

Fishing Effort and Catch-per-unit-effort of
the Inshore Herring Fisheries in the Southern Gulf
of St. Lawrence, 1973-1980

by

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Abstract

Data on fishing effort and catch-per-unit effort for the inshore herring fisheries in the southern Gulf of St. Lawrence in 1973 through 1980 are presented. These data were compiled from all purchase slip records available in the Public Archives.

CPUE ranged from .35 mt/trip to 5.02 mt/trip depending on the year and fishing area; the highest values being the Caraquet and Escuminac. In total CPUE steadily declined from 2.61 mt/trip in 1977 to 1.00 mt/trip in 1980. Meanwhile the fishing effort has sharply increased from 1658 to 5417 fishing trips during the same period.

Résumé

On trouvera dans l'article qui suit des données sur l'effort de pêche et sur les prises par unité d'effort dans les pêcheries côtières de hareng du sud du golfe du Saint-Laurent de 1973 à 1980 inclusivement. Ces données ont été compilées à partir de tous les bordereaux de vente disponibles dans les Archives publiques.

Les PUE ont varié de ,35 tm/voyage à 5,02 tm/voyage selon l'année et le lieu de pêche, les valeurs maximales provenant des régions de Caraquet et d'Escuminac. Au total, les PUE ont diminué, de façon continue, passant de 2,61 tm/voyage en 1977 à 1,00 tm/voyage en 1980. Dans la même période, l'effort de pêche a augmenté brusquement de 1 658 à 5 417 voyages.

Introduction

The inshore herring comprise a considerable component of the herring fisheries in the southern Gulf of St. Lawrence. However, reliable data on fishing effort and catch-per-unit of effort, the source data for estimates of abundance indices for this fishery are lacking.

Efforts were continued to improve the data base for CPUE. The only information pertinent to fishing effort available on a time series are data recorded on purchase slips. Information on each purchase slip contains catch by day, landing port, name of fishermen and buyer. This information is the only data source for all catch statistics used by the Department.

In 1980 a project was carried out to re-examine all available purchase slips to provide estimates of CPUE in the southern Gulf of St. Lawrence. This required examination and processing of purchase slip data since 1973, which were still available in the Public Archives. Prior to 1973 all purchase slips were destroyed.

This report includes a summary of results of this investigation.

Data Source and Methods of Analyses

After each fishing trip every fisherman delivers his catch to a buyer, who records the transaction on a 'purchase slip'. A copy of this slip is received by the Department through the fishery officer in each district. The purchase slip contains the name of fisherman and buyer, quantity and location of catch for each trip.

Since 1978, data for all individual purchase slips were recorded on computer tapes. Prior to 1978, only summaries of catch by district were computerized, and no data on number of fishing trips were recorded. To obtain this information, a re-examination of all available purchase slips (only since 1973) was carried out. All data were entered on computer tapes.

A comparison of the catch from the processed purchase slips with that reported in catch statistics showed that some purchase slips were missing or mislocated. Table 1 presents the number of purchase slips processed and percentage of landings recorded on the slips relative to total landings. Fishing effort was adjusted for these differences. On average the percentage of purchase slips processed was 85.9% which represent a very good sample size. CPUE was calculated by dividing total catch for each fishing district by the number of fishing trips.

Results

Fishing effort and CPUE for 1973 through 1980 are presented in Tables 2-10. All fishery districts represented in the analysis are included in Figure 1. In all years examined, the CPUE was highest in the Caraquet fishery

ranging from 1.65 mt/trip in 1980 to 5.02 mt/trip in 1977. This was followed by the Escuminac fishery where CPUE ranged from 1.46 mt/trip in 1980 to 2.99 mt/trip in 1978. The other three fisheries, namely Shediac, Pictou and North PEI were of similar magnitude and fluctuated from year to year. CPUE for these fisheries were much lower than those of Caraquet and Escuminac, ranging from .35 to 1.65 mt/trip.

