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Preliminary Results of a Joint International Observer Program  
to Evaluate the Silver Hake Small Mesh Gear Line in ICNAF Division 4VWX

by

D. E. Waldron  
Fisheries and Oceans Canada, Fisheries and Marine Service  
Marine Fish Division, Bedford Institute of Oceanography  
Dartmouth, Nova Scotia, Canada

INTRODUCTION

A continuation of the 1977 International Observer scheme was initiated in April 1978. A more detailed program was established with the main objectives clearly defined. It was the intent of both Canada, the U.S.S.R. and Cuba to establish the significance of the small mesh gear live as a regulatory measure for the management of the Scotian Shelf Silver hake (Merluccius bilinearis, Mitchell) fishery.

Analysis of 1977 data indicated that a higher level of coverage as well as increased emphasis on methods of sampling was required (Waldron, 1977 a, b). Concern was also expressed by Cuban and U.S.S.R. scientists that the current Canadian by-catch regulations were biasing the results. In response to this matter Canada removed these regulations from all vessels participating in the research program.

This paper outlines the research program conducted jointly between Canada, U.S.S.R. and Cuba during 1978.

MATERIALS & METHODS

The joint program of observation commenced in early April on U.S.S.R. vessels and three weeks later on Cuban vessels. Four vessels from each fleet carried two observers, one from the participating Country and one from Canada. Each Canadian observer remained at sea for an average of three (3) weeks after which he was replaced by a new observer. This meant that there was a gap in joint sampling for a period of one (1) to two (2) days per month (Table 1). During the interim, both the Cuban and the Soviet observer continued the agreed sampling procedures.

The catch data was collected on a set by set basis with species sampling done once a day. The time of sampling alternated between day and night as well as species. It was originally agreed by all Countries to sample every species caught during the set which was sampled. However, new Canadian observer requirements did not permit this in every instance.

Samples consisted of length measurements and otolith procurement from all groundfish species. In addition, for selected species, gonad samples were taken as well as one hundred (100) detailed squid morphology samples and where possible one hundred (100) frozen squid per week were transported to the regional laboratory. The length and otolith sampling techniques used were modified from those suggested by both the U.S.S.R. and Cuba. Essentially,

the method is designed to assist in estimating the catch composition of all species as well as providing random samples for length and age determinations. As previously indicated, it was not always possible to obtain the former objective due to time constraints and other observer responsibilities.

The method employed require that the observers have some degree of access and control over the conveyor belt(s) emptying the bunker(s).

#### SAMPLING METHOD

1. Three independent samples, each of a predetermined volume, are taken from the conveyor belts before sorting. The method employed was to fill a constant length of conveyor belts with fish which are being mechanically removed from the bunker.

If at the time of sampling, the species being removed by the belt were large (i.e. pollock or cod), then a larger area would be used in order to obtain a sufficient number for adequate sampling.

2. To randomize the sampling, the three samples are taken at equally spaced intervals throughout the processing of the set. The ability to judge the time of sampling is dependent upon knowledge of the estimated catch quantity, catch composition and average processing rate for the species captured. This requires familiarity with the vessel's operations.

3. Each of the three samples are separated by species and the total weight of each is recorded. A random sample of lengths and otoliths, if necessary, of a particular pre-designated species are taken. Determination is dependent upon the amount of previous sampling of this species in relation to all species.

4. The selected species sample is then measured and two (2) otoliths per cm. group and removed (stratified random sampling).

#### RESULTS AND DISCUSSION

The sampling coverage obtained in 1978 surpassed that of 1977 due to an increase in the number of observers available to the program (Table 1 and, Waldron 1977 b). However, the inability of the observers to sample all species, for lengths and otoliths, from one set did not permit a detailed evaluation of the observer's ability to estimate species catch compositions. This estimation procedure presented few problems on most vessels, except when the bunkers contained catches from more than one set. In this situation, no sampling was conducted and catch compositions were estimated from the net before dumping or copied directly from the Captain's log.

A joint Canada-Cuba study to evaluate this sampling procedure as a method for analysing catch compositions was conducted in July 1978. Results have not been fully analysed but they indicate that the method is quite adequate but very time consuming. It is best done in a "two man" operation and provides a method of estimating compositions when the processing techniques do not allow recording of the amount of fish processed per set (Waldron & Hurley trip report, 1978).

#### DIRECTED FISHERIES

The evaluation of the mixed fisheries for both Countries require some definition of a directed fishery. This term connotes a purposeful concentration of effort towards one species. Observations of the International Scotian Shelf fishery has been that Squid and Silver hake populations are heavily intermixed and it is difficult to fish each one separately. If this is the case, the Countries licensed for more than one (1) species would be reporting their effort as mixed.

An assessment of any particular stock, in this situation, would present many obstacles unless a clearer definition was developed. Chikuni (1975) presented a graphical technique where by plotting c/f against % composition, it was possible to distinguish a clustering of points about some % composition. He hypothesized that if there was a true "directed" fishery, the clustering would occur over 60% composition and at the higher levels of c/f.

Such plots for argentine squid and silver hake indicate clustering near 80% squid and 60% for both argentine and silver hake. Subsequently, for the fishery then criteria account for the major proportion of the species catch (Table 4). These results (Argentine 64.6%, Squid 96.9% and silver hake 87.6%) re-affirm this definition of a directed fishery.

#### GENERAL FISHERY DISTRIBUTIONS

##### Silver hake (Merluccius bilinearis)

The Silver hake fishery was conducted mainly by Cuba (3468.6 M.T., 33.7% of the quota) and U.S.S.R. (43912.6 M.T., 84.4% of the quota while Bulgaria reported a catch of (1055.4 M.T., 30.2% of the quota) and Italy (107.7 M.T., 43.1% of the quota) contributed only 2.4% of the total reported catch. The fishery commenced in April and effectively ended in the middle of September. This is a typical pattern to other years and usually precipitates the departure of the major fleets from the Scotian Shelf (Waldron 1978).

The distribution of the Silver hake fishery is concentrated along the small mesh gear line (fig. 1). However, high catch rates are not limited to this area. The 1978 fishery, unlike 1977 had more activity and some of the highest catch rates outside (landward) of this line. A high intensity fishery was conducted in the Emerald and LaHave Basins. Similar fisheries occurred last year but not at the same level (Waldron, 1978).

If it is assumed that the fleet directs it's effort where the highest concentrations of a species is, then in 1978 the highest concentrations of silver hake were outside the small mesh gear line. 1978 Appears to be atypical in distribution (Clay, 1979). The usual pattern for the Silver hake fishery is inside (seaward) of the line as in 1977.

##### Squid (Illex illecebrosus)

The squid fishery commence at least one (1) to two (2) weeks after the June 15th opening date (Waldron, 1979). Speculation was expressed by many sources (i.e. Fleet Commanders & Captains) that a delay in the normal warming trends along the shelf were the cause. Some indications of the relationship between temperature and squid abundance are presented by Dufour (1979). Despite this slow start, 1978 was a successful year for the squid fishery. The total reported non-Canadian catches amounted to 27006.5 tons (Waldron, 1979). The overall catches, both Canadian and Foreign were in excess of 90,000 tons for ICNAF subareas 3 & 4.

Observations on all vessels using bottom trawl and fishing for Squid in 1978 have a similar distribution to observations in 1977 (Waldron, 1978). The major concentration of effort was inside the small mesh gear line between 100 - 250 meters in depth (Fig. 2). The majority of vessels operating in this fishery used bottom trawl with some Countries employing modified bottom gear.

Modifications consisted of; removing the rollers and leaving about .5 meters of chain or the use of Japanese chain gear with extended lengths of chain and the Japanese off bottom bobbin gear (Waldron & Gray, 1978). Midwater gear was seldom observed.

Argentine (Argentina silus)

The Argentine fishery was limited with small quantities of Argentine being captured in a truly directed fishery. During 1978, reported catches of argentine for Cuba were 19.6 M.T. (1.08% of quota), Japan was the most successful at 1499.1 M.T. (37.20% of quota) while the U.S.S.R. reported 316.0 M.T. (2.62% of quota). It can be assumed that both Cuba and the U.S.S.R. caught Argentine primarily as a by-catch to the other two fisheries (Appendix 1).

Similar to 1977 (Waldron, 1977) the argentine were distributed in depths of 150 - 250 M primarily along the small mesh gear line. The highest c/f were observed to the southern boundaries of the small mesh gear line between 63° and 65° (Fig. 3 ).

American plaice (Hypoglossoides platessoides)

The observed catches of American plaice (84 m.t) were small in relation to the total catch. with the largest quantity of that caught in the silver hake fishery (Appendix 1). The major portion of this catch, 61 M.T., was obtained in areas outside of the small mesh gear line (Fig. 4 ).

Cod (Godus morhua)

Cod is a by-catch primarily of the silver hake fishery. Of the 164 M.T. observed, 60% was taken in that fishery while 31% was caught in a mixed fishery for silver hake, squid and argentine (Appendix 1). Catches in areas outside the small mesh gear line accounted for 77% of the total (fig. 5 ). The largest catches were in the Emerald Bank and Basin area with quantities being caught along the small mesh gear line.

Haddock (Melanogrammus aeglefinus)

Haddock is one of the largest of the by-catch species being second only to Pollock by 1 M.T. (Appendix 1). The total observed catch was 268 M.T. caught by bottom trawls. The highest percentage of the observed quantity is captured outside of the small mesh gear line (Fig. 6 ). The largest percentage of the haddock catches (71%) were caught in association with the silver hake fishery.

Total observed Haddock catches amounted to 266.2 m.t. of this 213.1 m.t. was associated with the silver hake fishery. The total reported catch of Silver hake for 1978 was approximately 48,000 m.t. of which 33% was observed in a directed fishery. Assuming the remaining 67% of the Silver hake catch had a similar by-catch rate, the potential catch of Haddock in a directed Silver hake fishery would have been 645.9 m.t.

The greater percentage (75%) was sampled in ICNAF Division 4W in areas outside the small mesh gear line. Of the total directed Silver hake fishery, 89% of the haddock was captured outside (landward) of the line.

The length frequency plot shows 48% of those sampled are between 160 and 270 mm which represents 1 year old fish (Fig. 7). Extrapolating of the total potential catch this would represent approximately  $732 \times 10^3$  1 year old individuals.

Assuming  $M = 0.2$  from ages 1 to 5 this would imply that approximately 45% of the  $732 \times 10^3$  individuals would be available to the fishery at age 5. Based on an average 5 year old haddock weighing 1.6 kg. this represents a removal of 527.4 m.t. This represents a substantial loss to the haddock fishery in this area.

Pollock (pollachius virens)

Pollack catches were the largest single by-catch species amounting to 269 M.T. (Appendix 1). There is a much higher percentage outside the small mesh gear line than inside (93%). As with the other by-catch species, these catches are associated with the silver hake fishery and occur in those areas of concentrated silver hake c/f (fig. 8).

Other Species

Data was collected from other species such as mackeral, yellowtail, redfish and witch flounder. All of these showed similar distribution patterns to cod and haddock. The highest by-catches were distributed outside (landward) of the small mesh gear line.

