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FISHERY CHARACTERISTICS AND STOCK STATUS OF GEORGES BANK SCALLOPS

by

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Abstract

Analysis of scallop fleet characteristics, effort and landings over the past twelve years is discussed, with particular attention devoted to explaining recent fluctuations. The decline in Canadian Georges Bank landings between 1979 (9207 t) and 1980 (5221 t) was the result of both a decline in average scallop abundance and a diversion of effort to the Scotian Shelf. In resource survey catches, average number of recruited scallops per tow in high CPUE areas decreased from 157 in 1978 to 70 in 1980, with a corresponding decrease in meat yield per tow of 60%. In 1979, 97% of Canadian effort of the offshore scallop fleet was applied on Georges Bank, whereas in 1980 only 78% of Canadian effort was applied to this ground. Offshore scallop fleet landings on the Scotian Shelf are estimated to have increased from 267 t in 1979 to 1473 t in 1980.

The value of the offshore fishery remains high, and although total landings decreased by 27%, landed value in 1980 decreased by 15%.

In contrast to a decline in abundance of recruited scallops (4+ year olds), prerecruit scallops increased between 1979 and 1980 in average abundance per tow by 328%, from 115 to 492. These scallops are sufficiently large now to be retained by commercial scallop gear, and are the basis of recent requests by fishermen to increase allowable meat counts per kilogram. Heavy exploitation of this year-class at a young age will reduce its potential overall yield in the long term. However, in the absence of any bilateral management agreement, the effectiveness of any management which can be applied to the Georges Bank scallop stock at this time by Canada is uncertain.

On analyse dans le présent document les caractéristiques de la flottille, l'effort de pêche et les débarquements des bateaux de pêche à la pétoncle dans les douze dernières années, surtout dans le but de trouver des explications aux fluctuations récentes. Le déclin des débarquements canadiens en provenance du banc Georges en 1979 (9 207 t) et 1980 (5 221 t) résulte à la fois d'une diminution de l'abondance moyenne des pétoncles et d'une diversion de l'effort vers le plateau néo-écossais. On a constaté, au cours de relevés de la ressource, que le nombre moyen de recrues par coup de drague dans les zones de fortes PUE avait diminué, passant de 157 en 1978 à 70 en 1980. On observa une diminution correspondante de 60% du rendement en chairs par coup de drague. En 1979, 97% de l'effort canadien par la flottille hauturière de pêche à la pétoncle était dirigé sur le banc Georges, alors qu'en 1980, ce pourcentage n'était que de 78. On estime que les débarquements de la flottille hauturière pêchant sur le plateau néo-écossais ont augmenté, passant de 267 t en 1979 à 1 473 t en 1980.

La valeur de cette pêche hauturière se maintient à un niveau élevé: bien que les débarquements totaux aient diminué de 27%, la valeur au débarquement diminuait de 15%.

Par opposition à la diminution d'abondance des pétoncles recrutés (âge 4+), le nombre de sujets d'avant-recrutement augmenta entre 1979 et 1980. passant d'une moyenne de 115 à 492 par coup de drague, soit une augmentation de 328%. Ces pétoncles sont maintenant suffisamment gros pour être retenus par les dragues commerciales. C'est pour cette raison que les pêcheurs ont demandé que le nombre de chairs permis par kilogramme soit augmenté. Une exploitation intensive et hâtive de cette classe d'âge entraînerait une diminution de son rendement potentiel à long terme. Cependant, en l'absence d'un accord de gestion bilatéral, l'efficacité de toute mesure appliquée au stock de pétoncles du banc Georges par le Canada est incertaine présentement.

Introduction

Georges Bank has been the primary offshore sea scallop (Placopecten magellanicus) fishing ground in the western Atlantic since exploration began there in the 1930s (Serchuk et al. 1979). Some inshore fishing grounds, notably in the Bay of Fundy, off Digby, N.S., have supported a commercial scallop fishery for a longer time (Jamieson and Lundy 1979) and while the offshore, mid-Atlantic region of the continental shelf south of Georges Bank has sporadically yielded quantities of scallop comparable to that of Georges Bank (Serchuk et al. 1979), the sustained high landings from Georges Bank have made this ground the mainstay of the present offshore scallop fisheries of both Canada and the United States.

Serchuk et al. (1979) have recently summarized the history of the sea scallop fisheries of both Canada and the United States and it is evident that while the offshore fishery expanded first in the United States, for the past two decades both countries have significantly exploited available scallop populations. Since 1960, American fishing activity has been about equally divided between the mid-Atlantic grounds and Georges Bank, whereas Canadian activity has been centered on Georges Bank, with exploitation of both the Scotian Shelf (ongoing) and the mid-Atlantic grounds (between 1965 and 1968) when these latter areas experienced successful recruitment. Because of the present Georges Bank boundary dispute between Canada and the United States, Canadian fishing activity since 1976 has been restricted to the northern part of Georges Bank and has been excluded from NAFO Subarea 6, whereas American fishing activity can occur over all of Georges Bank (NAFO Subarea 5Z), but is excluded from NAFO Subareas 3 and 4.

Since the early 1960s, Canadian fishing regulations have required the daily completion of scallop log records, and this has provided a record of both scallop fishing performance and the specific locations of scallop concentrations. American vessels have not been required to document daily fishing activity, and so these data are relevant only for the Canadian scallop fleet and its fishing locations. The potential use of these data in the estimation of exploitable scallop biomass has been previously discussed (Jamieson and Chandler 1980), and in this paper, fishery characteristics between 1966 and 1980 for both Georges Bank and the Scotian Shelf are presented, using as measures of effort days, and hours fished, drag width, and number of men on board the vessel.

Results of resource surveys from 1978 to 1980 are presented and discussed.

Materials and Methods

A. Log data

Fishermen are requested to report daily on a log record sheet (Fig. 1) their scallop catch (expressed as number of bags of scallop meat: each weighs about 18 kg), fishing location (i.e. navigational system and readings), effort (gear width, number of men on board, average tow duration and number of tows), calendar date, and as felt necessary, general comments as to weather, water depth and so on. Since there are no scallop closure zones

or TACs, scallop log data has never been associated with fisheries regulation enforcement. There has thus been no incentive to falsify or provide incomplete log records. Rather, because of the limited mobility of scallops and their contagious distribution (Jamieson and Chandler 1980), data from log records is used by Captains to evaluate alternate fishing strategies and locations. Maintenance of high data quality is thus in a Captain's own interest. Official landing statistics utilize sales slip data, not log data, and, because some log records may be incomplete, total catch as reported by logs is an underestimate of actual catch. A catch prorating coefficient (Table 1) is calculated to modify log catch and effort values accordingly. Similarly, as not all log records are complete as to fishing locations or effort data, even though catch data is provided, an additional effort prorating coefficient has been calculated to further adjust effort data. CPUE data was only calculated from those log records in which both catch and effort data were provided.