A graphic presentation of the trend in CPUE for the 5 fisheries in 1973-1980 is shown in Figure 2. In this figure, it is clear that CPUE has increased or slightly fluctuated in all fisheries since 1973 until 1977 or 1978. Since then, CPUE declined steadily through 1980. One exception, however, was the fishery in North PEI where CPUE has slightly increased from .81 mt/trip in 1978 to 1.18 mt/trip in 1979 and then declined to 1.05 mt/trip in 1980.

Figure 3 shows the trend in fishing effort and CPUE for all 5 fisheries combined. In total CPUE steadily declined from 2.61 mt/trip in 1977 to 1.00 mt/trip in 1980. Meanwhile, the fishing effort has sharply increased from 1658 to 5417 fishing trips during the same period.

Discussion

Fishing effort and CPUE presented in this report represent all available information on the inshore fisheries from the purchase slips. While these CPUE present the best available data source for estimating abundance indices of the inshore fisheries in the southern Gulf, two problems are encountered. Firstly, the fishing effort is expressed in terms of the number of successful fishing trips made. The purchase slip system does not allow for recording the unsuccessful trips, and this may result in underestimating the actual fishing effort. Discussions with the fishermen revealed that this is not a problem during the spawning season when the catch is high and usually a catch is made every day. This is not the case outside the spawning season when the fish get scarce.

Secondly, the number of fishing trips is not the best estimate for fishing effort since the number of nets fished could vary within season, and between areas and years. With increasing market demand for herring, the number of nets fished were drastically increased in the last 3 years. Monitoring of spatial and temporal distribution of the fishing nets is, at present, carried out by aerial photographic surveys, and by filling out voluntary logbooks in selected areas, a sample of which is shown in Table 11.

When completed, these data would provide valuable information on the changes in actual number of fishing gear operating in each area throughout the season. However, this would require a few years of observation before it becomes in full use. In the meantime, the fishing effort based on purchase slips will remain as an important source for stock abundance trends for the inshore herring fisheries in the southern Gulf of St. Lawrence.

Table 1. Number of herring purchase slips and sample size¹ processed

YEAR	NO. OF PURCHASE SLIPS	SAMPLE SIZE (% OF LANDINGS)
1973	4507	72.8%
1974	3236	80.1%
1975	2952	86.5%
1976	2346	75.0%
1977	1263	75.9%
1978	3010	97.0%
1979	4415	100.0%
1980	7266	100.0%

1 Sample size equals percent of landings recorded on purchase slips relative to total landings from Statistics Branch

Table 2. Fishing effort and catch-per-unit-effort for the major inshore gillnet herring fisheries in the southern Gulf of St. Lawrence, 1973 .

FISHERY	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		ALL YEAR		TOTAL INSHORE LANDINGS
	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	
Caraquet	-	-	2.20	413	4.95	256	1.09	35	2.16	593	4.26	247	1.36	15	2.49	1832	4569.58
Escuminac	-	-	2.03	1416	1.55	55	0.30	11	2.71	402	3.77	354	3.43	7	2.43	2232	5424.59
Shediac	-	-	1.55	2	0.85	352	0.98	237	-	-	-	-	-	-	1.09	532	579.31
Pictou	-	-	-	-	-	-	0.87	19	1.86	210	1.29	254	1.97	8	1.65	455	749.44
North PEI	-	-	1.26	78	0.73	106	1.02	22	-	-	-	-	-	-	0.91	301	274.00

C = Catch in metric tons.

E = Number of fishing trips.

Table 3. Fishing effort and catch-per-unit-effort for the major inshore gillnet herring fisheries in the southern Gulf of St. Lawrence, 1974.

