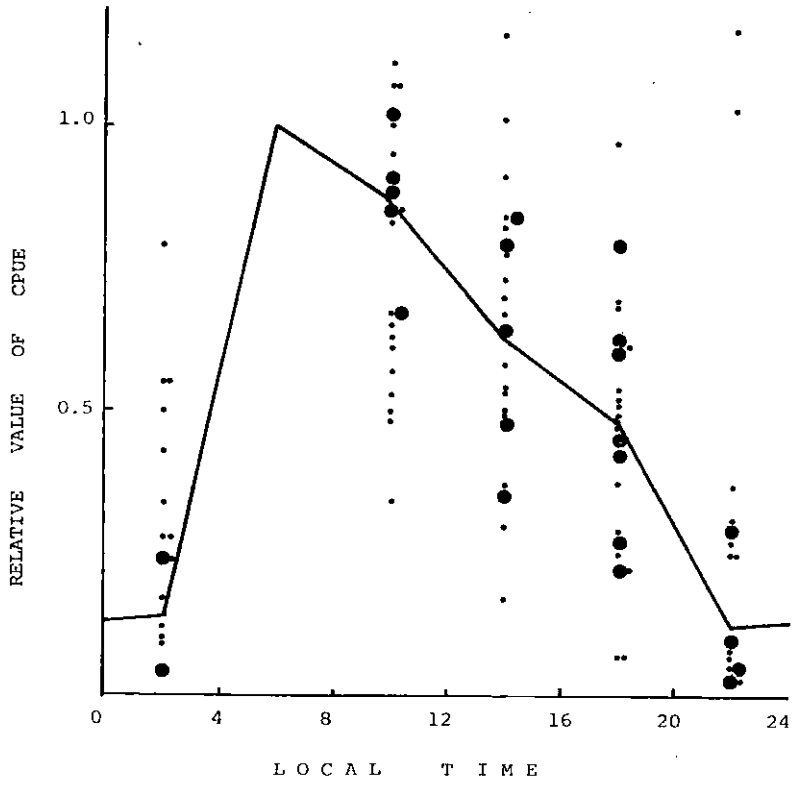
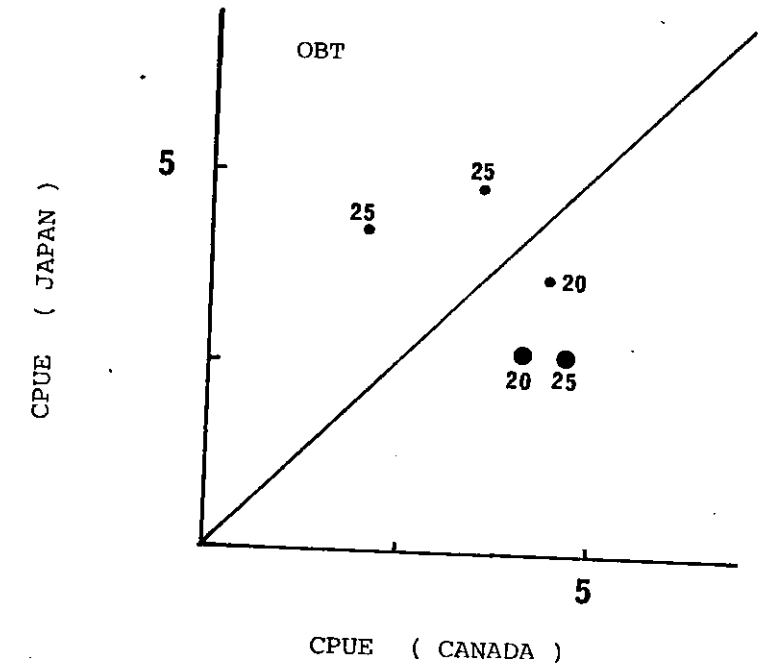


Fig. 1. The diurnal variation of CPUE.