B. Resource surveys

Scallop resource surveys have been conducted annually since 1977 on the R/V E.E. PRINCE. In 1977, the number of stations per ten minutes of latitude and longitude (= ten minute square, or TMS) was weighted by the distribution of commercial effort in 1976, with station location within a TMS randomized. The result was relatively few stations located in areas having high densities of scallops. Since the intent of surveys is to assess scallop year-class strength and meat yield on commercial scallop ground, survey design was subsequently modified (see Jamieson and Chandler 1980), with stations being randomly assigned within commercial CPUE strata, irrespective of number per TMS. The percentage of the total number of stations assigned per stratum varied annually depending on the relative area of the strata, but was generally 25% in the low CPUE stratum, 25-40% in the medium and high CPUE strata, and 10-15% in TMSs (stations randomly located) in which fishing occurred but where there was insufficient commercial fishery data to allow the calculation of CPUE isopleths.

Two resource surveys were conducted in 1978: an intensive one (P 199; May) of 160 stations in three TMS designed to evaluate the new survey design procedure, (previously discussed by Jamieson and Chandler 1980); and a more extensive one (P 201; June) of 101 stations (Table 2) designed to survey the remainder of Georges Bank. Initial strata used in P 201 were CPUE strata, with lb/day as units. A posteriori restratification has utilized as a unit of effort hour-metre-man. The data from both surveys are combined in this report.

The 1979 survey (P 220; June) consisted of 155 stations (Table 3) confined to the northern part of Georges Bank, with CPUE strata measured in kg/hr. In 1980, the survey was carried out in two legs, (P 237; June), with 352 stations sampled (Table 4) in both the northern and southern parts and with CPUE strata measured in kg/h-m-men.

Survey procedures and gear in 1978 to 1980 were the same as described for survey P 199 (Jamieson and Chandler 1980). CPUE strata were determined from commercial data collected in the six months prior to each survey. Von Bertalanffy growth parameters used in aging were those described by Caddy and Jamieson (1977).

Results and Discussion

A. Fleet size

In the years 1966-1980 inclusive, the number of active vessels in the Canadian offshore scallop fleet increased from 40 to 77 vessels (Table 7). Entry into the fishery was unrestricted prior to 1973, and fleet size was a function of the relative profitability of scallop fishing. In 1973, the number of vessels that could participate in the offshore scallop fishery was restricted to those which were licenced in the fishery in the fiscal year 1973-74 or their replacements (77 vessels). Many licence holders were not active in the fishery in 1972, and 1980 was the first year in which all 77 vessels actively participated.

B. Fishery performance

1) Landings

Over the last two decades, the Georges Bank scallop fishery has experienced two peaks in landings: between the years 1959-1964 and 1976-1979 respectively. In the interval 1966 to 1975, Canadian landings averaged 4897 t of meat (Table 1), with a minimum landing of 3908 t in 1971. Landings peaked in 1977 (13089 t), and have since fallen rapidly to 9207 t in 1979 and 5221 t in 1980.

Relatively low landings from Georges Bank in 1980 are the result of both depletion of the above-average scallop year-class (1972) which had been the mainstay of the fishery during the preceding four years (see below), and increased fishing activity on the Scotian Shelf. For the first time since 1966, the percent of the total year's Canadian scallop catch caught by the offshore scallop fleet on Georges Bank dropped below 94% (Table 6); 23% of landings were fished from Browns (4%) and German (19%) Banks on the Scotian Shelf. Total landings from all fishing grounds by the offshore scallop fleet in 1980 are estimated to be 6694 t; this is a 27% reduction in total catch between 1979 and 1980.

Since total annual landings are a function of fleet size and vessels may fish Georges Bank and the Scotian Shelf on the same trip, average daily catch per vessel on Georges Bank (Table 7) is a better measure of fishery status than annual fishery landings (Table 1). Between peak years, average vessel catch on Georges Bank ranged between 500-750 kg meat per day. During peak years, average vessel catch on Georges Bank increased to about 1500 kg meat per day.

2) Effort

Fishing effort in the scallop fishery has historically been expressed as days fished (Serchuk et al. 1979). Prior to 1969, less than 7,000 vessel-days annually were spent by the Canadian offshore scallop fleet on Georges Bank (Table 1). Since then, effort has ranged between 7,500 to 8,800 vessel days, excepting 1980.

An alternate measure of effort is hours-meters-men, which is derived from the time the gear is actually on the sea bottom (hours) multiplied by gear width (m) multiplied by the number of men crewing the vessel. When this unit of effort is compared to days fished (Fig. 2; Table 1), differences in the relative annual expended effort are obvious. With the effort unit "days fished", there was an increase in effort in 1977 and then a general leveling off in effort until 1980. With "h-m-men", the decrease in effort occurred in 1977, and there were two years of major effort increase (1978 and 1979) until 1980.

In correlating recent annual fluctuations in number of "days fished" with the status of the scallop stock in Georges Bank, the suggested decline in effort in 1976 occurred when the above-average scallop year-class was recruiting to the fishery. Total number of trips to Georges Bank (Table 7) declined in 1976 and since this was coincident with an increased CPUE from Browns Bank (Table 8), it would appear that as in 1980, but to a somewhat lesser extent, the decline in effort and landings resulted from a transfer of fishing activity to the Scotian Shelf.

With the effort unit h-m-men, there was no major decrease in effort in 1976; the decline in number of trips (Table 7) was balanced by a greater number of hours fishing per trip (Table 6) and a larger average gear and crew size (Table 9). Although young scallops are often contagiously distributed (Jamieson and Chandler, 1980), their smaller meat yield increases processing time per unit weight of meat. Also, because a meat count regulation of 44-1/2 kg (40/lb) was in effect as of May, 1976, the landing of small meats necessitated the fishing of older, large-meat yielding scallops. By blending meats of different sizes fished during the course of a trip, an acceptable meat count could be achieved at landing. Large scallops in 1976 were relatively less abundant, and with a low CPUE, increased effort was required.

By 1977, rapid growth of the young scallops (Brown et al. 1972) allowed them to be fished with little blending of meat sizes required. Their above-average abundance reduced fishing hours per day (Table 6), while increased prices (Table 10) resulted in an increase in fishing days (Table 1). Regulation (as of March 15, 1977; maximum trip duration, dock to dock: 12 days; maximum landing per vessel per trip: 13.1 t; and maximum landing per vessel over a 4-month period: 81.6 t) has effectively restricted the maximum number of fishing days since 1977 to about 8,800 per year. However, expressed as h-m-men, effective effort fluctuates more, and increased (Table 1) as the abundance of the above-average scallop year-classes decreased. This increase was the result of both higher scallop prices (Table 10) and the return of effort to the more traditional, maximum level of about 15 fishing h/day (Table 6).