FISHERY	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		ALL YEAR		TOTAL INSHORE LANDINGS
	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	
Caraquet	-	-	2.49	355	1.28	137	2.06	58	2.94	95	7.99	173	7.10	7	4.21	689	2897.25
Escuminac	-	-	1.69	1191	1.05	245	0.05	7	3.07	67	4.05	124	-	-	1.86	1603	2982.30
Shediac	0.40	1	0.41	582	0.69	182	0.26	214	-	-	-	-	-	-	0.49	906	445.07
Pictou	-	-	-	-	-	-	0.49	41	0.88	260	1.25	80	-	-	0.91	384	348.35
North PEI	-	-	0.40	223	0.32	204	0.42	26	0.06	80	0.55	33	-	-	0.35	593	204.57

C = Catch in metric tons.

E = Number of fishing trips.

Table 4. Fishing effort and catch-per-unit-effort for the major inshore gillnet herring fisheries in the southern Gulf of St. Lawrence, 1975 .

FISHERY	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		ALL YEAR		TOTAL INSHORE LANDINGS
	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	
Caraquet	-	-	1.83	46	0.58	192	0.48	25	7.16	170	6.12	107	8.25	3	4.48	472	2115.41
Escuminac	-	-	1.63	810	1.51	225	-	-	3.76	71	4.98	152	-	-	2.21	1215	2682.08
Shediac	-	-	0.83	111	0.54	78	0.22	49	0.09	1	-	-	-	-	0.78	187	145.95
Pictou	-	-	-	-	-	-	1.58	22	1.07	201	1.58	129	-	-	1.02	443	452.57
North PEI	-	-	1.24	253	0.29	92	0.36	12	0.23	36	0.26	52	-	-	0.97	415	401.29

C = Catch in metric tons.

E = Number of fishing trips.

Table 5. Fishing effort and catch-per-unit-effort for the major inshore gillnet herring fisheries in the southern Gulf of St. Lawrence, 1976.

FISHERY	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		ALL YEAR		TOTAL INSHORE LANDINGS
	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	
Caraquet	-	-	3.20	94	0.92	262	0.52	20	4.37	143	6.36	98	2.34	30	4.28	495	2115.54
Escuminac	1.84	5	2.14	1019	0.25	199	-	-	8.22	2	7.42	71	-	-	2.44	1249	3042.83
Shediac	0.96	55	0.23	443	0.85	10	0.33	38	-	-	-	-	-	-	0.53	489	260.34
Pictou	-	-	-	-	-	-	0.71	103	0.73	154	1.31	183	0.99	14	0.97	454	439.91
North PEI	-	-	0.60	142	0.13	41	0.15	19	-	-	0.44	40	0.35	11	0.41	349	143.44

C = Catch in metric tons.

E = Number of fishing trips.

Table 6. Fishing effort and catch-per-unit-effort for the major inshore gillnet herring fisheries in the southern Gulf of St. Lawrence, 1977.

FISHERY	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		ALL YEAR		TOTAL INSHORE LANDINGS
	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	
Caraquet	-	-	4.04	63	1.87	4	1.59	16	7.55	181	2.58	202	0.29	40	5.02	438	2200.09
Escuminac	-	-	2.42	469	1.44	77	-	-	3.55	16	-	-	-	-	2.57	572	1467.29
Shediac	-	-	1.12	101	0.41	39	0.20	14	-	-	-	-	2.46	50	1.28	204	261.83
Pictou	-	-	-	-	-	-	0.81	46	1.30	36	1.21	142	-	-	1.14	224	255.00
North PEI	-	-	0.54	155	-	-	0.35	20	0.11	2	0.23	31	-	-	0.61	220	134.79

C = Catch in metric tons.

E = Number of fishing trips.

Table 7. Fishing effort and catch-per-unit-effort for the major inshore gillnet herring fisheries in the southern Gulf of St. Lawrence, 1978.