(Hours fished: • ; 20 - 40, ● ; > 40)



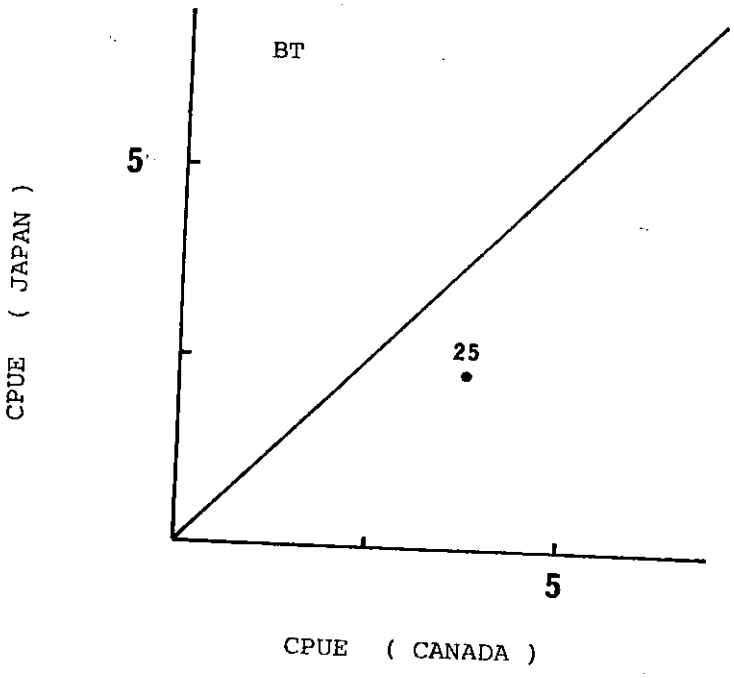


Fig. 2. Relationship between the cpue (tons/hours fished) under the Canadian quota and the cpue under the Japanese quota. Numerals in the figure represent the tonnage class (10^2ton) of the vessels analized.

(Hours fished: • ; 20 - 40, ● ; > 40)

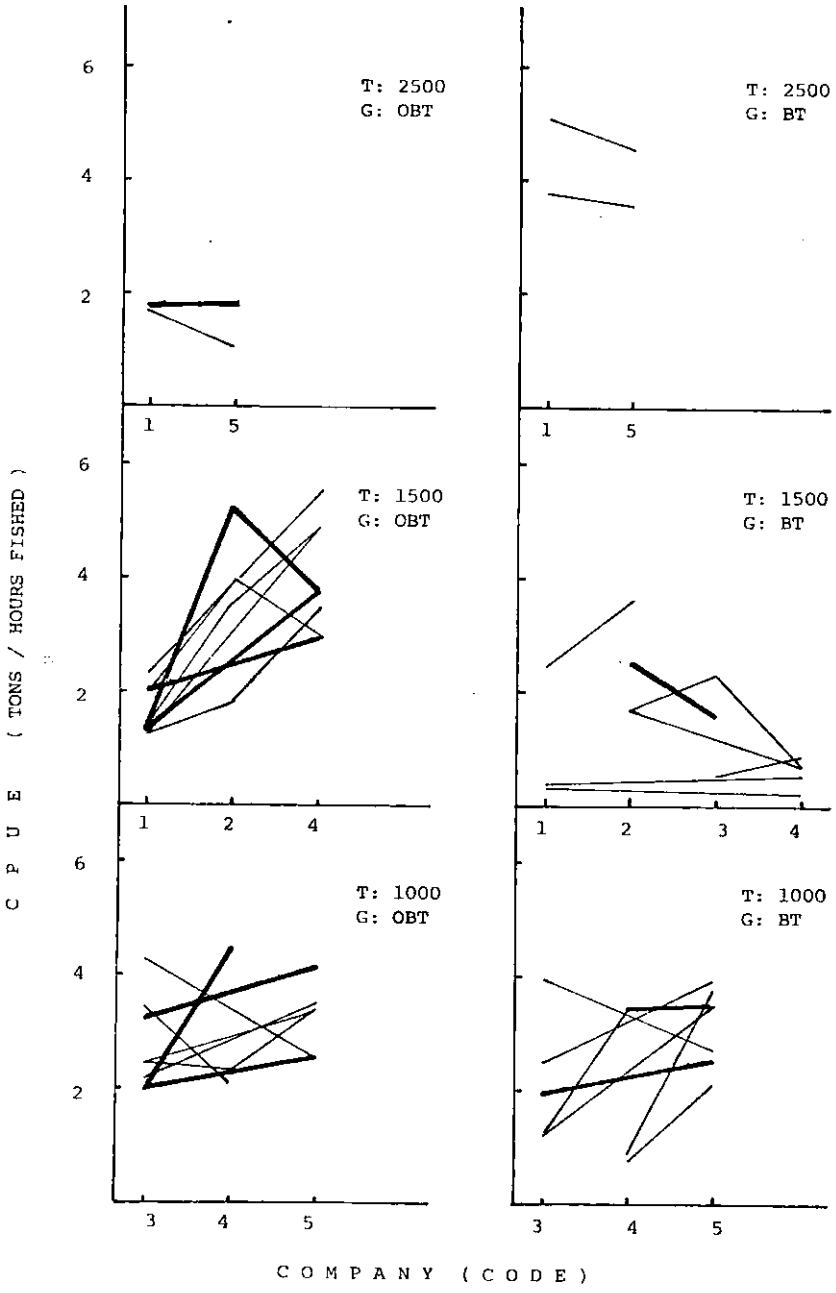


Fig. 3. Comparison of the cpue values among the companies by tonnage class (T) and type of gear (G). (Hours fished: — ; 20 - 40, —; > 40)