3) CPUE

Average annual scallop CPUE for Georges Bank has been greater than that for any fishing location on the Scotian Shelf in the years 1969 to 1975 inclusive, and in 1977 (Table 8; Fig. 3). In 1976 and 1978 to 1980 inclusive, Scotian Shelf CPUE was considerably greater, explaining in part why fishing effort increased on this ground in these years. However, since CPUE reflects scallop density, not overall scallop abundance, its value as a measure of fishery performance is more qualitative than quantitative.

Historically, scallops have been of much greater abundance on Georges Bank than on the Scotian Shelf, and thus even though CPUE may, on occasion, be greater on the Scotian Shelf, the percentage of the total annual scallop catch which has been fished on the Scotian Shelf has been always low (Table 8; Fig. 3).

To reach Georges Bank, Canadian offshore scallop vessels have to steam over the Scotian Shelf, and it is common for vessels to make a few tows there to obtain scallops to keep the crew occupied. Thus, even though CPUE may be relatively less, some scalloping generally occurs each year on the Scotian Shelf.

On Georges Bank, CPUE reached a minimum value of about 0.3 kg/h-m-men (36 kg/h-m) in the years 1970-1973 inclusive. Prior to 1970, CPUE was decreasing following the above average landings of the early 1960s (Serchuk et al. 1979). After 1973, CPUE began to increase as another above-average year-class (1972) entered the fishery. Peak CPUE was 1.0 kg/h-m-men (139 kg/h-m) in 1977.

These average CPUE values are similar to those reported recently in the Northumberland Strait scallop fishery; two-man crews typically have scallop CPUEs of 1.0-2.0 kg/h-m (= 0.5-1.0 kg/h-m-men) (Jamieson et al. 1981b,c,d).

4) Log data quality (fishing location)

The importance of accurate knowledge of the fishing locations of vessels for resource survey purposes has been previously discussed and a comparison of 1978 log data with aerial surveillance records indicated an average daily discrepancy of 36 km (Jamieson and Chandler 1980). Additional data for the years 1979-1980 is presented (Table 11), and results indicate that recent average discrepancies are 20-25 km. This is considered indicative of accurate recording of fishing data, since a surveillance record is only for a specific time during a day whereas the log record is for the entire day's activity. Explanations (Table 12) for those discrepancies >90 km indicate that extensive movement by vessels during a day, not misrepresentation, account for most major discrepancies.

5) Commercial meat weight and age class frequencies

Resource Branch personnel weigh individual meats (adductor muscles) in subsamples of commercial landings, and these data have been used to calculate both average monthly scallop age fished and meat count (Table 13). In 1978 and 1979, average exploited age was about 5.25 yr (meat count: 29/500 g), but this decreased substantially in 1980 to 4.5 yr (meat count: 38/500 g). The explanation for this shift in exploitation emphasis to a younger scallop is two-fold: a) depletion of significant quantities of the 1972 scallop year-class, which was of above-average abundance, and the subsequent shift in exploitation to more recent scallop year-classes on Georges Bank, and b) significant fishing on the Scotian Shelf, with blending of these smaller meats (Jamieson et al. 1981a) in the overall landings.

During 1978-1980, the quantity of commercial landings sampled increased from 0.001% (133 kg) to 0.03% (1474 kg) of the total catch; sampling

is still seasonally biased and in quantity, largely dependent on the availability of summer students for sampling. Apart from a monthly documentation of fishery performance, the main value of such data is anticipated to be in the establishment of a sufficiently large data base over the long term to document relative year-class exploitation and obtain estimates of fishing mortality and exploitable biomass.

C. Resource surveys

Average scallop catch at age per tow (Table 14) documents the rapid removal of scallops in the late 1970s. Analytical scallop ageing procedures result in a decreasing ability with increasing scallop age to age accurately, and so by 1978, a number of year-classes from the early 1970s (1971-1973) are suggested (Table 14) to have been above the recent average in abundance. In fact, data indicate that it was only the 1972 year-class which was relatively abundant (Serchuk et al. 1979).

The 1976 and 1978 year-classes were also above the recent average in abundance (Table 14), although they were not as abundant as was the 1972 year-class. The absence of Canadian resource surveys on Georges Bank prior to 1977 prevents direct comparison of prerecruit abundance; the Americans conducted a resource survey in 1975 but their gear was unlined and hence would poorly sample prerecruits (Serchuk et al. 1979). However, while the 1972 year-class supported the entire Georges Bank scallop fishery during 2 yr of record landings, recent periods of above-average recruitment have resulted in a relatively short-term (<6-mo) increase in CPUE and landings.

The survey design described by Jamieson and Chandler (1980) to establish commercial CPUE strata for subsequent resource surveys appears to have been effective; higher commercial CPUE (kg/h-m-men) strata had a greater average number of scallops per tow in resource surveys. Number of scallops is perhaps a poor measure of the status of the stock, since many may be prerecruits unavailable to the fishery. Average scallop meat yield per stratum (Table 14) thus better reflects fishery potential. Average yield per ton from the highest strata were 4.32, 2.63, and 2.91 kg in 1978, 1979, and 1980, respectively (the two highest strata in 1978 were combined for comparative purposes).

An average prerecruit abundance >500 per tow was observed in one stratum in 1978, was not observed in any strata in 1979, and occurred in two strata in 1980. Comparison of areas between years (km^2) contained within each strata (unpublished data), and the greater scallop density observed in 1980, indicates that as 2-yr-olds, the 1978 year-class was more abundant than the 1976 year-class.

D. Estimation of fishing rate

There is no clear correlation in scallops between catch and effort (Fig. 4). During the period 1966-1973, decreasing catch with increasing effort suggests that there was no reserve to draw from and that exploitation was severe. However, from 1972-1980, catch increased, then decreased, three-fold with little change in effort.

E. Management

As a highly fecund species which is widely distributed, and in part located in areas inaccessible to commercial fishing, derivation of a useful stock-recruitment relationship for scallops is difficult. Environmental variables are suggested to largely determine year-class strength, and it remains for management to optimize yield per recruit. Present approaches to derive an optimal exploitation rate need refinement to include the blending aspect of a meat count regulation; scallops of different ages are mixed to achieve an acceptable value. The concept of knife-edge recruitment has little relevance to a scallop fishery.