FISHERY	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		ALL YEAR		TOTAL INSHORE LANDINGS
	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	
Caraquet	-	-	3.83	107	8.16	14	2.01	54	4.27	401	3.22	38	1.77	9	4.02	623	2620.8
Escuminac	0.68	2	2.60	1145	3.97	59	0.12	12	2.05	20	5.45	39	1.36	1	2.99	1278	3471.2
Shediac	0.67	9	1.12	307	3.40	14	1.19	52	-	-	-	-	-	-	1.18	382	463.1
Pictou	-	-	-	-	-	-	0.59	70	1.00	138	1.19	51	-	-	0.93	259	244.8
North PEI	0.98	4	1.31	250	0.26	127	0.23	40	0.24	15	0.54	14	0.92	18	0.81	498	406.4

C = Catch in metric tons.

E = Number of fishing trips.

Table 8. Fishing effort and catch-per-unit-effort for the major inshore gillnet herring fisheries in the southern Gulf of St. Lawrence, 1979.

FISHERY	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		ALL YEAR		TOTAL INSHORE LANDINGS
	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	
Caraquet	1.22	5	1.39	163	3.29	60	0.60	65	1.50	129	3.01	313	1.44	181	2.01	916	1982.9
Escuminac	2.05	6	1.63	1607	3.32	50	2.10	3	5.15	22	8.71	35	-	-	1.87	1723	3399.6
Shediac	1.00	35	0.59	401	0.53	14	2.55	18	-	-	0.06	1	-	-	0.70	469	333.3
Pictou	-	-	-	-	-	-	1.01	173	1.11	409	0.83	345	0.29	3	0.98	930	915.6
North PEI	1.40	8	1.80	192	0.33	83	0.11	22	0.24	26	1.42	45	0.32	1	1.18	377	476.2

C = Catch in metric tons.

E = Number of fishing trips

Table 9. Fishing effort and catch-per-unit-effort for the major inshore gillnet herring fisheries in the southern Gulf of St. Lawrence, 1980 .

FISHERY	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		ALL YEAR		TOTAL INSHORE LANDINGS
	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	
Caraquet	4.83	2	3.29	163	0.36	54	0.31	200	1.84	329	1.66	167	1.62	68	1.65	985	1623.8
Escuminac	0.44	7	1.20	1128	0.47	46	0.17	92	5.02	55	5.66	65	-	-	1.46	1393	2035.3
Shediac	0.70	24	0.64	691	0.57	105	0.65	37	-	-	-	-	-	-	0.63	857	541.3
Pictou	-	-	-	-	-	-	0.44	339	0.49	1040	0.92	252	1.43	3	0.55	1634	899.1
North PEI	0.66	8	0.88	227	2.00	9	0.10	169	2.40	51	2.91	68	0.89	16	1.05	548	574.4

C = Catch in metric tons.

E = Number of fishing trips.

Table 10. Summary of fishing effort and catch-per-unit-effort for the major inshore gillnet herring fisheries in the southern Gulf of St. Lawrence, 1973 - 1980.

FISHERY	1973		1974		1975		1976		1977		1978		1979		1980	
	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E	C/E	E
Caraquet	2.49	1832	4.21	689	4.48	472	4.28	495	5.02	438	4.02	623	2.01	916	1.65	985
Escuminac	2.43	2232	1.86	1603	2.21	1215	2.44	1249	2.57	572	2.99	1278	1.87	1723	1.46	1393
Shediac	1.09	532	0.49	906	0.78	187	0.53	489	1.28	204	1.18	382	0.70	469	0.63	857
Pictou	1.65	455	0.91	384	1.02	443	0.97	454	1.14	224	0.93	259	0.98	930	0.55	1634
North PEI	0.91	301	0.35	593	0.97	415	0.41	349	0.61	220	0.81	498	1.18	377	1.05	548
Total	2.17	5352	1.65	4175	2.12	2732	1.98	3036	2.61	1658	2.16	3040	1.51	4415	1.00	5417
Catch (only these areas)	11613.84		6883.20		5791.84		6011.28		4327.38		6566.40		6666.65		5417.00	
Catch (total southern Gulf)	13022.00		7561.59		6676.10		6730.18		4617.67		7974.10		7938.38		7254.43	

C = Catch in metric tons.
E = Number of fishing trips.