CUBAN FISHERY:

Preliminary analysis of observed catches indicate that the major species captured was silver hake which was 1.5 times as great as that observed for squid (Table 1). The directed Cuban silver hake fishery had a by-catch of 12.4% while that for the squid (*Illex*) fishery was 3.1% (Table 2). The Argentine directed fishery had high by-catches (60.7%) with the major species being silver hake and mackeral. The high by-catches of mackeral experienced in 1977 did not occur, however in relation to overall catches in the argentine fishery, mackeral represents a high percentage. Weekly catch compositions again have silver hake as the major species until July 9th (28) when the catch is predominantly squid.

The catch continues to fluctuate between these two species for the remainder of the fishing season (fig. 9). The total by-catch remains about 10% when it is associated with the silver hake fishery (Table 2). The major contributing species to these by-catch levels are haddock (3.6%) and pollock (3.1%).

Analysis of the effort exerted in each area by directed species clearly indicate that the silver hake fishery is conducted outside of the small mesh gear line with 71.6% of the total effort. (Appendix I, Tables 3 and 4)

Comparison of the estimated number of hours per day is evenly distributed between inside and outside for mixed fisheries but for both silver hake and squid, a greater number of hours/day were spent fishing in the concentrated areas. The low number of hours per day fished probably indicate the vessels were engaged in searching activities.

U.S.S.R. FISHERY

Observations onboard the Soviet fleet commenced the week of April 9th (15). Each vessel, as with the Cubans, was permitted to use small mesh bottom trawl (60 mm codends). On June 29th (26) those vessels participating in the research program were exempted from Canadian by-catch regulations.

Silver hake was the main species observed, constituting 78% of the total catch (Table 5). By-catches were highest when associated with the silver hake fishery where it represented 10%. The directed *illex* fishery had a by-catch of 5% with the main species being silver hake.

Comparison of inside and outside the small mesh gear line showed that the major portion of the silver hake fishery was outside the line (66%) while only 8% of the squid fisheries were outside. This compares to the results already presented for Cuba. (Table 6.)

Directed fisheries for silver hake had the same daily effort exerted both in and outside of the line (Table 7). The squid fishery had a proportionally greater amount of effort as well as daily hours fished inside the line. Overall, the U.S.S.R. fleet conducted 53% of its effort outside the line with a resultant 58% of the catch attributed to this area.

The observer program monitored 83% of the 3468.6 of Silver hake and 71% of the 2686.7 m.t. of Squid reported by Cuba in 4VWX. Similarly, 30% of the 43912.6 m.t. of Silver hake and 26% of the 9509.4 of Squid reported by the USSR was observed. These levels and area of coverage are sufficient to apply the observed results to the total fleet.

Catch rates in 1978 showed an overall improvement from 1977 for both the USSR and Cuba. In 1977 Cuba was observed to have a catch rate (kg/hr) of 682 outside, 597 inside and a total of 638 for Silver hake. Also for Squid the 1977 observed catch rates were 377 outside, 678 inside and 548 for all areas (Waldron 1977). During 1978 Cuba improved its observed catch rates for Silver hake and Squid. The recorded catch rates for Silver hake were 1130 outside, 610 inside and 1100 for all areas. Similarly, for squid, 2130 outside, 2190 inside and 2150 overall. These represent an overall improvement of 2 times for Silver hake and 4 times for Squid from that observed in 1977.

The USSR fleet demonstrated similar results in 1977 with catch rates of 2050 outside, 1370 inside and overall 1770 for Silver hake. The catch rates for Squid in 1978 were 4640 outside, 2260 inside and 2270 overall. The high catch/hour outside the small mesh gear line represents only 2 days of observed fishing activity. The general improvement for Silver hake was similar to that in 1977 and for Squid it was 4 times that observed in 1977.

These results reflect not only a higher abundance of Squid inside than outside the line but also, for the Cuban fleet, it indicates an increase in knowledge of the fishery in 4VWX.

#### Summary

The 1978 Observer program, with its increased coverage permitted a more indepth analysis of the 1978 International fishery. This report briefly touched upon the distribution of catch and effort.

The Fishery in 1978 for Squid and Silver hake showed marked improvement over 1977. The total reported catch for Silver hake in 1977 was 72% of that in 1978. Similarly, Squid had an overall increase in catch of 11% in 1978 for areas 3 and 4. These increases were reflected in the catch rates observed during the program.

Distribution of Squid (Illex illecebrosus) was similar to 1977 and indicates that the highest catches and rates are experienced inside (seaward) of the line. Silver hake data shows the reverse to that in 1977. Clay (1979) indicates that the typical distribution of this species is predominately inside (seaward) of the line. The 1978 fishery for Silver hake then, is atypical. It should be pointed out that since only 33% of the reported catch was observed, there is no indication of the distribution of the remaining catch.

Removal of the by-catch regulations for both the USSR and Cuba gives a more precise indication of actual catch interrelationships. The results observed in 1977 agree with those for 1978, that is there is a higher by-catch with the Silver hake fishery, than Squid, and these catches are highest outside (landward) of the line.

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Table 3. Weekly Percent of each Species Caught OUTSIDE the Small Mesh Gear Line during the 1978 Joint Canada-Cuba Observer Program in ICNAF Division 4VWX.

Weeks	S. Hake % Outside	Squid % Outside	Argentine % Outside	Bycatch % Outside	Total % Outside
18	61.84	0.00	100.00	49.55	60.31
19	100.00	-	-	100.00	100.00
20	95.44	100.00	-	100.00	96.37
21	100.00	100.00	100.00	100.00	100.00
22	90.34	33.96	54.18	85.94	88.73
23	99.81	100.00	100.00	99.68	99.79
24	88.71	37.66	100.00	68.94	86.17
25	28.50	1.73	100.00	82.64	32.43
26	97.17	31.84	-	99.84	97.21
<b>TOTAL (18-26)</b>	<b>97.24</b>	<b>20.96</b>	<b>94.46</b>	<b>91.39</b>	<b>87.26</b>
27	94.35	46.70	93.33	96.41	93.83
28	99.11	92.31	100.00	99.76	99.27
29	0.42	1.45	-	3.86	1.37
30	16.96	0.85	-	12.10	1.33
31	99.01	0.88	0.00	96.72	36.19
32	97.84	13.08	0.00	88.07	82.61
33	100.00	100.00	-	100.00	100.00
34	99.75	1.29	-	99.55	62.01
35	99.58	9.38	-	99.05	39.60
36	0.00	2.67	-	0.00	2.56
37	0.00	0.00	-	0.00	0.00
38	0.00	0.39	100.00	0.00	0.40
39	95.85	0.00	-	0.00	4.13
<b>TOTAL (27-39)</b>	<b>89.81</b>	<b>1.58</b>	<b>13.01</b>	<b>87.90</b>	<b>37.62</b>
<b>TOTAL (18-39)</b>	<b>94.63</b>	<b>0.02</b>	<b>76.39</b>	<b>90.06</b>	<b>57.73</b>

TABLE 4 : CATCH DATA FOR DIRECTED FISHERIES INSIDE AND OUTSIDE OF THE SMALL MESH GEAR LINE,  
 DATA OBSERVED DURING THE 1978 JOINT CANADA-CUBA OBSERVER PROGRAM IN ICNAF  
 DIVISION 4VWX

D I R E C T E D F I S H E R I E S

DATA TYPE	Silver hake		Squid (Illex)		Mixed (S. hake, Squid, Argentine)		1978 Cuban Fishery (Total) (All Species)									
	In-side	Out-side	In-side	Out-side	In-side	Out-side	Inside	Outside								
Catch (MT)	83.37	2591.32	2665.20	97.23	1469.04	305.80	1761.83	17.36	145.28	119.18	411.53	28.96	1764.63	3533.20	5297.83	66.69
Days	20	187	196	95.41	83	25	98	25.51	20	22	35	62.86	123	237	331	71.60
Hours	136.90	2298.80	2427.80	94.69	669.40	143.70	819.90	17.53	160.50	204.30	369.20	55.34	966.70	2672.30	3639.00	73.44
Hrs/day	6.85	12.29	12.39		8.07	5.75	8.37		8.03	9.29	10.55		7.86	11.28	10.99	
MT/Day	4.17	13.86	13.60		17.70	12.23	17.98		7.26	5.42	11.76		14.35	14.91	16.01	
MT/Hr	0.61	1.13	1.10		2.19	2.13	2.15		0.91	0.58	1.11		1.83	1.32	1.46	

TABLE 5. RATIO OF CATCH COMPOSITIONS FOR USSR DIRECTED FISHERIES DURING THE 1978 JOINT CANADA-USSR OBSERVER PROGRAM

Directed S.P.P.	Had.	S. Hake	Squid	Argent.	Am. Plaice	Yellow-Tail	Cod	Red-Fish	Poll.	Mac.	Witch	Other	Ratio Dir. of Total	Ratio By-Catch
Silver hake	0.009	1.000	0.024	0.004	0.004	0.000	0.007	0.003	0.009	0.008	.002	0.036	0.904	0.096
Squid (Illex)	0.001	0.042	1.000	0.000	0.000	0.000	0.002	0.000	0.000	0.005	0.000	0.006	0.946	0.054
Argentine	0.002	0.314	0.002	1.000		0.000	0.002		0.001	0.002		0.011	0.750	0.250
Silver hake + Squid														
Mixed Fishery	0.016	0.441	0.543	0.018	0.013	0.002	0.032	0.004	0.037	0.021	0.000	0.077	0.831	0.169
Total Fishery	0.008	0.776	0.146	0.005	0.004	0.000	0.008	0.003	0.009	0.008	0.001	0.033	0.926	0.074

TABLE 6. WEEKLY PERCENT OF EACH SPECIES CAUGHT OUTSIDE THE SMALL MESH GEAR LINE DURING THE 1978 JOINT CANADA-USSR OBSERVER PROGRAM IN ICNAF DIVISION 4VWX

Weeks	S. hake % Outside	Squid % Outside	Argentine % Outside	By-Catch % Outside	Total % Outside
14					
15	0.00				
16	0.68		0.30		0.73
17	1.13			0.94	1.11
18	1.14		0.22	3.28	1.20
19	80.43	30.76	72.22	30.95	78.97
20	81.80	98.55	98.75	84.81	81.86
21	40.76	24.83	88.63	74.81	44.77
22	21.04	13.55	48.04	14.32	20.56
23	32.58	29.22		33.14	32.53
24	66.63	57.23	50.00	60.09	66.05
25	77.17	72.17	61.54	73.58	76.76
26	60.25	38.49	25.00	69.58	60.02
<hr/>					
(Total 14-26)	54.60	40.05	49.41	44.55	54.45
<hr/>					
27	71.13	27.73	97.32	81.36	69.82
28	70.96	29.94	58.12	80.04	70.17
29	20.07	3.79		18.74	12.61
30	18.18	0.03		41.46	4.23
31	97.58	22.06		95.20	90.87
32	97.54	59.75	53.70	91.43	93.67
33	99.46	39.13		99.50	95.04
34	88.67	1.56		75.57	56.65
35	97.64	4.48		46.85	62.46
36	0.00				
37					
38	0.00			100.00	100.00
<hr/>					
Total (27-39)	76.79	6.32		73.02	60.71
<hr/>					
Total (18-39)	66.09	7.75		58.78 58.00	58.18

TABLE 7 . CATCH AND EFFORT DATA FOR DIRECTED FISHERIES INSIDE AND OUTSIDE OF THE SMALL MESH GEAR LINE.  
DATA OBSERVED DURING THE 1978 JOINT CANADA-U.S.S.R.