With the decline of older scallop reserves and the relatively large number of Canadian and American (F. Serchuk, pers. comm.) vessels presently in the fishery, significant exploitation of young scallops near the age of first retention by the gear is likely for the near future. This will reduce the potential yield from recent and new recruitment in the long term (Brown et al. 1972), but in the absence of any acceptable exploitation strategy by Canada and the United States, no biological management program by Canada is likely to be particularly effective at this time.

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Table 1. Annual prorated effort and catch (t meat) values from log records for the Canadian offshore scallop fleet in NAFO subarea 5Ze (+: subarea 5Z). Effort units are days fishing, hours gear is on the sea bottom, and hours multiplied by gear width (m) multiplied by number of men.

	Prorated coefficient		EFFORT			
	Effort (complete data/ total log data)	Catch (log data/ ICNAF data)	Days*	H* (10^{-2})	H-Meter-Men* (10^{-4})	Catch**
1966+	2.42	1.60	5662	719	880	4878+
1967+	1.54	6.54	6829	873	1056	5019+
1968	1.27	2.02	6703	905	1100	4810
1969	1.03	1.77	6727	1041	1259	4318
1970	1.14	1.90	7691	1106	1311	4097
1971	1.03	2.05	7800	1111	1393	3908
1972	1.07	2.14	8319	1139	1397	4161
1973	1.06	2.01	8144	1153	1355	4223
1974	1.22	1.75	8278	1212	1461	6137
1975	1.41	1.50	8387	1186	1522	7414
1976	1.26	1.32	7534	1125	1520	9761
1977	1.08	1.24	8759	974	1299	13089
1978	1.06	1.19	8799	1105	1520	12189
1979	1.07	1.19	8746	1268	1741	9207
1980	1.05	1.19	6863	955	1302	5221

*These values have been prorated by both effort and catch prorating coefficients.

**Source: 1966-1978: ICNAF Statistical Bulletins; 1979-80: NAFO Statistical Bulletins. Note: the Canadian sea scallop conversion coefficient from round weight to meat weight is 8.3.

Table 2. Location, depth and scallop catch characteristics for stations surveyed on Georges Bank in 1978 (Cruise P 201).

GEORGES BANK SURVEY (P201) 1978

STN#	LAT	LONG	DEPTH (M)	WEIGHT(KG) TOTAL	WEIGHT(KG) SAMPLE	#AT AGE(YR) 1-3	#AT AGE(YR) 4-7	#AT AGE(YR) 8+	TRASH (TUBS)
1	420605	672302	79.0	81.	22.	383.	234.	0.	4.5
2	420450	672050	51.0	14.	14.	27.	59.	4.	14.0
3	420812	671744	88.0	48.	24.	129.	86.	2.	1.5
4	420401	671017	50.0	51.	21.	147.	222.	10.	13.0
5	420614	670523	60.0	93.	14.	744.	213.	2.	13.0
6	420745	670242	70.0	47.	16.	20.	200.	0.	10.0
7	420239	670250	58.0	54.	20.	8.	112.	20.	9.0
8	420504	665657	64.0	46.	24.	237.	69.	0.	11.8
9	420704	665606	67.0	154.	16.	68.	809.	0.	25.0
10	420453	665234	66.0	127.	20.	19.	413.	2.	12.0
11	420652	664853	69.0	43.	15.	4.	109.	5.	12.0
12	420634	664826	69.0	194.	20.	31.	601.	5.	21.0
12	420017	664911	69.0	63.	15.	158.	0.	0.	19.5
13	415501	664736	65.0	78.	18.	383.	160.	0.	15.0
14	414449	665509	62.0	2.	2.	77.	198.	20.	3.5
15	415416	664652	63.0	40.	24.	3.	1.	1.	13.5
16	421105	670112	64.0	50.	22.	140.	124.	20.	16.5
17	420147	664127	70.0	14.	14.	71.	24.	1.	13.0
18	420623	663910	72.0	186.	20.	28.	34.	0.	22.5
19	420702	663757	77.0	61.	20.	26.	465.	28.	13.0
20	420317	663725	79.0	80.	28.	8.	133.	6.	17.5
21	420217	663724	76.0	50.	20.	25.	230.	5.	14.0
22	415659	663750	76.0	37.	20.	20.	126.	1.	8.0
23	415532	663722	74.0	50.	18.	22.	85.	1.	8.0
24	415525	663604	75.0	35.	24.	150.	53.	0.	14.0
25	415451	663519	73.0	20.	20.	89.	95.	1.	8.5
26	415715	663601	71.0	24.	24.	28.	88.	1.	6.5
27	415847	663617	75.0	33.	20.	15.	47.	1.	10.0
28	420307	663500	81.0	66.	18.	6.	63.	9.	100.0
29	420229	663421	77.0	20.	20.	0.	51.	48.	50.0
30	415906	663138	79.0	72.	23.	6.	51.	5.	160.0
31	420132	663009	82.0	63.	21.	158.	257.	0.	120.0
32	420323	663029	81.0	38.	20.	155.	173.	2.	7.5
33	420814	662822	85.0	20.	20.	41.	104.	0.	110.0
34	420420	662343	104.0	94.	21.	110.	17.	0.	10.5
35	420130	662339	86.0	86.	18.	28.	716.	22.	8.5
36	415840	662259	85.0	86.	13.	356.	341.	2.	120.0
37	415709	662609	82.0	55.	24.	235.	35.	2.	100.0
38	415646	662428	81.0	50.	15.	131.	192.	13.	9.5
39	415420	662321	82.0	29.	19.	266.	189.	7.	120.0
40	414639	662359	83.0	20.	20.	1.	50.	16.	30.0
41	414703	661600	81.0	19.	19.	1.	39.	18.	20.0
42	415105	661559	83.0	39.	19.	7.	53.	8.	70.0
43	415052	661515	84.0	13.	13.	30.	88.	9.	10.0
44	415126	661515	83.0	38.	18.	4.	34.	7.	14.5
45	415231	661541	82.0	44.	24.	3.	92.	11.	130.0
46	415418	661635	83.0	49.	17.	6.	90.	5.	130.0

Table 2 (cont'd)