Table 11. ESCUMINAC INSHORE HERRING FISHERY, SPRING 1980, LOGBOOK SURVEY SUMMARY

DATE BY MON	WEIGHT (KG)	NO. OF ACTUAL NETS	NO. OF STD. NETS	NO. OF VESSELS	ACTUAL NETS/ VESSEL	STD. NETS/ VESSEL	WT/ACTUAL NET-DAY	WT/STD NET-DAY	WT/ VESSEL-DAY	
26	4	0	52	104	1	52.00	104.00	0.00	0.00	0.00
27	4	0	52	104	1	52.00	104.00	0.00	0.00	0.00
28	4	0	129	269	3	43.00	89.67	0.00	0.00	0.00
29	4	0	129	269	3	43.00	89.67	0.00	0.00	0.00
30	4	510	189	331	4	47.25	82.75	2.70	1.54	127.50
MON TOT	510	551	1077	12	45.92	89.75	.93	.47	42.50	
1	5	283	336	508	7	48.00	72.57	.84	.56	40.43
2	5	2636	999	1824	19	52.58	96.00	2.64	1.45	138.74
3	5	7196	1132	2117	21	53.90	100.81	6.36	3.40	342.67
4	5	87544	1422	2731	25	56.88	109.24	61.56	32.06	3501.76
5	5	63070	1548	2929	27	57.33	108.48	40.74	21.53	2335.93
6	5	27510	1478	2795	26	56.85	107.50	18.61	9.84	1058.08
7	5	20344	1434	2690	26	55.15	103.46	14.19	7.56	782.46
8	5	57175	1379	2566	25	55.16	102.64	41.46	22.28	2287.00
9	5	84033	1588	3006	28	56.71	107.36	52.92	27.96	3001.18
10	5	17199	1592	3016	28	56.86	107.71	10.80	5.70	614.25
11	5	62247	1518	2870	27	56.22	106.30	41.01	21.69	2305.44
12	5	26885	1530	2892	27	56.67	107.11	17.57	9.30	995.74
13	5	2832	1530	2873	28	54.64	102.61	1.85	.99	101.14
14	5	6601	1488	2801	27	55.11	103.74	4.44	2.36	244.48
15	5	8187	1521	2863	26	58.50	110.12	5.38	2.86	314.88
16	5	1472	1461	2801	25	58.44	112.04	1.01	.53	58.88
17	5	1077	1326	2538	22	60.27	115.36	.81	.42	48.95
18	5	312	1058	2013	18	58.78	111.83	.29	.15	17.33
19	5	453	858	1665	15	57.20	111.00	.53	.27	30.20
20	5	340	703	1355	12	58.58	112.92	.48	.25	28.33
21	5	481	645	1239	12	53.75	103.25	.75	.39	40.08
22	5	680	541	1050	10	54.10	105.00	1.26	.65	68.00
23	5	511	493	954	9	54.78	106.00	1.04	.54	56.78
24	5	2125	427	878	9	47.44	97.56	4.98	2.42	236.11
25	5	963	427	878	9	47.44	97.56	2.26	1.10	107.00
26	5	3541	494	952	9	54.89	105.78	7.17	3.72	393.44
27	5	4277	554	1090	10	55.40	109.00	7.72	3.92	427.70
28	5	5043	485	923	9	53.89	102.56	10.40	5.46	560.33
29	5	3683	485	923	9	53.89	102.56	7.59	3.99	409.22
30	5	4674	485	923	9	53.89	102.56	9.64	5.06	519.33
31	5	1757	327	629	6	54.50	104.83	5.37	2.79	292.83
MON TOT	505131	31264	59292	560	55.83	105.88	16.16	8.52	902.02	
1	6	0	48	115	1	48.00	115.00	0.00	0.00	0.00
2	6	283	48	115	1	48.00	115.00	5.90	2.46	283.00
3	6	170	16	38	1	16.00	38.00	10.63	4.47	170.00
MON TOT	453	112	268	3	37.33	89.33	4.04	1.69	151.00	