D I R E C T E D F I S H E R I E S																
DATA TYPE	Silver hake			Squid (Illex)			Mixed (S. hake, Squid, Argentine)			1978 U.S.S.R. Fishery (Total All Species)						
	In-side	Out-side	Total	In-side	Out-side	Total	In-side	Out-side	Total	In-side	Out-side	Total				
Catch (MT)	4088.3	8586.4	12674.7	67.74	1555.0	16.7	1571.7	1.06	894.3	224.3	1118.6	20.05	7161.8	9902.3	17064.1	58.03
Days	280	401	681	58.88	57	2	59	3.39	50	26	76	34.21	389	430	819	52.50
Hours	2973.8	4184.8	7158.6	58.46	688.0	3.6	691.6	0.52	522.9	199.5	722.4	27.62	4195.1	4389.4	8584.50	51.13
Hrs/Day	10.62	10.44	10.51		12.07	1.80	11.72		10.46	7.67	9.50		10.78	10.21	10.48	
MT/Day	14.60	21.41	18.61		27.28	8.35	26.64		17.89	8.63	14.72		18.41	23.03	20.84	
MT/Hour	1.37	2.05	1.77		2.26	4.64	2.27		1.71	1.12	1.55		1.71	2.26	1.99	

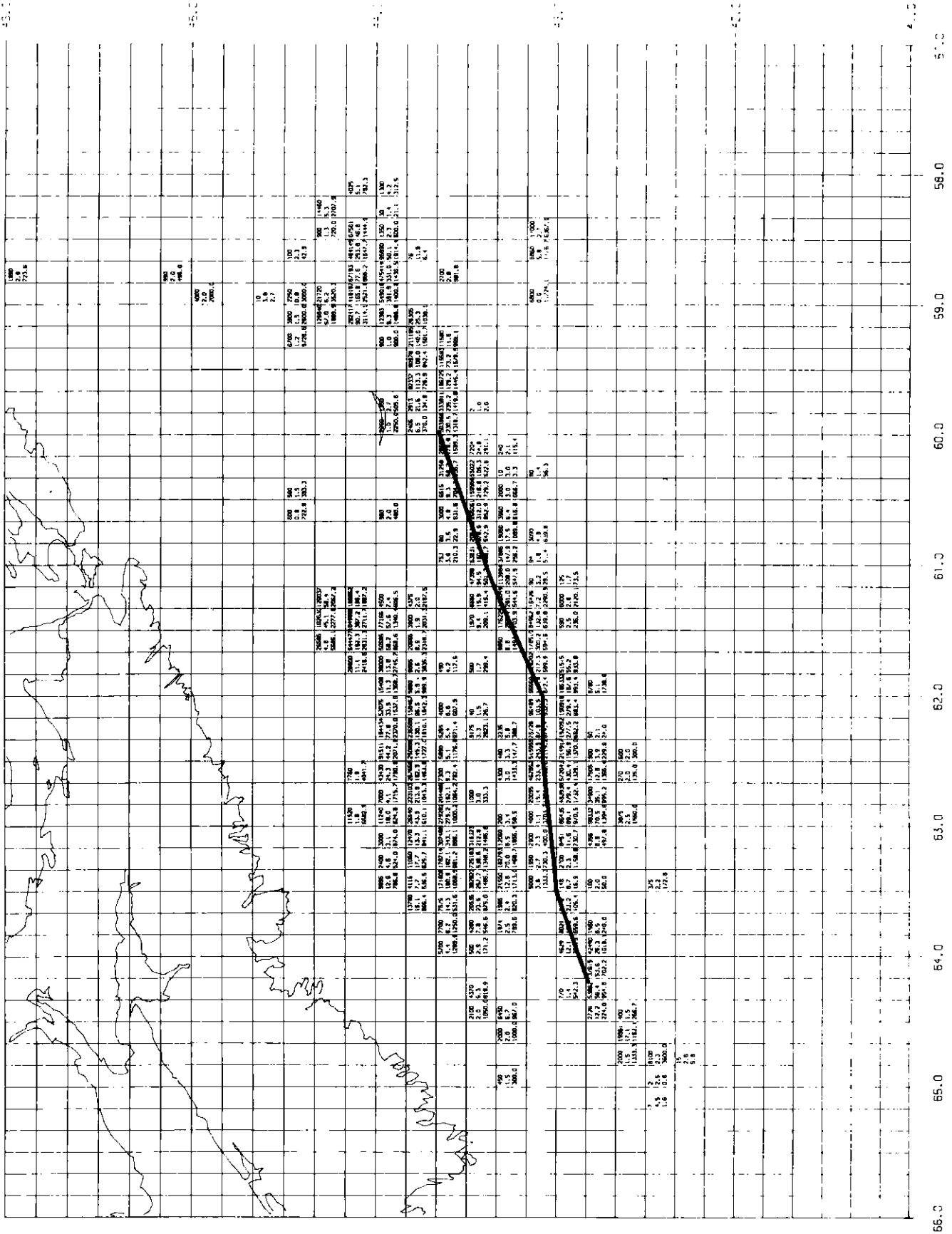


Fig. 1. Distribution of observed Silver Hake catches by bottom trawl during the 1978 4VWX International fishery. Squares contain catch (kg.), effort (hr.) and c/f.

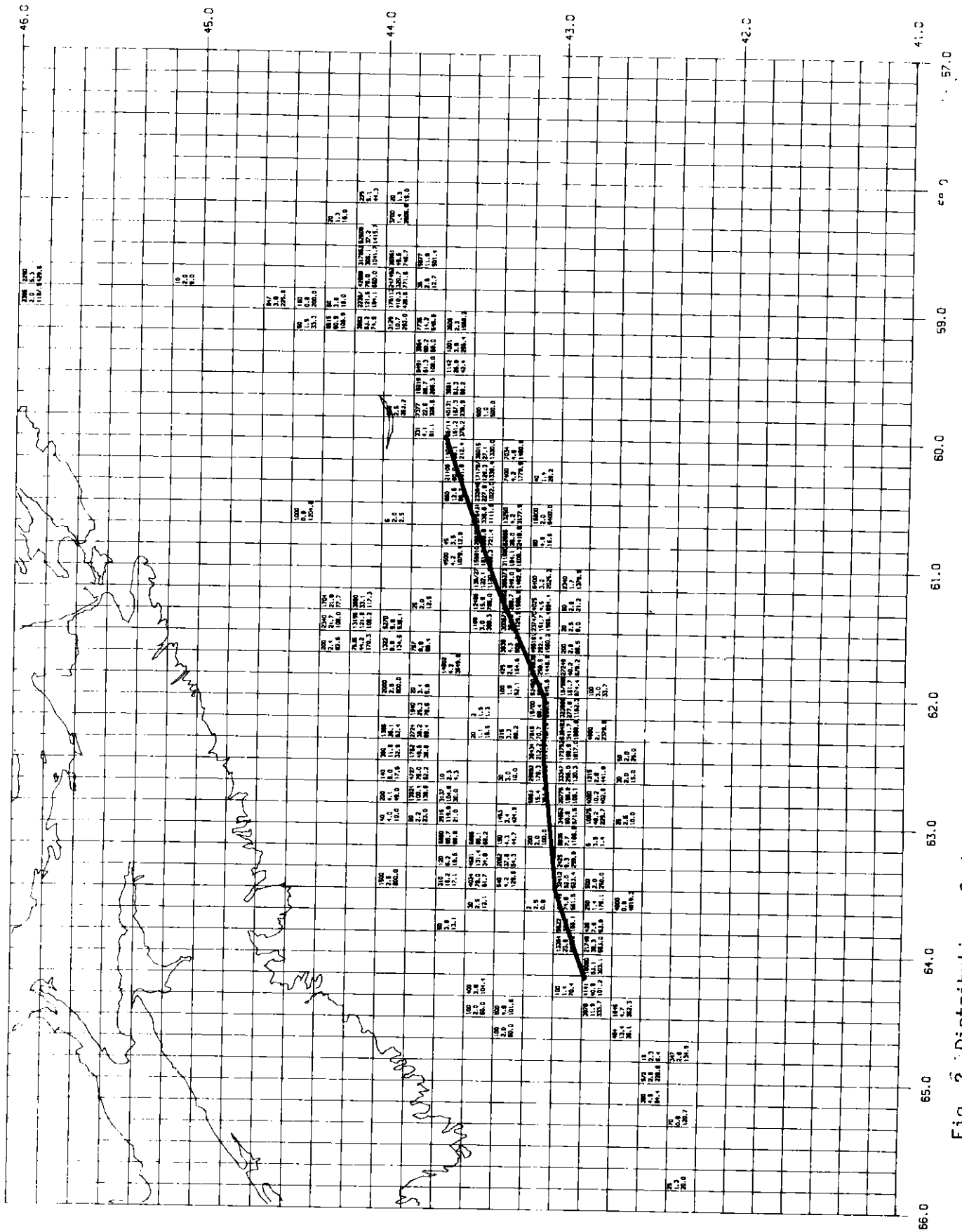


Fig. 2 Distribution of observed Squid catches by bottom trawl during the 1978 4VMX International fishery. Squares contain catch (kg.), effort (hr.) and c/f.

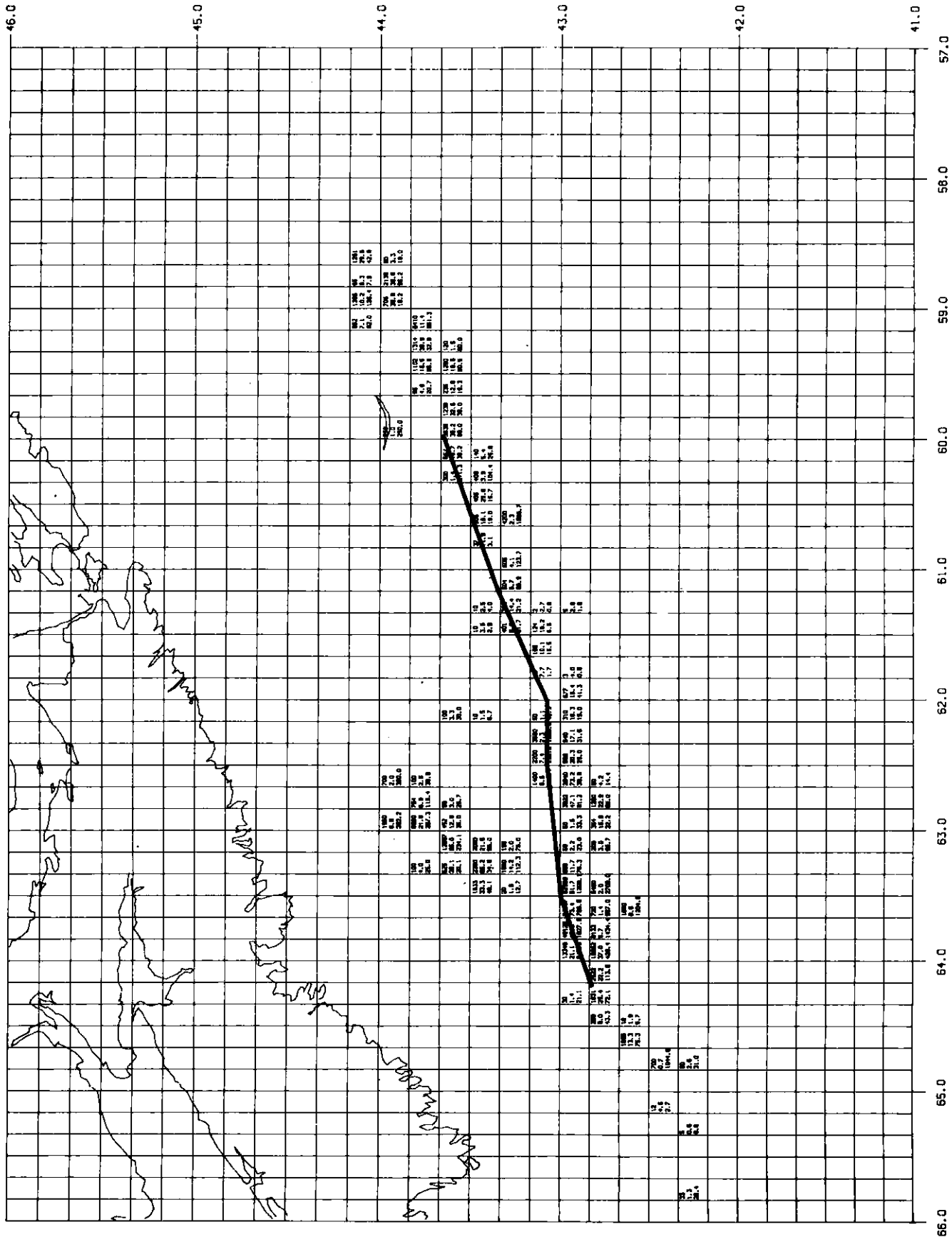


Fig. 3 Distribution of observed Argentine catches by bottom trawl during the 1978 4WVX International fishery. Squares contain catch (kg.), effort (hr.) and c/f.