47	415429	661727	86.0	55.	20.	34.	95.	8.	210.0
48	415658	661634	81.0	61.	13.	31.	74.	2.	14.5
49	415450	661315	83.0	168.	24.	548.	150.	0.	23.5
50	415454	661001	84.0	53.	14.	274.	661.	8.	15.0
51	415338	660617	92.0	256.	24.	348.	152.	0.	12.0
52	415106	660402	95.0	59.	20.	412.	462.	1.	30.0
53	414528	661352	97.0	21.	18.	129.	220.	0.	50.0
54	414200	661337	87.0	10.	10.	138.	69.	0.	70.0
55	414351	660930	90.0	18.	18.	97.	22.	0.	40.0
56	414306	660643	91.0	49.	12.	9.	57.	0.	80.0
57	414228	660651	97.0	11.	5.	610.	154.	0.	40.0
58	414129	660838	96.0	25.	6.	284.	31.	0.	30.0
59	414035	660826	94.0	20.	20.	592.	83.	0.	60.0
60	413921	660700	95.0	45.	21.	26.	120.	0.	40.0
61	413143	661442	99.0	58.	17.	16.	201.	0.	10.0
62	413224	661727	91.0	10.	10.	238.	234.	0.	20.0
63	412810	663021	90.0	15.	15.	9.	50.	0.	10.0
64	412139	663114	91.0	30.	20.	9.	44.	2.	40.0
65	411748	663108	91.0	32.	18.	57.	111.	0.	1.5
66	411750	664137	91.0	24.	24.	15.	169.	6.	20.0
67	411543	663029	77.0	34.	20.	14.	44.	7.	30.0
68	410410	662949	91.0	1.	1.	99.	112.	2.	20.0
69	410647	664040	95.0	14.	14.	7.	4.	0.	2.5
70	410620	664105	81.0	15.	15.	30.	63.	1.	1.5
71	405849	664959	80.0	6.	6.	25.	43.	0.	20.0
72	405748	664544	76.0	15.	15.	0.	9.	1.	10.0
73	410105	664847	83.0	15.	15.	2.	60.	3.	10.0
74	410232	664744	72.0	24.	24.	5.	48.	8.	50.0
75	410222	670445	73.0	21.	21.	6.	59.	3.	4.5
76	405935	671754	70.0	27.	24.	0.	25.	24.	70.0
77	405827	671810	72.0	21.	21.	27.	68.	8.	4.5
78	405931	672457	75.0	14.	14.	77.	22.	0.	30.0
79	405652	672618	70.0	6.	6.	17.	18.	9.	1.5
80	411329	692304	72.0	39.	24.	4.	4.	4.	50.0
81	405726	690718	72.0	95.	20.	46.	352.	5.	14.5
82	405754	690954	70.0	132.	24.	265.	394.	0.	14.5
83	405951	691357	62.0	8.	8.	595.	427.	0.	2.5
84	411517	692428	63.0	0.	0.	15.	38.	17.	2.5
85	411641	692440	47.0	0.	0.	0.	1.	0.	.5
86	412251	692334	48.0	9.	9.	0.	1.	1.	.5
87	412245	693327	43.0	3.	3.	4.	35.	0.	100.0
88	412742	692602	27.0	16.	16.	3.	6.	1.	170.0
89	412812	692939	43.0	4.	4.	0.	56.	0.	9.5
90	413512	692927	38.0	0.	0.	0.	27.	0.	50.0
91	410436	684730	70.0	20.	20.	1.	1.	0.	20.0
92	411534	683821	65.0	20.	20.	27.	166.	10.	10.0
93	415355	675627	64.0	10.	10.	4.	13.	18.	20.0
94	424942	660641	70.0	0.	0.	8.	22.	6.	15.0
95	425024	660932	62.0	34.	34.	123.	0.	1.	10.0
96	425023	661058	59.0	50.	26.	84.	113.	1.	19.0
97	424838	660944	55.0	3.	3.	47.	174.	0.	10.0
98	424917	661845	58.0	0.	0.	0.	6.	0.	5.3
99	424634	661708	56.0	2.	2.	0.	0.	0.	7.0
100	424736	662153	52.0	0.	0.	0.	2.	1.	1.5

Table 3. Location, depth and scallop catch characteristics for stations surveyed on Georges Bank in 1979 (Cruise P 220).

GEORGES BANK SURVEY (P220) 1979

STN#	LAT	LONG	DEPTH (M)	WEIGHT(KG) TOTAL	WEIGHT(KG) SAMPLE	#AT AGE(YR) 1-3	#AT AGE(YR) 4-7	#AT AGE(YR) 8+	TRASH (TUBS)
1	415634	660332	95.0	24.	24.	17.	74.	1.	7.0
2	415412	660104	94.0	68.	19.	46.	89.	0.	13.5
3	415413	660301	94.0	41.	24.	749.	221.	0.	2.0
4	415412	660352	95.0	37.	23.	716.	98.	0.	7.5
5	415131	660248	98.0	19.	19.	13.	92.	2.	1.0
6	415138	660929	89.0	11.	11.	31.	27.	0.	2.0
7	415527	661150	88.0	36.	21.	12.	74.	2.	14.0
8	415441	661236	83.0	73.	24.	200.	96.	1.	18.0
9	415504	661332	82.0	42.	24.	233.	86.	1.	14.0
10	415602	661351	82.0	12.	12.	41.	55.	0.	12.0
11	415636	661450	80.0	58.	24.	202.	191.	1.	15.0
12	415628	661600	87.0	48.	24.	349.	74.	2.	3.5
13	415128	661616	82.0	24.	24.	25.	21.	6.	8.0
14	415446	661951	80.0	92.	18.	953.	135.	3.	16.5
15	415814	662354	81.0	29.	24.	279.	95.	13.	5.5
16	415742	662444	86.0	17.	17.	87.	44.	2.	5.0
17	415614	662651	89.0	49.	23.	11.	47.	48.	9.0
18	415504	662841	81.0	11.	11.	4.	11.	5.	6.0
19	415211	662813	82.0	2.	2.	3.	4.	5.	1.0
20	415717	662837	80.0	45.	20.	320.	79.	1.	20.0
21	415831	662939	80.0	88.	23.	284.	194.	4.	15.0
22	415945	662859	78.0	58.	21.	98.	146.	1.	27.0
23	420634	662727	81.0	78.	20.	7.	197.	15.	21.0
24	420504	663312	83.0	61.	20.	167.	271.	6.	17.0
25	420429	663337	80.0	34.	20.	103.	59.	2.	13.0
26	420136	663734	78.0	24.	24.	19.	61.	7.	6.0
27	415948	664053	69.0	34.	22.	29.	39.	2.	19.0
28	415957	664314	76.0	39.	20.	142.	77.	2.	17.0
29	420251	664543	74.0	44.	20.	6.	89.	2.	15.0
30	420432	664708	69.0	50.	19.	6.	69.	5.	16.0
31	420645	664711	70.0	56.	20.	20.	249.	3.	20.0
32	420553	664919	69.0	48.	20.	68.	118.	0.	17.0
33	420606	664941	68.0	34.	20.	44.	86.	0.	15.0
34	420545	665424	66.0	69.	21.	497.	101.	2.	16.0
35	420605	665526	67.0	40.	22.	236.	33.	0.	21.0
36	420706	665600	66.0	17.	17.	152.	31.	0.	5.0
37	420926	665954	80.0	9.	9.	10.	23.	0.	7.0
38	420707	665830	62.0	53.	20.	199.	60.	0.	15.0
39	420614	665748	63.0	34.	24.	357.	77.	1.	11.0
40	420600	665546	67.0	25.	20.	157.	62.	2.	8.0
41	420453	665441	64.0	58.	24.	263.	57.	2.	13.0
42	420357	665347	68.0	19.	19.	80.	36.	2.	10.0
43	420154	665112	74.0	20.	20.	125.	41.	0.	4.0
44	420119	664956	68.0	60.	24.	771.	156.	1.	9.0
45	420104	665232	55.0	0.	0.	0.	3.	0.	.1
46	420228	665707	68.0	2.	2.	0.	4.	2.	.1
47	420225	665738	63.0	0.	0.	0.	0.	0.	.5