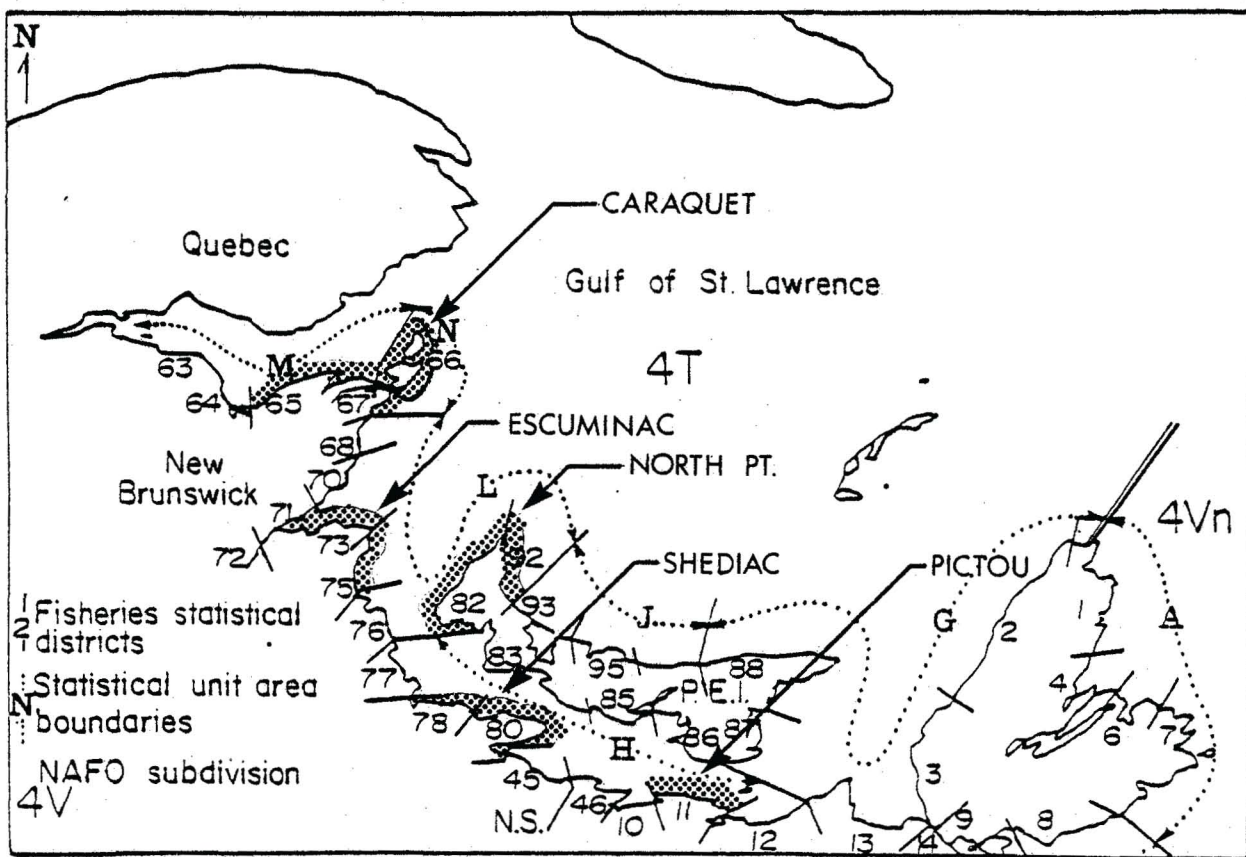


Figure 1. A map of the Southern Gulf of St. Lawrence showing fisheries statistical districts referred to in the text.