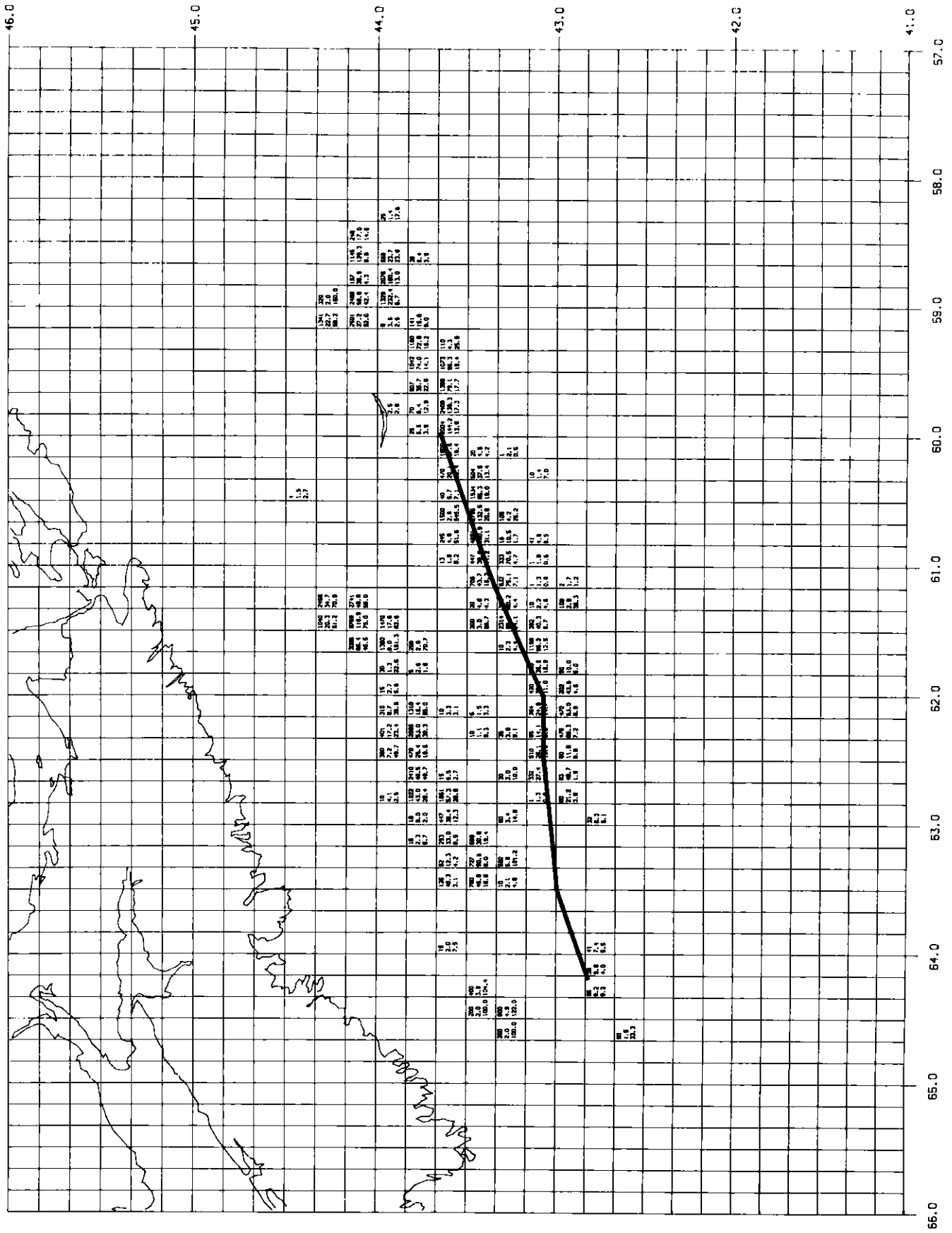


Fig. 4 Distribution of observed American plaice catches by bottom trawl during the 1978 4VWX International fishery. Squares contain catch (kg), effort (hr.) and c/f.

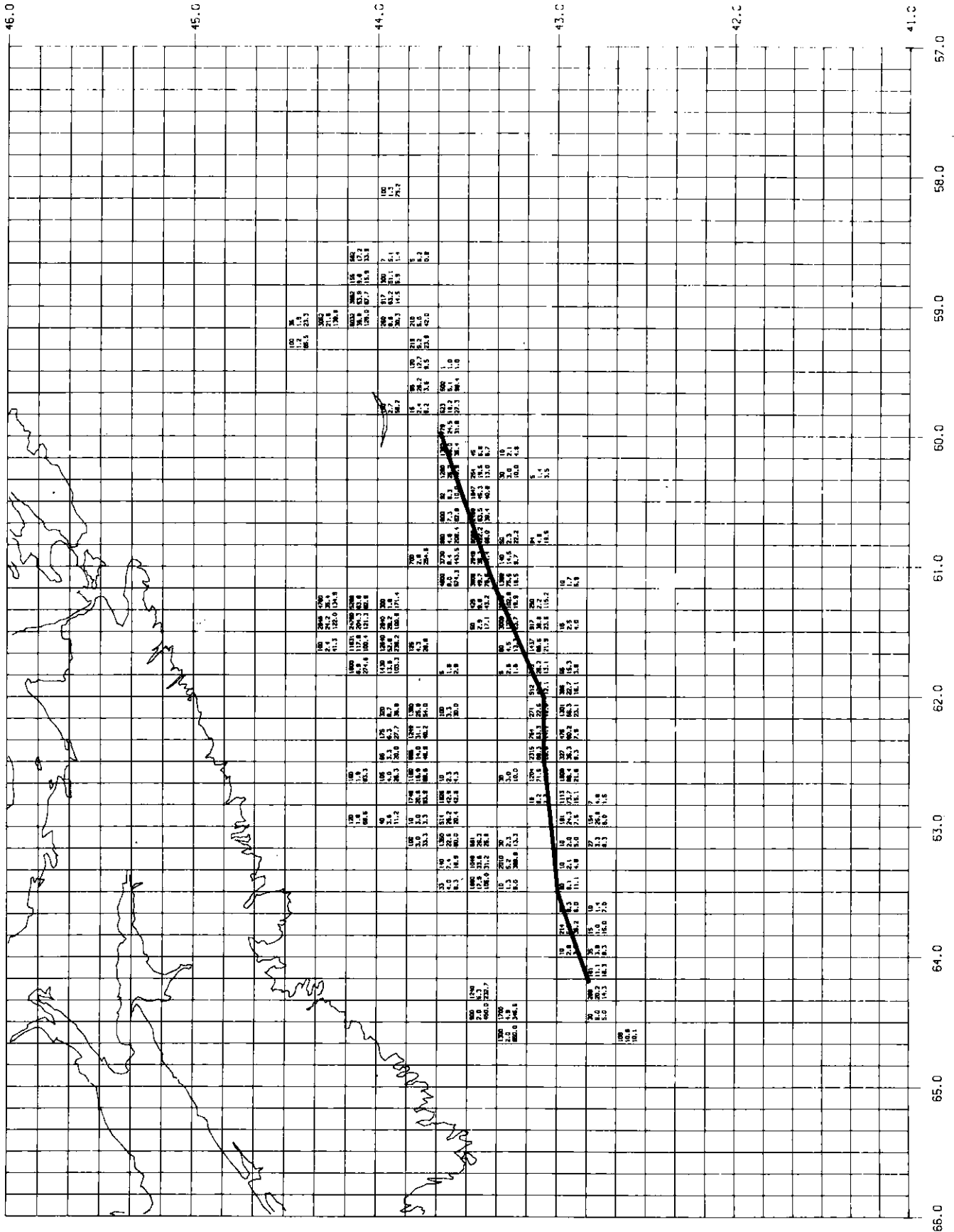
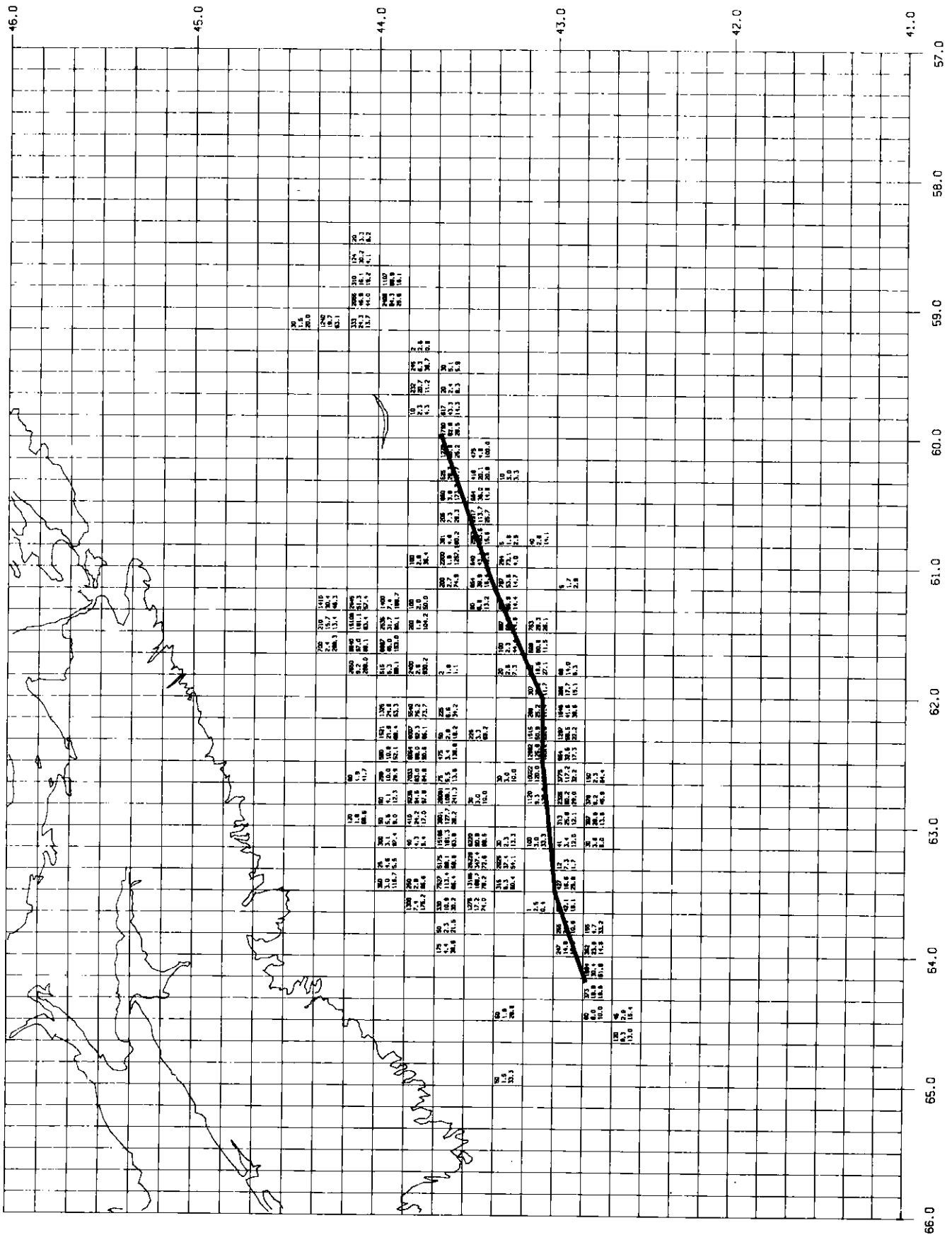