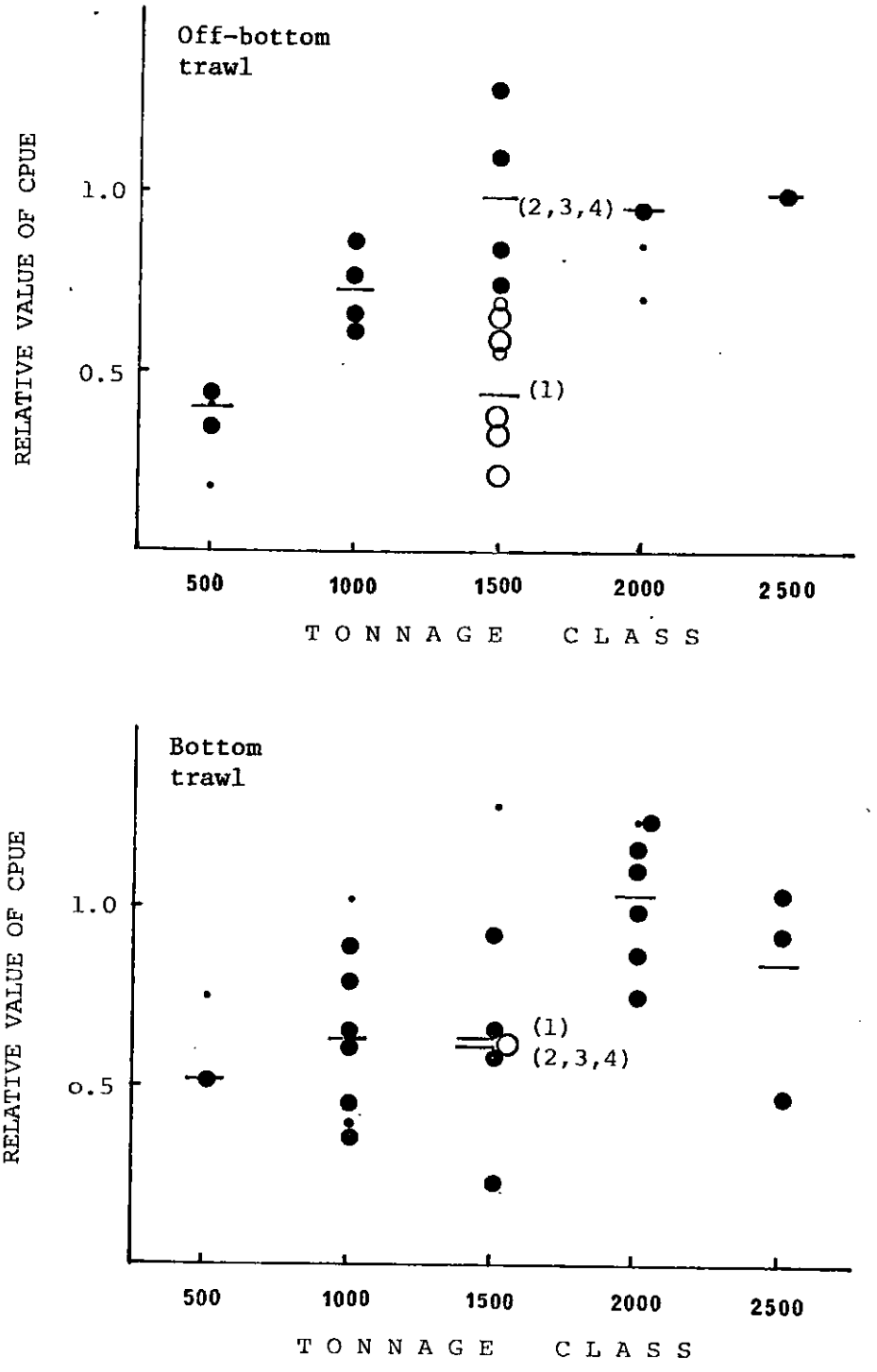


Fig. 4. Relative value of the cpue by tonnage class and type of gear (The cpue for the off bottom trawler of 2500 tons class is designated as unity. The lines represent average values, and the numerals in parentheses indicate the code No. of companies. (Hours fished: •; 20 - 40, ●; > 40)