Table 3 (cont'd)

48	420243	665820	58.0	0.	0.	0.	1.	0.	.3
49	420157	670236	62.0	6.	6.	5.	6.	3.	10.0
50	420143	670256	63.0	37.	20.	22.	51.	12.	8.0
51	420125	670337	61.0	37.	20.	32.	35.	9.	9.0
52	420257	670307	58.0	5.	5.	14.	13.	1.	12.0
53	420323	670308	57.0	15.	15.	19.	34.	2.	5.5
54	420505	670158	61.0	74.	24.	776.	177.	1.	12.0
55	420736	670201	64.0	32.	19.	290.	70.	1.	10.0
56	420946	670420	87.0	24.	24.	31.	95.	0.	3.0
57	420852	670410	71.0	34.	15.	14.	179.	4.	11.0
58	420620	670610	54.0	71.	21.	514.	44.	0.	19.0
59	420336	670621	55.0	30.	15.	209.	58.	1.	9.0
60	420253	670540	55.0	27.	18.	203.	78.	7.	8.0
61	420339	670802	48.0	21.	21.	15.	34.	20.	3.5
62	420140	670855	55.0	10.	10.	4.	18.	3.	4.0
63	420124	670947	53.0	22.	22.	58.	41.	12.	11.0
64	420131	671059	52.0	44.	24.	288.	104.	9.	17.0
65	415851	671237	49.0	7.	7.	126.	15.	4.	7.0
66	415943	671316	54.0	24.	24.	97.	35.	3.	11.0
67	420212	671128	50.0	20.	20.	90.	24.	1.	7.0
68	420255	671248	51.0	46.	18.	258.	58.	5.	13.0
69	420249	671419	48.0	46.	23.	156.	78.	7.	12.0
70	420236	671440	46.0	32.	21.	154.	56.	2.	10.0
71	420306	671540	45.0	44.	20.	147.	45.	3.	20.0
72	420239	671652	44.0	20.	20.	63.	64.	13.	11.0
73	420327	671800	49.0	20.	20.	163.	27.	0.	12.0
74	420409	671556	46.0	75.	24.	590.	58.	0.	14.0
75	421002	671219	126.0	67.	20.	152.	492.	228.	6.0
76	420854	671301	111.0	10.	10.	5.	46.	0.	1.0
77	420619	671658	63.0	34.	24.	194.	80.	0.	11.0
78	420907	672258	161.0	0.	0.	0.	0.	0.	4.0
79	420804	672305	126.0	22.	22.	2.	71.	1.	3.0
80	420708	672510	111.0	28.	20.	11.	87.	6.	3.0
81	420031	673820	48.0	98.	22.	0.	63.	69.	8.0
82	420423	671947	51.0	43.	24.	359.	54.	0.	16.0
83	420133	671930	48.0	25.	25.	62.	24.	8.	15.0
84	420139	672000	47.0	25.	25.	61.	43.	17.	24.0
85	420112	672104	49.0	15.	15.	74.	26.	7.	16.0
86	420135	672133	49.0	34.	24.	70.	42.	16.	21.0
87	415949	672407	42.0	1.	1.	3.	3.	0.	1.0
88	415814	672243	48.0	12.	12.	6.	10.	8.	2.0
89	415904	672054	53.0	186.	19.	406.	491.	90.	16.0
90	415551	671957	47.0	19.	19.	58.	14.	8.	15.0
91	414907	671742	49.0	6.	6.	40.	11.	0.	.3
92	414838	671806	52.0	0.	0.	9.	0.	0.	2.5
93	414405	671328	56.0	0.	0.	1.	0.	0.	1.0
94	414230	671354	52.0	0.	0.	1.	1.	0.	2.0
95	414206	671235	53.0	37.	22.	39.	79.	0.	11.0
96	414211	671149	52.0	38.	23.	312.	186.	4.	15.0
97	414103	671116	55.0	36.	20.	96.	70.	5.	15.0
98	414102	670909	59.0	3.	3.	1.	2.	1.	1.5
99	414150	670909	59.0	1.	1.	2.	1.	0.	1.0
100	414108	670726	57.0	0.	0.	0.	0.	0.	1.0

Table 3 (cont'd)