Fig. 5 Distribution of observed Cod catches by bottom trawl during the 1978 4VMX International fishery. Squares contain catch (kg), effort (hr.) and c/f.



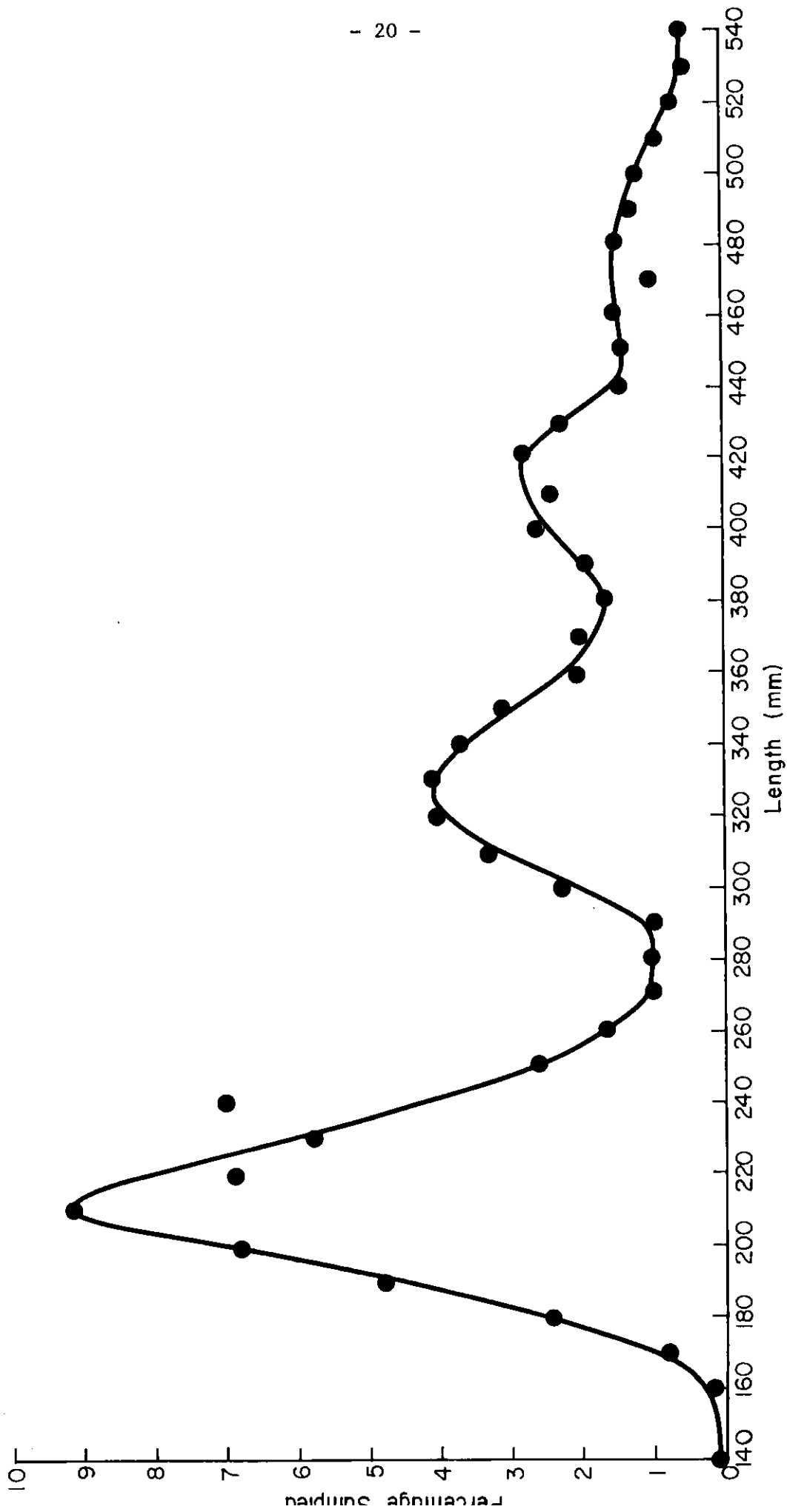


Fig. 7. Length composition of Haddock sampled from the 1978 International Fishery.

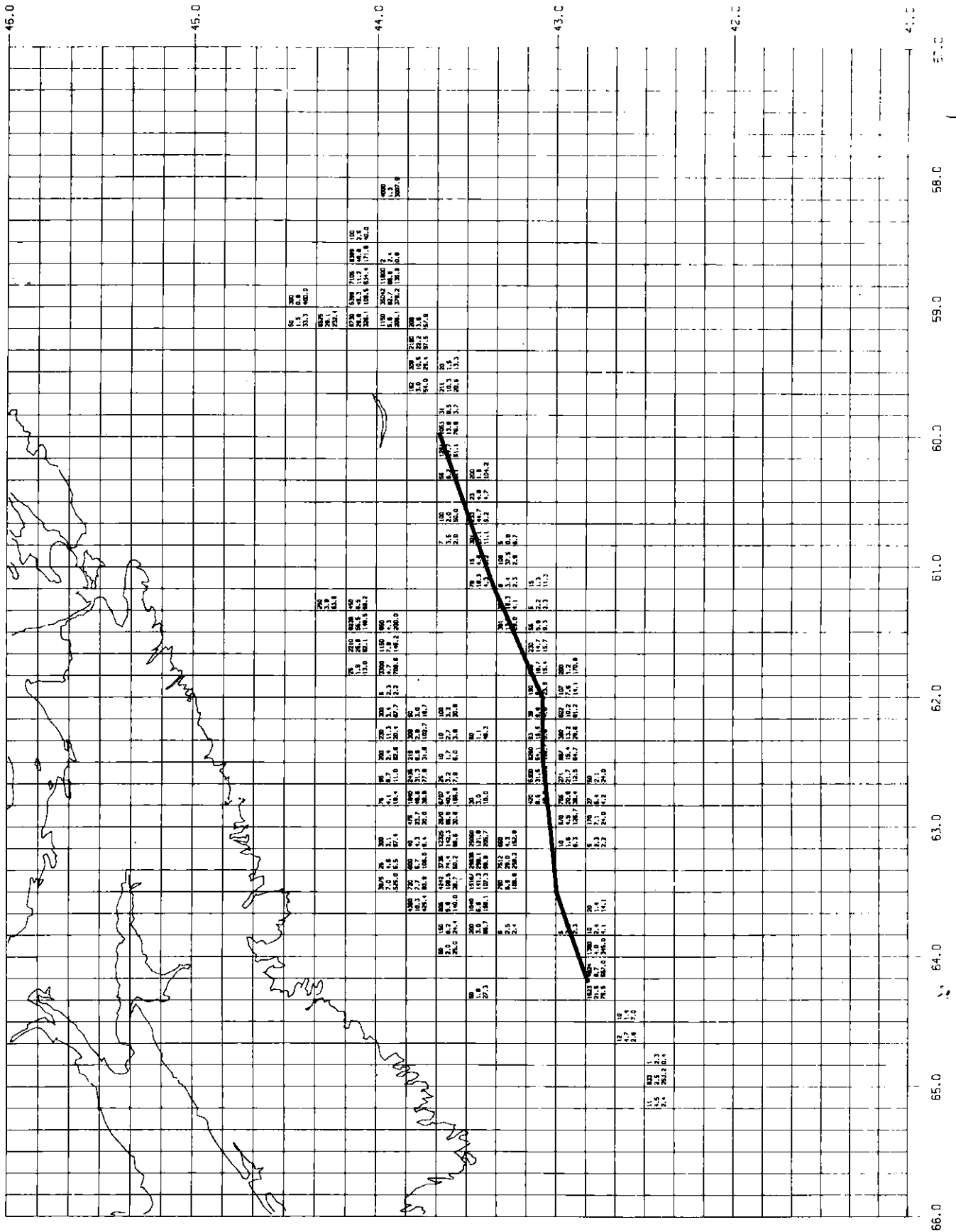


Fig. 8 Distribution of observed Pollock catches by bottom trawl during the 1978 4VWX International fishery. Squares contain catch (kg.), effort (hr.) and c/f.