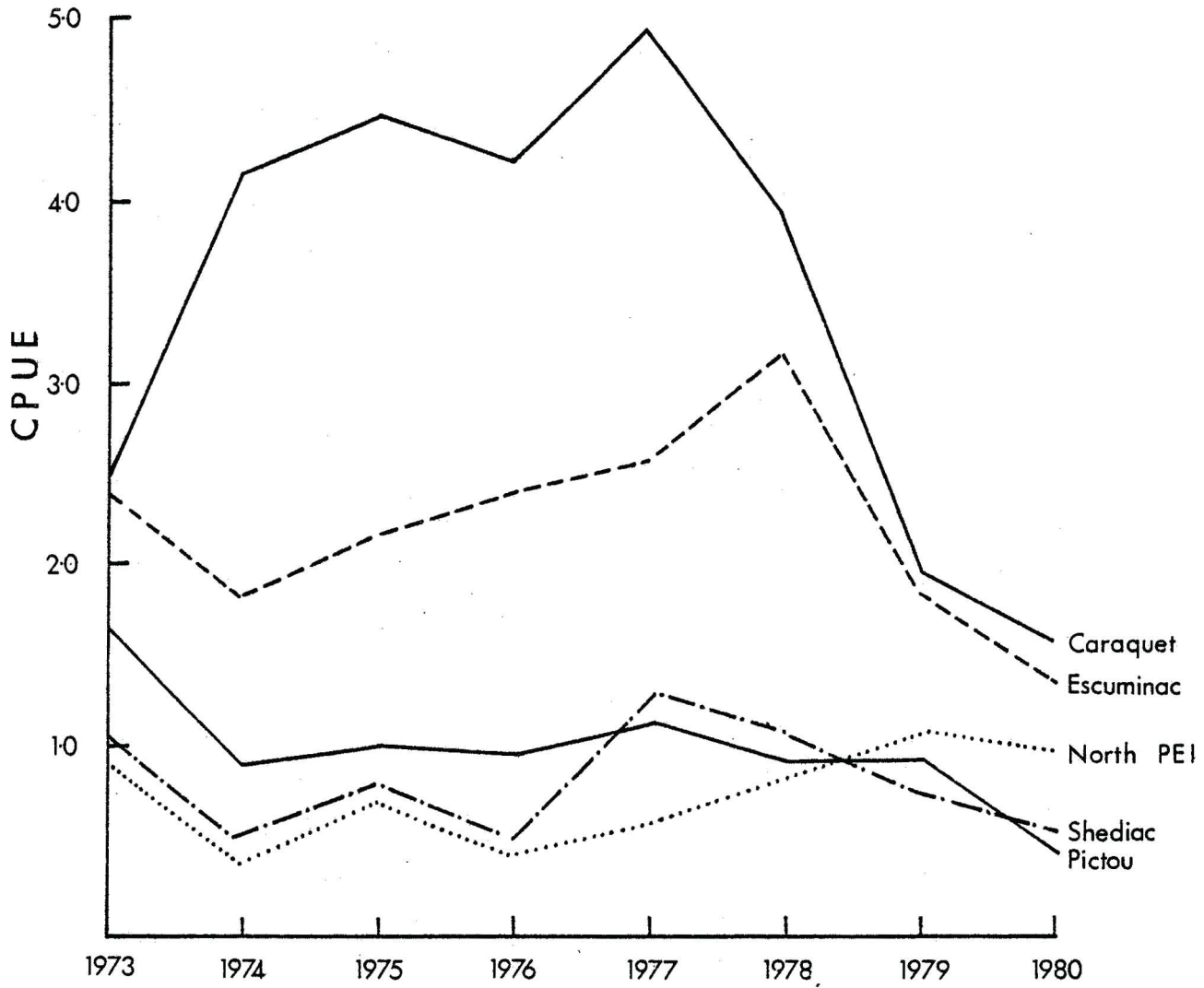


Figure 2. CPUE trend in 5 major inshore herring fisheries in the Southern Gulf of St. Lawrence, 1973-80.