101	414513	670642	59.0	0.	0.	0.	1.	0.	7.0
102	414653	670738	59.0	6.	6.	1.	0.	4.	4.0
103	414713	665723	61.0	10.	10.	11.	44.	5.	4.0
104	415239	670339	59.0	64.	23.	165.	75.	12.	21.0
105	415732	670344	58.0	22.	22.	11.	38.	12.	9.0
106	415554	665959	56.0	0.	0.	0.	1.	0.	1.0
107	415508	664953	60.0	10.	10.	9.	19.	1.	1.0
108	415438	664906	62.0	29.	16.	128.	84.	0.	10.0
109	415410	664830	62.0	24.	24.	131.	56.	0.	9.0
110	415235	664556	64.0	9.	9.	20.	19.	0.	4.5
111	415441	664549	70.0	43.	19.	0.	20.	25.	14.0
112	415619	664717	64.0	39.	20.	83.	90.	3.	21.0
113	415845	664859	64.0	69.	24.	208.	106.	0.	17.0
114	415950	665019	65.0	15.	15.	162.	44.	0.	7.0
115	420009	665103	69.0	54.	20.	203.	103.	3.	14.0
116	415934	664903	64.0	73.	20.	614.	208.	0.	20.5
117	415947	664750	66.0	34.	20.	329.	86.	1.	17.0
118	420005	664659	66.0	51.	25.	179.	106.	5.	20.0
119	415817	664647	67.0	30.	20.	148.	59.	2.	17.0
120	415717	664336	73.0	21.	21.	32.	47.	7.	12.0
121	415900	663835	74.0	10.	10.	30.	40.	2.	10.0
122	415827	663819	73.0	34.	24.	16.	73.	6.	18.0
123	415826	663501	78.0	6.	6.	0.	4.	10.	1.0
124	415729	663652	73.0	50.	20.	229.	342.	12.	10.0
125	415657	663731	74.0	19.	19.	147.	70.	4.	9.5
126	415442	664006	71.0	16.	16.	5.	26.	13.	5.0
127	415203	663930	69.0	24.	20.	33.	62.	35.	9.0
128	414306	663837	66.0	1.	1.	1.	1.	0.	.1
129	414129	663555	69.0	0.	0.	0.	0.	2.	3.5
130	414450	663157	76.0	15.	15.	0.	6.	22.	2.0
131	414804	662627	80.0	15.	15.	2.	10.	11.	2.0
132	414538	662223	77.0	15.	15.	10.	20.	17.	3.0
133	414815	661504	86.0	19.	19.	51.	30.	15.	9.0
134	414449	660343	99.0	15.	15.	7.	31.	0.	1.0
135	413801	660609	98.0	20.	20.	25.	76.	0.	5.0
136	414228	661419	87.0	17.	17.	73.	40.	4.	2.0
137	405245	672649	80.0	12.	12.	37.	13.	15.	5.5
138	400606	665335	81.0	6.	6.	1.	0.	0.	1.0
139	405830	671838	76.0	10.	10.	67.	22.	7.	3.0
140	405940	671035	76.0	5.	5.	14.	5.	3.	2.0
141	405152	671032	85.0	2.	2.	5.	6.	0.	1.5
142	410046	664957	75.0	14.	14.	1.	33.	6.	1.0
143	410620	664036	82.0	15.	15.	20.	26.	2.	.5
144	410437	663320	91.0	8.	8.	13.	17.	1.	1.0
145	411122	663337	94.0	18.	18.	40.	45.	1.	2.0
146	411733	662640	97.0	24.	24.	8.	65.	1.	2.0
147	412113	663109	92.0	10.	10.	59.	32.	0.	2.0
148	412305	663051	91.0	15.	15.	98.	37.	7.	2.0
149	412143	664131	80.0	5.	5.	2.	4.	12.	3.0
150	412736	663923	82.0	5.	5.	1.	10.	6.	2.0
151	412458	662820	95.0	8.	8.	20.	14.	2.	4.0
152	412456	662226	95.0	20.	20.	8.	93.	1.	2.0
153	412750	661947	93.0	3.	3.	1.	10.	0.	.5
154	413030	662655	91.0	6.	6.	7.	17.	3.	2.0

Table 3 (cont'd).

155	413844	662448	83.0	9.	9.	1.	12.	7.	2.0
156	413957	661739	85.0	15.	15.	23.	30.	20.	3.5
157	414035	661711	85.0	19.	19.	78.	32.	4.	13.0
158	414105	661615	86.0	9.	9.	21.	10.	2.	2.5
159	414156	661722	0.0	10.	10.	1.	22.	7.	2.5
160	414359	661720	85.0	5.	5.	1.	13.	4.	0.0
161	424942	660632	60.0	0.	0.	2.	1.	0.	6.0
162	425024	660940	59.0	2.	2.	30.	13.	2.	.5
163	423653	660946	68.0	105.	24.	166.	518.	0.	4.0
164	423500	660659	103.0	338.	26.	4929.	214.	0.	6.0

Table 4. Location, depth and scallop catch characteristics for stations surveyed on Georges Bank in 1980 (Cruise P 237).

GEORGES BANK SURVEY (P237) 1980

STN#	LAT	LONG	DEPTH (M)	WEIGHT(KG) TOTAL	WEIGHT(KG) SAMPLE	#AT AGE(YR) 1-3	#AT AGE(YR) 4-7	#AT AGE(YR) 8+	TRASH (TUBS)
1	420307	660207	107.0	0.	0.	28.	8.	0.	.3
2	415503	655517	113.0	0.	0.	1.	0.	0.	2.0
3	415855	660910	90.0	0.	0.	16.	36.	1.	14.0
4	415434	660804	91.0	0.	0.	78.	22.	0.	16.0
5	415435	660223	96.0	0.	0.	31.	37.	0.	12.0
6	415341	660225	95.0	0.	0.	249.	27.	0.	8.0
7	415312	660300	94.0	0.	0.	437.	43.	0.	7.0
8	415207	660631	93.0	0.	0.	36.	13.	0.	1.0
9	415011	660209	97.0	0.	0.	34.	67.	2.	2.0
10	415022	660906	87.0	0.	0.	56.	94.	1.	1.5
11	415013	660853	87.0	0.	0.	61.	82.	0.	5.0
12	415004	661018	85.0	0.	0.	189.	34.	0.	4.0
13	415022	661031	85.0	0.	0.	209.	41.	0.	2.0
14	415013	661220	79.0	0.	0.	316.	56.	0.	8.0
15	415029	661121	81.0	0.	0.	931.	92.	0.	9.0
16	415047	661217	81.0	0.	0.	1008.	62.	0.	0.0
17	415100	661127	81.0	0.	0.	851.	85.	0.	8.0
18	415100	661140	82.0	0.	0.	2371.	118.	0.	0.0
19	414959	661128	75.0	0.	0.	682.	174.	0.	6.0
20	415035	661052	84.0	0.	0.	2513.	212.	0.	8.0
21	415114	661131	82.0	0.	0.	914.	50.	0.	13.0
22	415144	661201	81.0	0.	0.	1440.	78.	0.	17.0
23	415135	661131	82.0	0.	0.	1352.	60.	0.	16.0
24	415207	661322	81.0	0.	0.	631.	61.	0.	0.0
25	415243	661203	82.0	0.	0.	898.	93.	0.	15.0
26	415345	661238	82.0	0.	0.	688.	71.	0.	15.0
27	415313	661420	81.0	0.	0.	933.	93.	0.	14.0
28	415317	661233	82.0	0.	0.	587.	68.	0.	15.0
29	415309	662453	81.0	0.	0.	799.	101.	0.	11.0
30	415412	661332	81.0	0.	0.	941.	142.	0.	17.0
31	415414	661345	81.0	0.	0.	978.	125.	0.	17.0
32	415443	661408	79.0	0.	0.	1077.	189.	1.	20.0
33	415535	661454	79.0	0.	0.	877.	108.	1.	19.0
34	415544	661521	79.0	0.	0.	443.	53.	1.	9.0
35	415525	661518	79.0	0.	0.	95.	52.	0.	8.0
36	415553	661506	79.0	0.	0.	134.	49.	0.	13.0
37	415625	661355	81.0	0.	0.	261.	44.	0.	7.0
38	412221	661716	101.0	0.	0.	78.	8.	0.	1.0
39	412546	661540	97.0	0.	0.	6.	1.	0.	1.0
41	412151	660520	146.0	0.	0.	0.	0.	0.	0.0
43	412337	660428	104.0	0.	0.	0.	0.	0.	3.0
44	413153	660038	124.0	0.	0.	28.	6.	1.	0.0
45	413906	655701	99.0	0.	0.	27.	73.	0.	2.0
46	413901	655424	99.0	0.	0.	33.	51.	0.	.5
47	414133	660017	88.0	0.	0.	14.	28.	1.	1.5
48	414150	660322	86.0	0.	0.	29.	30.	1.	.5
49	414444	661035	86.0	0.	0.	111.	34.	0.	1.0
50	414534	660833	87.0	0.	0.	36.	66.	2.	1.0