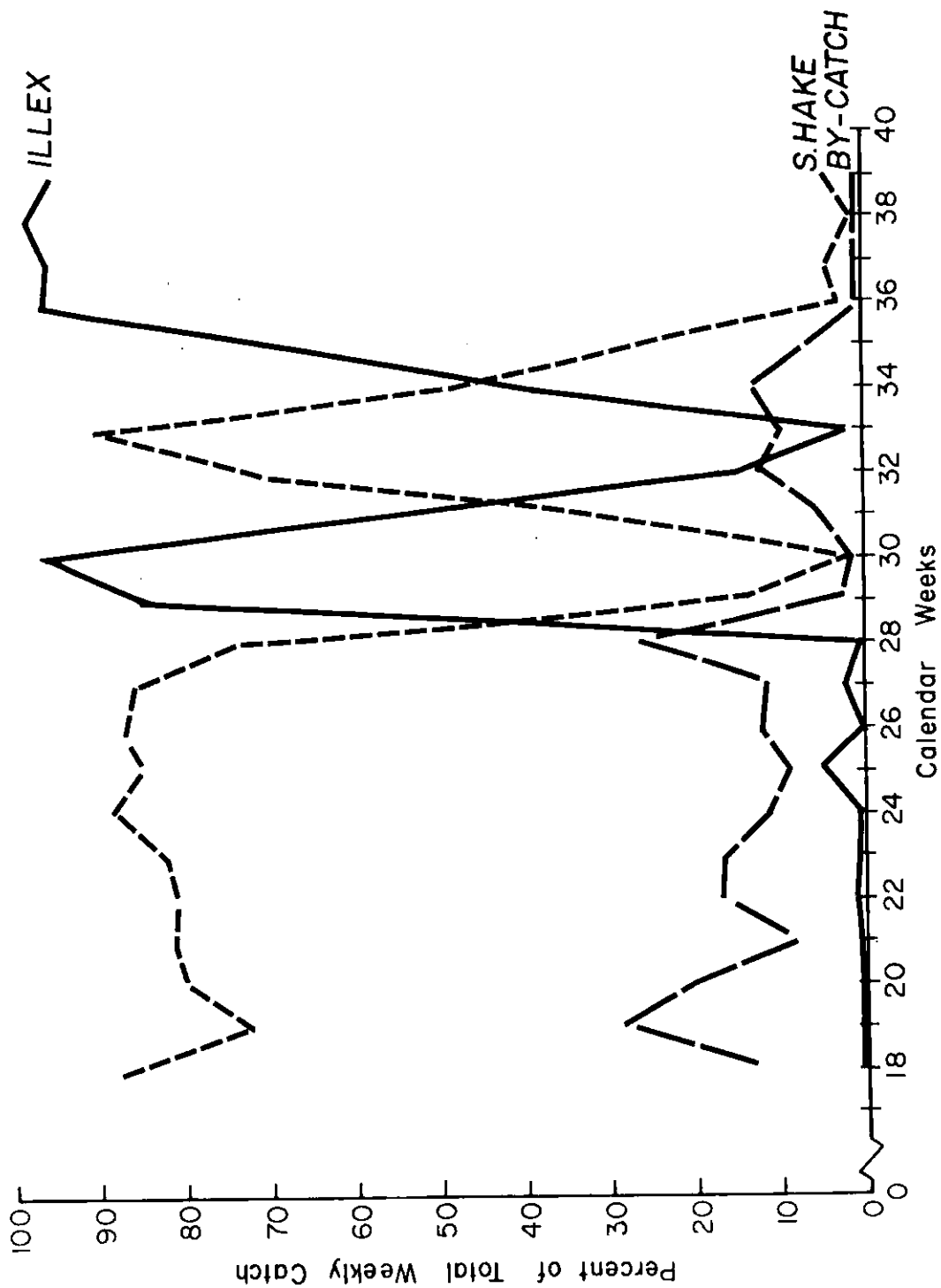


Fig. 9 Observed weekly catch composition for the 1978 Cuban Fishery on the Scotian Shelf.

APPENDIX I

Catch and Effort Data from the 1978 International Observer Program

Table 1. Total International Fishery for 1978.

Table 2. International Fishery inside (seaward) the small mesh gear line.

Table 3. International Fishery outside (landward) the small mesh gear line.

COUNTRY:	CATCH COMPOSITION (KG)			MAIN SPECIES			AND EFFORT			1978 INTERNATIONAL OBSERVER DATA		
	HADDOCK	SILVERHAKE	SQUID	ARGENTINE	AM. PLAICE	YELLOWTAIL	COO	REDFISH	POLLOCK	MACKEREL	HITCH	OTHER
U.S.S.R.												
SILVERHAKE	114640.	12625095.	302444.	49985.	51392.	3835.	86112.	43905.	116057.	101262.	19105.	452235.
CATCH/DAY	198.0	21805.0	522.4	86.3	88.8	6.6	148.7	75.8	200.4	174.9	33.0	761.1
CATCH/HOUR	16.1	1770.1	42.4	7.0	7.2	.5	12.1	6.2	16.3	14.2	2.7	63.4
DAYS	579	HOURS	7132.3									
SQUID	1494.	63322.	1510159.	5.	663.	35.	3736.	189.	150.	6958.	103.	9439.
CATCH/DAY	28.2	1194.8	28493.6	.1	12.5	.7	70.5	3.6	2.8	131.3	1.9	178.1
CATCH/HOUR	2.2	94.6	2255.0	.0	1.0	.1	5.6	.3	.2	10.4	.2	14.1
DAYS	53	HOURS	669.7									
ARGENTINE	10.	1885.	11.	6002.	0.	1.	15.	0.	5.	11.	0.	67.
CATCH/DAY	10.0	1885.0	11.0	6002.0	0.0	1.0	15.0	0.0	5.0	11.0	0.0	67.0
CATCH/HOUR	1.2	217.4	1.3	692.3	0.0	.1	1.7	0.0	.6	1.3	0.0	7.7
DAYS	1	HOURS	8.7									
SILVERHAKE SQUID	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
CATCH/DAY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CATCH/HOUR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DAYS	0	HOURS	0.0									
MIXED FISHERY	20407.	547049.	673269.	22018.	15685.	2120.	39898.	5410.	45616.	26595.	250.	95447.
CATCH/DAY	309.2	8288.6	10201.0	333.6	237.6	32.1	604.5	82.0	691.2	403.0	3.8	1446.2
CATCH/HOUR	26.4	706.9	870.0	28.5	20.3	2.7	51.6	7.0	58.9	34.4	.3	123.3
DAYS	66	HOURS	773.9									
TOTAL CATCH	136551.	13237354.	2485883.	78010.	67739.	5991.	129761.	49504.	161430.	134826.	19457.	557167.
CATCH/DAY	195.4	16937.6	3556.3	111.6	96.9	6.6	185.6	70.8	231.5	192.4	27.6	797.1
CATCH/HOUR	15.9	1542.0	289.6	9.1	7.9	.7	15.1	5.6	18.9	15.7	2.3	64.9
DAYS	699	HOURS	8564.5									

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Table 1. Total International Fishery for 1978.



Table 1. (cont'd)

CATCH COMPOSITION (KG)		MAIN SPECIES		AVG EFFORT		1976 INTERNATIONAL OBSERVER DATA							
COUNTRY: CUBA		HADDOCK	SILVERHAKE	SQUID	ARGENTINE	AMPPLAICE	YELLOWTAIL	COD	REDFISH	POLLOCK	MACKEREL	HATCH	OTHER
SILVERHAKE	96990	2665204	29745	6412	6389	258	11704	42186	81946	16277	934	86412	
CATCH/DAY	494.8	13598.0	151.8	32.7	42.8	1.3	59.7	215.2	418.1	83.0	4.8	480.9	
CATCH/HOUR	40.0	1097.8	12.3	2.6	3.5	.1	4.6	17.4	33.8	6.7	.4	35.6	
DAYS	146	HOURS	2427.8										
SQUID	1099	36845	1761833	3100	1230	53	3003	288	77	1372	16	7545	
CATCH/DAY	11.2	396.4	17977.9	31.6	12.5	.5	30.6	2.9	.8	14.0	.2	77.0	
CATCH/HOUR	1.3	47.4	2148.8	3.8	1.5	.1	3.7	.4	.1	1.7	.0	9.2	
DAYS	98	HOURS	819.9										
ARGENTINE	90	4700	0	13300	0	0	90	0	0	700	0	1700	
CATCH/DAY	90.0	4700.0	0.0	13300.0	0.0	0.0	90.0	0.0	0.0	700.0	0.0	1700.0	
CATCH/HOUR	4.4	231.6	0.0	655.5	0.0	0.0	4.4	0.0	0.0	34.5	0.0	83.8	
DAYS	1	HOURS	20.3										
SILVERHAKE	0	0	0	0	30	0	0	0	20	0	0	750	
CATCH/DAY	0.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0	20.0	0.0	0.0	750.0	
CATCH/HOUR	0.0	0.0	0.0	0.0	18.2	0.0	0.0	0.0	10.6	0.0	0.0	405.4	
DAYS	1	HOURS	1.9										
MIXED FISHERY	16647	167734	113507	5836	663	215	1743	19996	20538	4765	98	61770	
CATCH/DAY	475.6	4792.4	3243.1	109.6	18.9	6.1	49.8	571.3	586.6	135.7	2.8	1764.9	
CATCH/HOUR	45.1	454.3	307.4	10.4	1.8	.6	4.7	54.2	55.6	13.0	.3	167.3	
DAYS	35	HOURS	369.2										
TOTAL CATCH	114826	2876482	1405045	26648	10311	526	16540	62490	102561	23134	1046	158176	
CATCH/DAY	346.9	8690.5	5755.5	80.5	31.2	1.6	50.0	188.8	309.9	69.9	3.2	477.9	
CATCH/HOUR	31.6	790.4	523.5	7.3	2.8	.1	4.5	17.2	28.2	6.4	.3	43.5	
DAYS	331	HOURS	3634.0										

Table 1. (cont'd)

CATCH COMPOSITION (KG)		MAIN SPECIES		AND EFFORT		1978 INTERNATIONAL OBSERVER DATA					
COUNTRY: ALL COUNTRIES		HAUDDOCK SILVERHAKE	SQUID	ARGENTINE AN-PLAICE	YELLOWTAIL	COD	REDFISH	POLLOCK	MACKENEL	WITCH	OTHER
SILVERHAKE	213124.	15680089.	383932.	56407.	60465.	4299.	92608.	196064.	116203.	20111.	543615.
CATCH/DAY	263.1	19358.1	474.0	69.6	74.6	5.3	121.7	244.5	145.9	24.8	671.1
CATCH/HOUR	21.4	1573.5	38.5	5.7	6.1	.4	9.9	19.9	11.9	2.0	54.6
DAYS	010	HOURS	9965.2								
SQUID	6472.	115251.	5591471.	12920.	3501.	412.	7701.	3542.	10300.	555.	36757.
CATCH/DAY	19.0	339.0	16445.5	38.0	10.3	1.2	22.7	7.4	30.3	1.6	108.1
CATCH/HOUR	1.6	32.2	1559.8	3.6	1.0	.1	2.1	.7	2.9	.2	10.3
DAYS	340	HOURS	3584.7								
ARGENTINE	1378.	7827.	26277.	194099.	0.	1.	240.	5.	711.	0.	1899.
CATCH/DAY	9.9	521.8	1751.8	13273.3	0.0	.1	16.0	.3	47.4	0.0	126.6
CATCH/HOUR	7.3	41.4	139.1	1053.8	0.0	.0	1.3	.0	3.8	0.0	10.1
DAYS	15	HOURS	188.9								
SILVERHAKE	2207.	3000.	3000.	0.	30.	1518.	6188.	0.	0.	0.	1091.
SQUID											
CATCH/DAY	735.7	1000.0	1000.0	0.0	10.0	506.0	2062.7	0.0	0.0	0.0	363.7
CATCH/HOUR	42.8	128.2	128.2	0.0	1.3	63.9	260.3	0.0	0.0	0.0	45.9
DAYS	3	HOURS	23.8								
MIXED FISHERY	45021.	777178.	1024071.	37910.	20054.	12114.	51143.	69137.	45040.	4572.	200192.
CATCH/DAY	302.2	5216.0	6878.3	254.4	134.6	81.3	343.2	464.0	302.3	30.7	1343.6
CATCH/HOUR	25.9	447.7	590.4	21.8	11.6	7.0	29.5	39.8	25.9	2.6	115.3
DAYS	149	HOURS	1736.0								
TOTAL CATCH	268202.	16583345.	7029551.	306335.	84049.	18343.	163881.	268748.	174254.	25237.	783554.
CATCH/DAY	203.6	12941.9	5337.5	232.6	63.8	13.9	124.4	204.1	132.3	19.2	595.0
CATCH/HOUR	17.3	1070.0	453.6	19.8	5.4	1.2	10.6	17.5	11.2	1.6	50.6
DAYS	1517	HOURS	15498.7								

Table 2. International Fishery inside (seaward) the small mesh gear line.