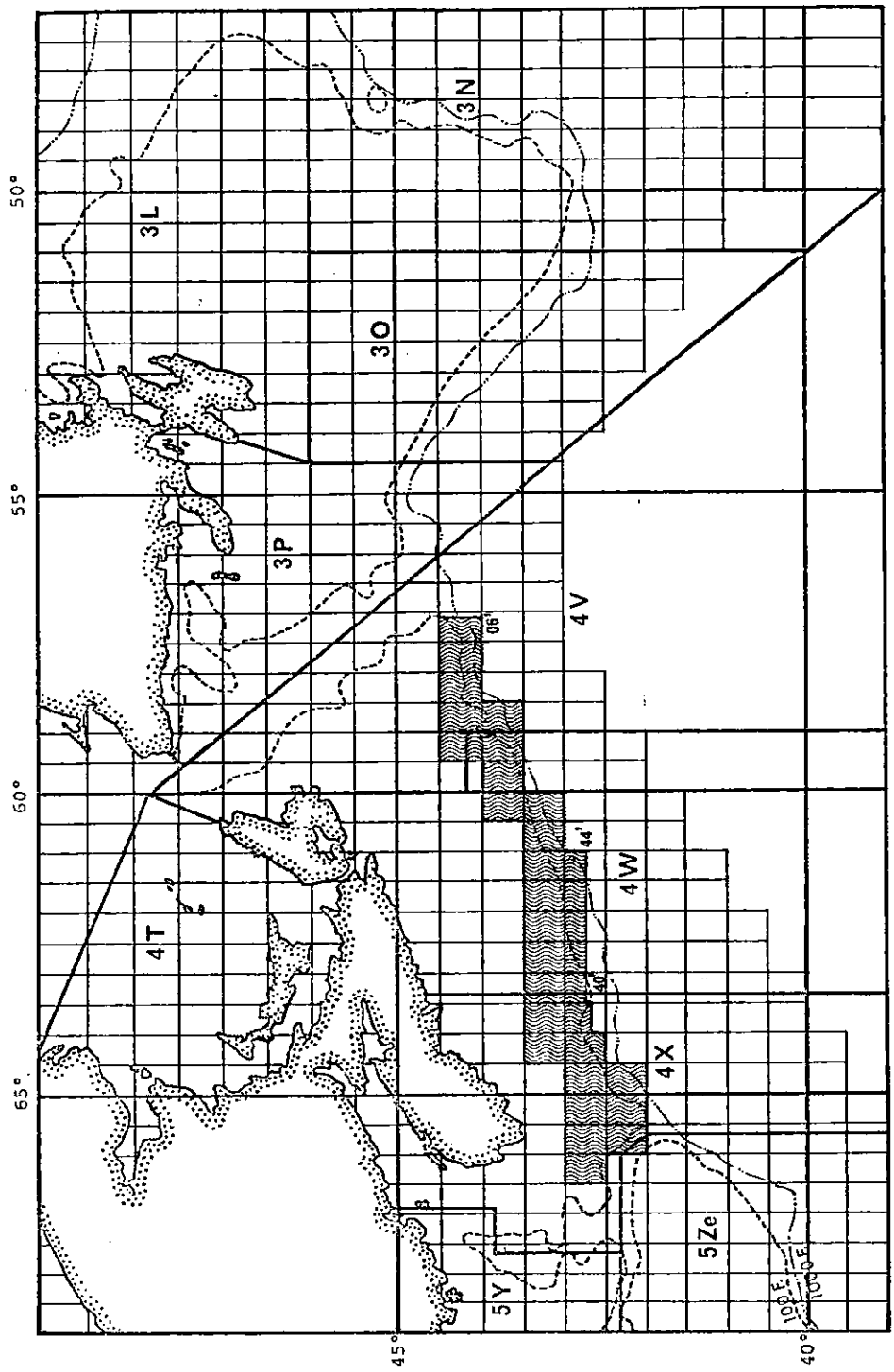


Fig. 5. Range and locality of fishing grounds, shown in half-a-degree square blocks, for Japanese squid fishery in 1978.