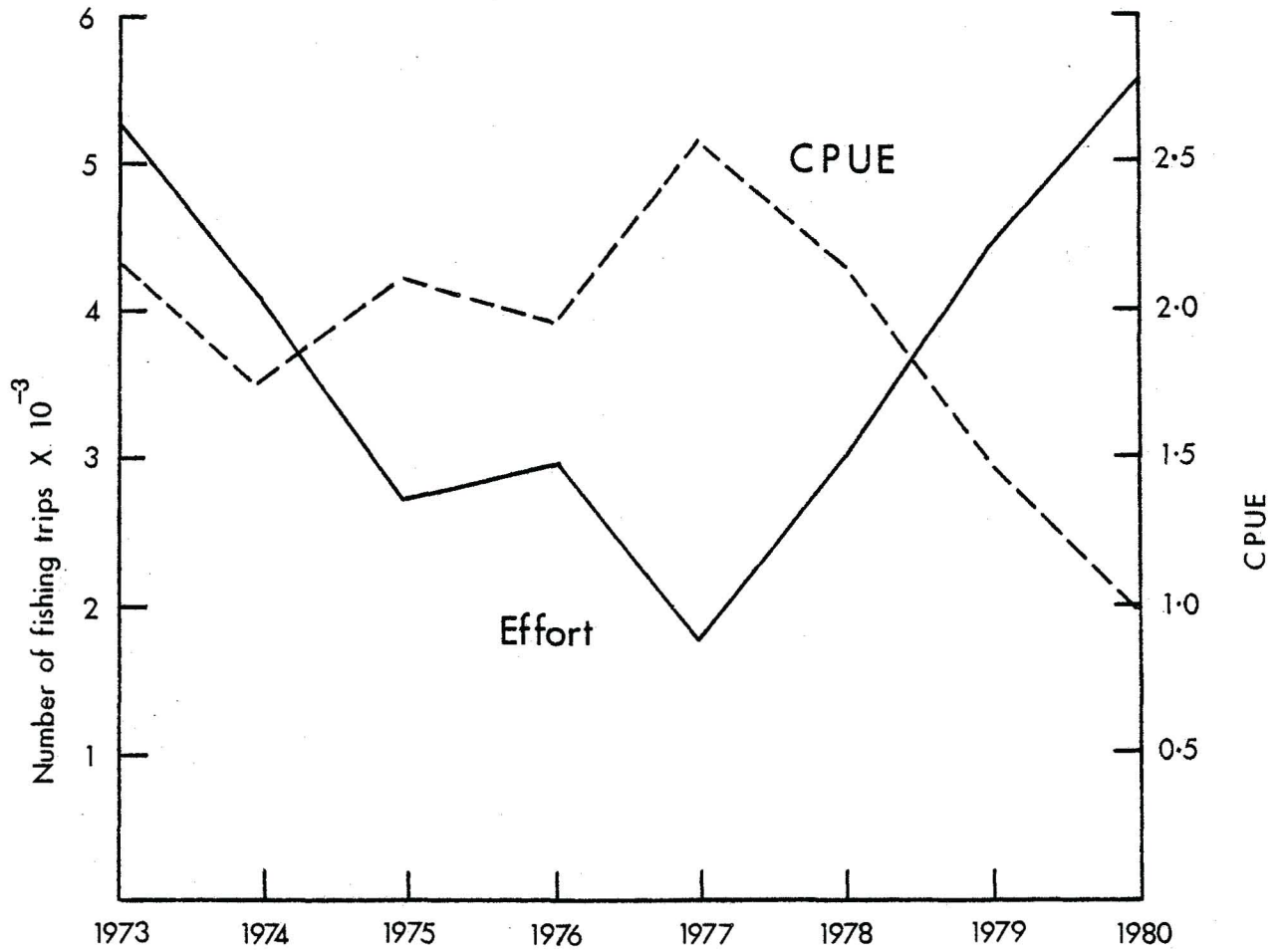


Figure 3. Trend in fishing effort and catch per unit of effort of inshore herring fisheries in the Southern Gulf of St. Lawrence in 1973-80.