CATCH COMPOSITION (CS)		MAIN SPECIES		AND EFFORT		1978 INTERNATIONAL OBSERVER DATA						
COUNTRY: U.S.S.R.		HADDOCK	SILVERHAKE	SQUID	ARGENTINE AM. PLAICE	YELLOWTAIL	COD	REDFISH	POLLOCK	MACKEREL	WITCH	OTHER
SILVERHAKE	20873.	4088345.	102200.	19606.	11689.	960.	12491.	7941.	13470.	25452.	1839.	117761.
CATCH/DAY	74.5	14401.2	650.7	70.0	41.7	3.4	44.6	28.4	48.1	90.9	6.6	420.6
CATCH/HOUR	7.0	1374.8	61.3	6.6	3.9	.3	4.2	2.7	4.5	8.6	.6	39.6
DAYS	280	HOURS	2973.8									
SQUID	1494.	65022.	1555029.	105.	663.	35.	3796.	189.	150.	6456.	103.	9709.
CATCH/DAY	26.2	1151.3	27281.2	1.8	11.6	.6	66.6	3.3	2.6	122.1	1.8	170.3
CATCH/HOUR	2.2	95.4	2260.1	.2	1.0	.1	5.5	.3	.2	10.1	.1	14.1
DAYS	57	HOURS	688.0									
ARGENTINE	10.	1885.	11.	6002.	0.	1.	15.	0.	5.	11.	0.	67.
CATCH/DAY	10.0	1885.0	11.0	6002.0	0.0	1.0	15.0	0.0	5.0	11.0	0.0	67.0
CATCH/HOUR	1.2	217.4	1.3	692.3	0.0	.1	1.7	0.0	.6	1.3	0.0	7.7
DAYS	1	HOURS	8.7									
SILVERHAKE	50.	0.	0.	0.	0.	10.	90.	0.	0.	0.	0.	50.
SQUID												
CATCH/DAY	50.0	0.0	0.0	0.0	0.0	10.0	90.0	0.0	0.0	0.0	0.0	50.0
CATCH/HOUR	29.9	0.0	0.0	0.0	0.0	6.0	53.9	0.0	0.0	0.0	0.0	29.9
DAYS	1	HOURS	1.7									
MIXED FISHERY	2775.	337562.	550197.	6560.	5453.	145.	11740.	339.	1055.	21848.	26.	69436.
CATCH/DAY	55.5	6751.2	11003.9	131.2	109.1	2.9	234.9	6.8	21.1	437.0	.5	1388.7
CATCH/HOUR	5.3	645.5	1052.1	12.5	10.4	.3	22.5	.6	2.0	41.8	.0	132.8
DAYS	50	HOURS	522.9									
TOTAL CATCH	25202.	4493414.	2287437.	32273.	17804.	1151.	28134.	8469.	14679.	58269.	1968.	197022.
CATCH/DAY	64.8	11551.2	5880.3	83.0	45.8	3.0	72.3	21.6	37.7	139.5	5.1	506.5
CATCH/HOUR	6.0	1071.1	545.3	7.7	4.2	.5	6.7	2.0	3.5	12.9	.5	47.0
DAYS	389	HOURS	4195.1									

Table 2. (cont'd)

CATCH COMPOSITION (RATIO)	1978 INTERNATIONAL OBSERVER DATA										
	HADDOCK	SILVERHAKE	SQUID	ARGENTINE AMPPLAICE	YELLOWTAIL	COD	REDFISH	PULLOCK	MACKEREL	HITCH	OTHER
COUNTRY: U.S.S.R.											
SILVERHAKE	.005	1.000	.045	.005	.000	.003	.002	.003	.006	.000	.029
SQUID	.001	.042	1.000	.000	.000	.002	.000	.000	.004	.000	.006
ARGENTINE	.002	.314	.002	1.000	.000	.002	0.000	.001	.002	0.000	.041
SILVERHAKE SQUID	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MIXED FISHERY	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL CATCH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 2. (cont'd)

CATCH COMPOSITION (KG)		MAIN SPECIES		AND EFFORT		1978 INTERNATIONAL OBSERVER DATA								
COUNTRY:	CUBA	HADDOCK	SILVERHAKE	SQUID	ARGENTINE AN. PLAICE	YELLOWTAIL	COD	REDFISH	PULLOCK	MACKEREL	HITCH	OTHER		
		SILVERHAKE	1669.	83369.	3970.	500.	21.	0.	45.	229.	225.	755.	17.	2575.
		CATCH/DAY	65.5	4166.4	198.5	25.0	1.1	0.0	2.3	11.5	11.3	37.6	.9	128.8
		CATCH/HOUR	12.2	609.0	24.0	3.7	.2	0.0	.3	1.7	1.6	5.5	.1	18.8
		DAYS	20	HOURS	136.9									
		SQUID	772.	26315.	146940.	3100.	994.	48.	3016.	232.	77.	1372.	11.	6929.
		CATCH/DAY	9.3	317.0	17699.3	37.3	10.8	.6	36.3	2.8	.9	16.5	.1	63.5
		CATCH/HOUR	1.2	39.3	2194.6	4.6	1.3	.1	4.5	.3	.1	2.0	.0	10.4
		DAYS	83	HOURS	669.4									
		ARGENTINE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
		CATCH/DAY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		CATCH/HOUR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		DAYS	0	HOURS	0.0									
		SILVERHAKE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
		SQUID	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
		CATCH/DAY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		CATCH/HOUR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		DAYS	0	HOURS	0.0									
		MIXED	4098.	50451.	92122.	2704.	475.	260.	1635.	41.	4935.	630.	13.	2085.
		FISHERY	204.9	2522.5	4606.1	135.2	23.8	13.0	81.8	2.1	246.7	31.5	.7	164.3
		CATCH/DAY	25.5	314.4	574.1	16.9	3.0	1.6	10.2	.3	30.7	3.9	.1	13.0
		CATCH/HOUR	20	HOURS	160.5									
		TOTAL	6539.	160130.	1565132.	6304.	1540.	304.	4696.	502.	5235.	2757.	41.	11589.
		CATCH	53.2	1301.9	12724.7	51.3	11.3	2.5	38.2	4.1	42.6	22.4	.3	94.2
		CATCH/HOUR	9.8	185.6	1619.0	6.5	1.4	.5	4.9	.5	5.4	2.9	.0	12.0
		DAYS	123	HOURS	966.7									

Table 2. (cont'd)

CATCH COMPOSITION (Kilograms)	MAIN SPECIES	1975 INTERNATIONAL OBSERVER DATA											
		AND EFFORT	ARGENTINE AMPPLAICE	YELLOWTAIL	COD	REDFISH	POLLOCK	HACKEREL	WITCH	OTHER			
COUNTRY: CUBA													
SILVERHAKE	0.020	1.000	0.048	0.006	0.000	0.000	0.001	0.003	0.003	0.009	0.000	0.031	
SQUID	0.001	0.015	1.000	0.002	0.001	0.000	0.002	0.000	0.000	0.001	0.006	0.005	
ARGENTINE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
SILVERHAKE SQUID	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
MIXED FISHERY	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
TOTAL CATCH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Table 2. (cont'd)

CATCH COMPOSITION ( % )		MAIN SPECIES		GAD EFFORT		1978 INTERNATIONAL OBSERVER DATA						
COUNTRY: ALL COUNTRIES		SQUID	ARGENTINE AMPPLAICE YELLOWTAIL	CHD	REDFISH	PULLUCK	MACKEREL	WITCH	OTHER			
SILVERMAKE	23972.	4548382.	237598.	20116.	12374.	1151.	13258.	6332.	13756.	26861.	1928.	125161.
CATCH/DAY	71.6	13577.3	709.2	60.0	36.9	3.4	39.6	24.9	41.1	40.2	5.8	373.7
CATCH/HOUR	6.8	1298.0	67.8	5.7	3.5	.3	3.8	2.4	3.9	7.7	.6	35.7
DAYS	335	HOURS	3504.2									
SQUID	5064.	100630.	4733812.	12803.	2214.	236.	7559.	2253.	622.	10300.	518.	27691.
CATCH/DAY	19.0	376.9	17729.6	48.0	8.3	.9	28.3	8.4	2.3	35.6	1.4	103.7
CATCH/HOUR	1.9	37.9	1783.2	4.8	.8	.1	2.8	.8	.2	3.9	.2	10.4
DAYS	267	HOURS	2654.6									
ARGENTINE	1288.	3127.	26277.	185799.	0.	1.	150.	0.	5.	11.	0.	199.
CATCH/DAY	92.0	223.4	1076.9	13271.4	0.0	.1	10.7	0.0	.4	.8	0.0	14.2
CATCH/HOUR	7.6	18.5	155.6	1101.7	0.0	.0	.9	0.0	.0	.1	0.0	1.2
DAYS	14	HOURS	168.7									
SILVERMAKE	57.	3000.	3000.	0.	0.	10.	98.	0.	0.	0.	0.	150.
SQUID												
CATCH/DAY	19.0	1000.0	1000.0	0.0	0.0	3.3	32.7	0.0	0.0	0.0	0.0	50.0
CATCH/HOUR	3.4	176.5	176.5	0.0	0.0	.6	5.8	0.0	0.0	0.0	0.0	8.6
DAYS	3	HOURS	17.0									
MIXED FISHERY	12278.	442084.	788405.	21320.	7275.	2226.	16494.	744.	688.	30319.	808.	89537.
CATCH/DAY	114.7	4131.6	7368.3	199.2	68.0	20.8	154.1	6.9	64.4	253.3	7.6	336.8
CATCH/HOUR	11.4	428.6	764.4	20.7	7.1	2.2	16.0	.7	6.7	29.4	.8	66.6
DAYS	107	HOURS	1031.4									
TOTAL CATCH	42659.	5047223.	5789091.	240037.	21862.	3626.	37559.	11326.	21270.	67490.	3254.	242756.
CATCH/DAY	58.8	7021.0	7978.0	330.6	30.1	5.0	51.7	15.6	24.3	93.0	4.5	334.4
CATCH/HOUR	5.8	691.1	788.9	32.5	3.0	.5	5.1	1.5	2.9	9.2	.4	32.9
DAYS	726	HOURS	7375.9									

Table 2. (cont'd)

COUNTRY: ALL COUNTRIES	1978 INTERNATIONAL OBSERVER DATA									
	CATCH COMPOSITION (RAIIS)	MAIN SPECIES	AVD EFFORT	COB	REDFISH	POLLOCK	MACKEREL	WITCH	OTHER	
SILVERHAKE	.005	1.000	.052	.004	.003	.000	.003	.006	.000	.028
SQUID	.001	.021	1.000	.003	.000	.000	.002	.000	.000	.006
ARGENTINE	.007	.017	.141	1.000	.000	.000	.001	.000	.000	.001
SILVERHAKE SQUID	.010	.500	.500	0.000	.002	.000	.016	0.000	0.000	.025
MIXED FISHERY	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL CATCH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000



Table 3. International Fishery outside (landward) the small mesh gear line.

CATCH COMPOSITION (KG)		SPECIES		AND EFFORT		1974 INTERNATIONAL OBSERVER DATA						
COUNTRY: U.S.S.R.		Haddock	SILVERHAKE	SQUID	ARGENTINE ANCHOVIA	YELLOWTAIL	COD	REDFISH	PULLUCK	HACKEREL	WITCH	OTHER
SILVERHAKE	94190.	8586442.	129694.	30279.	40077.	2863.	72501.	36197.	103313.	74795.	17058.	332124.
CATCH/DAY	234.9	21412.5	325.4	75.5	97.9	7.1	180.8	90.3	257.6	156.5	42.5	820.2
CATCH/HOUR	22.5	2031.8	31.0	7.2	9.6	.7	17.3	8.6	24.7	17.9	4.1	79.4
DAYS	401	HOURS	4184.6									
SQUID	0.	230.	16769.	0.	0.	0.	0.	0.	0.	0.	0.	0.
CATCH/DAY	0.0	120.0	8380.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CATCH/HOUR	0.0	66.9	4668.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DAYS	2	HOURS	3.6									
ARGENTINE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
CATCH/DAY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CATCH/HOUR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DAYS	0	HOURS	0.0									
SILVERHAKE	0.	207.	200.	0.	200.	0.	0.	10.	0.	0.	10.	410.
CATCH/DAY	0.0	200.0	200.0	0.0	200.0	0.0	0.0	10.0	0.0	0.0	10.0	410.0
CATCH/HOUR	0.0	133.3	133.3	0.0	133.3	0.0	0.0	6.7	0.0	0.0	6.7	273.3
DAYS	1	HOURS	1.5									
MIXED FISHERY	17159.	157054.	51792.	15458.	4659.	1977.	29122.	4828.	43839.	5762.	421.	27631.
CATCH/DAY	650.0	6040.7	1992.0	590.5	371.5	79.0	1120.1	165.7	1686.1	221.6	16.2	1662.7
CATCH/HOUR	86.0	787.3	259.8	77.5	48.4	9.9	146.0	24.2	219.8	28.9	2.1	138.5
DAYS	26	HOURS	199.5									
TOTAL CATCH	111349.	874390.	196446.	45737.	49936.	4639.	101623.	41035.	147151.	86557.	17489.	360165.
CATCH/DAY	259.0	20334.7	461.5	106.4	116.1	11.3	236.3	95.4	342.2	197.3	40.7	637.6
CATCH/HOUR	25.4	1442.1	45.2	10.4	11.4	1.1	23.2	9.3	33.5	18.4	4.0	82.1
DAYS	430	HOURS	4389.4									

Table 3. (cont'd)

CATCH COMPOSITION (RATIO)	1978 INTERNATIONAL OBSERVER DATA										
	HADDOCK	SILVERHAKE	SQUID	ARGENTINE AM. PLACE	YELLOWTAIL	COD	REDFISH	PULLOCK	MACKEREL	WITCH	OTHER
COUNTRY: U.S.S.R.											
SILVERHAKE	.011	1.000	.015	.004	.005	.008	.004	.012	.009	.002	.039
SQUID	0.000	.014	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ARGENTINE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SILVERHAKE SQUID	0.000	.500	.500	0.000	.500	0.000	.025	0.000	0.000	.025	1.025
MIXED FISHERY	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL CATCH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 3. (cont'd)

CATCH COMPOSITION (KG)		MAIN SPECIES		AND EFFORT		1978 INTERNATIONAL OBSERVATION DATA							
COUNTRY: CUBA		HADDOCK	SILVERHAKE	SQUID	ARGENTINE	AMPLAICE	YELLOWTAIL	COU	REDFISH	PULLUCK	MACAREL	WITCH	OTHER
SILVERHAKE	95825.	2591316.	25275.	5942.	8303.	213.	11544.	42457.	81736.	15522.	907.	83057.	
CATCH/DAY	512.4	13657.3	135.2	31.8	44.4	1.1	61.7	227.0	437.1	83.0	4.9	440.4	
CATCH/HOUR	41.7	1127.3	11.0	2.6	3.6	.1	5.0	18.5	35.6	6.8	.4	36.5	
DAYS	167	HOURS	2298.8										
SQUID	5.	10127.	305802.	0.	55.	0.	0.	45.	0.	0.	0.	233.	
CATCH/DAY	.2	405.1	1232.1	0.0	2.2	0.0	0.0	1.8	0.0	0.0	0.0	4.3	
CATCH/HOUR	.0	70.5	2128.1	0.0	.4	0.0	0.0	.3	0.0	0.0	0.0	1.5	
DAYS	25	HOURS	143.7										
ARGENTINE	90.	4700.	0.	13300.	0.	0.	90.	0.	0.	790.	0.	1700.	
CATCH/DAY	90.0	4700.0	0.0	13300.0	0.0	0.0	90.0	0.0	0.0	790.0	0.0	1700.0	
CATCH/HOUR	4.4	231.6	0.0	655.5	0.0	0.0	4.4	0.0	0.0	34.5	0.0	83.8	
DAYS	1	HOURS	20.3										
SILVERHAKE	0.	500.	500.	0.	30.	0.	0.	20.	0.	0.	0.	750.	
CATCH/DAY	0.0	250.0	250.0	0.0	15.0	0.0	0.0	10.0	0.0	0.0	0.0	375.0	
CATCH/HOUR	0.0	44.9	44.9	0.0	5.7	0.0	0.0	3.8	0.0	0.0	0.0	142.5	
DAYS	2	HOURS	5.3										
MIXED FISHERY	12360.	104705.	8370.	1102.	539.	5.	210.	19446.	15590.	4155.	100.	60049.	
CATCH/DAY	562.1	4586.6	380.7	50.1	24.3	.2	9.5	854.8	708.6	183.9	4.5	2720.5	
CATCH/HOUR	60.5	587.1	61.0	5.4	2.6	.0	1.0	95.3	74.3	27.5	.5	244.0	
DAYS	22	HOURS	204.3										
TOTAL CATCH	108287.	2716349.	359953.	20344.	8922.	210.	11544.	61988.	97326.	20377.	1007.	140584.	
CATCH/DAY	456.9	11461.4	1454.8	85.6	37.6	.9	50.0	241.6	410.7	80.0	4.2	614.5	
CATCH/HOUR	40.5	1016.5	127.2	7.6	3.3	.1	4.4	23.2	36.4	7.6	.4	54.9	
DAYS	237	HOURS	2672.3										

Table 3. (cont'd)

CATCH COMPOSITION (RATIO)	1974 INTERNATIONAL RESERVE DATA										
	AND EFFORT										
COUNTRY: CUBA	HADDOCK	SILVERHAKE	SQUID	ARGENTINE AP. PLAICE	YELLOWTAIL	COD	REDFISH	POLLOCK	WACKEREL	CATCH	OTHER
SILVERHAKE	.037	1.000	.010	.002	.003	.000	.016	.032	.006	.000	.032
SQUID	.000	.033	1.000	0.000	.000	0.000	.000	0.000	0.000	0.000	.001
ARGENTINE	.007	.353	0.000	1.000	0.000	0.000	0.000	0.000	.053	0.000	.124
SILVERHAKE SQUID	0.000	.500	.500	0.000	.030	0.000	.020	0.000	0.000	0.000	.750
MIXED FISHERY	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL CATCH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 3. (cont'd)

CATCH COMPOSITION (43)		1978 INTERNATIONAL OBSERVER DATA										
COUNTRY: ALL COUNTRIES		AND EFFORT										
		MAIN SPECIES										
		HADDOCK	SILVERHAKE	SQUID	ARGENTINE ANCHOVILLA	YELLOWTAIL	COD	REDFISH	PULLOCK	MACKEREL	MITCH	OTHER
SILVERHAKE	19081, 11190877,	155280.	36221.	44399.	3091.	84115.	78654.	185049.	90327.	17965.	418103.	
CATCH/DAY	321.1 18903.5	262.3	61.2	61.8	5.2	142.1	132.9	312.6	152.6	30.3	702.9	
CATCH/HOUR	29.3 1/22.9	23.9	5.6	7.5	.5	13.0	12.1	28.5	13.9	2.6	64.1	
DAYS	592 HOURS	6495.3										
SQUID	1075, 14824,	957730.	217.	1064.	212.	244.	246.	952.	0.	97.	9912.	
CATCH/DAY	16.0 136.5	4950.7	2.0	9.9	2.0	2.3	2.3	6.9	0.0	.9	92.6	
CATCH/HOUR	1.1 15.0	968.0	.2	1.1	.2	.2	.2	1.0	0.0	.1	10.0	
DAYS	107 HOURS	989.4										
ARGENTINE	90.	4700.	0.	13300.	0.	90.	0.	0.	700.	0.	1700.	
CATCH/DAY	90.0 4700.0	0.0	13300.0	0.0	0.0	90.0	0.0	0.0	700.0	0.0	1700.0	
CATCH/HOUR	4.4 231.6	0.0	655.5	0.0	0.0	4.4	0.0	0.0	34.5	0.0	83.8	
DAYS	1 HOURS	20.3										
SILVERHAKE	2400.	700.	0.	230.	2623.	7780.	30.	0.	0.	10.	1631.	
CATCH/DAY	480.0 140.0	140.0	0.0	46.0	524.6	1556.0	6.0	6.0	0.0	2.0	326.2	
CATCH/HOUR	122.4 35.7	35.7	0.0	11.7	133.8	396.7	1.5	0.0	0.0	.5	83.2	
DAYS	5 HOURS	14.6										
MIXED	31890.	275022.	16560.	12494.	4792.	34942.	24323.	61477.	19737.	3911.	111449.	
FISHERY	459.1 4044.4	1463.9	243.5	183.7	129.3	501.4	357.7	904.1	231.4	57.5	1659.0	
CATCH/DAY	53.3 459.7	211.9	27.7	20.9	14.7	57.0	40.7	102.6	25.3	6.5	146.3	
CATCH/HOUR	DAYS	60 HOURS	598.2									
TOTAL	225544.	11480122.	1240460.	66290.	62187.	14717.	126321.	103255.	247473.	106765.	21983.	540746.
CATCH/DAY	291.8 14859.1	1404.7	85.8	60.4	19.0	193.4	133.6	320.2	136.1	28.4	649.6	
CATCH/HOUR	27.4 1414.1	152.7	8.2	7.7	1.8	15.6	12.7	30.5	13.1	2.7	66.6	
DAYS	773 HOURS	8122.8										

Table 3. (cont'd)

COUNTRY: ALL COUNTRIES	1979 INTERNATIONAL RESERVE DATA										
	CATCH COMPOSITION (RATIO)	MAIN SPECIES		AND EFFORT		1979 INTERNATIONAL RESERVE DATA		OTHER			
	HADDOCK	SILVERHAKE	SQUID	ARGENTINE AM. PLAICE	YELLOWTAIL	COD	REDFISH	PULLOCK	MACKEREL	WITCH	OTHER
SILVERHAKE	.017	1.000	.014	.003	.004	.000	.007	.017	.008	.002	.037
SQUID	.001	.015	1.000	.000	.001	.000	.000	.001	0.000	.000	.010
ARGENTINE	.007	.353	0.000	1.000	0.000	.007	0.000	0.000	.053	0.000	.128
SILVERHAKE SQUID	1.714	.500	.500	0.000	.164	1.874	.021	0.000	0.000	.007	1.165
MIXED FISHERY	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL CATCH	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000