Table 4 (cont'd)

51	414545	660913	86.0	0.	0.	39.	33.	0.	7.0
52	414540	660904	85.0	0.	0.	34.	31.	0.	8.0
53	414549	660853	86.0	0.	0.	49.	85.	0.	7.0
54	414600	660949	86.0	0.	0.	23.	69.	1.	5.0
55	414557	660911	86.0	0.	0.	24.	24.	0.	5.0
56	414604	661022	85.0	0.	0.	20.	80.	1.	0.0
57	414648	660836	85.0	0.	0.	30.	29.	0.	4.0
58	414618	660916	87.0	0.	0.	19.	55.	1.	6.0
59	414651	660950	86.0	0.	0.	21.	37.	1.	8.0
60	414653	660758	84.0	0.	0.	44.	31.	0.	5.0
61	414722	660851	85.0	0.	0.	378.	197.	2.	2.0
62	414738	661001	86.0	0.	0.	41.	63.	0.	7.0
63	414747	660916	85.0	0.	0.	32.	28.	0.	0.0
64	414736	660933	84.0	0.	0.	118.	16.	0.	4.0
65	414700	660853	88.0	0.	0.	106.	77.	0.	1.0
66	414835	661013	87.0	0.	0.	60.	110.	0.	8.0
67	414918	660839	86.0	0.	0.	133.	83.	0.	6.0
68	414907	660949	86.0	0.	0.	175.	39.	0.	0.0
69	414911	660901	87.0	0.	0.	60.	79.	0.	9.0
70	415000	661017	84.0	0.	0.	83.	51.	0.	6.0
71	414650	661000	84.0	0.	0.	186.	77.	0.	7.0
72	414712	661025	84.0	0.	0.	250.	59.	0.	8.0
73	414752	661014	81.0	0.	0.	967.	259.	1.	8.0
74	414825	660946	84.0	0.	0.	320.	59.	0.	10.0
75	414906	661136	82.0	0.	0.	764.	95.	0.	12.0
76	414932	660959	84.0	0.	0.	555.	95.	0.	11.0
77	414947	661115	81.0	0.	0.	650.	64.	0.	8.0
78	414932	661004	81.0	0.	0.	1058.	68.	0.	9.0
79	414927	661113	81.0	0.	0.	702.	53.	0.	8.0
80	414931	661121	91.0	0.	0.	154.	130.	0.	7.0
81	414935	661055	93.0	0.	0.	282.	61.	0.	7.0
82	420409	661010	115.0	0.	0.	109.	21.	0.	7.0
83	420326	661122	88.0	0.	0.	443.	173.	0.	12.0
84	420803	661157	91.0	0.	0.	48.	75.	2.	13.0
85	420436	661524	90.0	0.	0.	92.	93.	5.	18.0
86	420249	662624	81.0	0.	0.	1083.	44.	0.	11.0
87	420250	662705	86.0	0.	0.	2.	1.	0.	18.0
88	420006	663117	83.0	0.	0.	74.	34.	0.	11.0
89	420731	663156	69.0	0.	0.	0.	0.	0.	10.0
90	420520	663608	100.0	0.	0.	5062.	190.	0.	17.0
91	420819	664014	85.0	0.	0.	2151.	49.	0.	0.0
92	420026	664222	70.0	0.	0.	2928.	68.	0.	17.0
93	420009	664310	76.0	0.	0.	989.	8.	0.	14.0
94	420034	664203	76.0	0.	0.	1950.	19.	0.	13.0
95	420042	664333	82.0	0.	0.	32.	12.	4.	9.0
96	420027	664333	76.0	0.	0.	4.	3.	4.	8.0
97	413959	662259	80.0	0.	0.	6.	11.	3.	7.0
98	414335	662547	81.0	0.	0.	408.	107.	0.	5.0
99	414920	662131	79.0	0.	0.	1665.	54.	0.	5.0
100	415329	662050	80.0	0.	0.	84.	37.	10.	4.0
101	415426	662130	82.0	0.	0.	105.	77.	6.	9.0
102	415524	662346	81.0	0.	0.	21.	28.	23.	8.0
103	415604	662149	70.0	0.	0.	383.	35.	0.	7.0
104	415505	663104	69.0	0.	0.	477.	73.	3.	8.0
105	430516	645612	69.0	0.	0.	1035.	66.	0.	8.0
106	415950	664139	73.0	0.	0.	264.	26.	3.	10.0

Table 4 (cont'd)

107	415929	664238	70.0	0.	0.	1708.	66.	0.	14.0
108	415942	664034	70.0	0.	0.	381.	38.	0.	0.0
109	415950	664231	69.0	0.	0.	154.	22.	1.	10.0
110	415952	664117	69.0	0.	0.	128.	105.	8.	7.0
111	415946	664137	69.0	0.	0.	922.	72.	0.	8.0
112	415909	664133	74.0	0.	0.	1190.	46.	0.	5.0
113	415958	664158	70.0	0.	0.	266.	12.	0.	9.0
114	415942	664259	77.0	0.	0.	356.	28.	0.	0.0
115	415926	664140	73.0	0.	0.	326.	64.	0.	0.0
116	415957	664330	94.0	0.	0.	125.	53.	1.	3.0
117	415946	664609	94.0	0.	0.	79.	62.	3.	6.0
118	412140	662145	94.0	0.	0.	144.	40.	3.	2.0
119	412012	663044	94.0	0.	0.	20.	11.	5.	2.0
120	412113	663257	94.0	0.	0.	0.	0.	4.	2.0
121	412523	663901	94.0	0.	0.	0.	0.	1.	4.0
122	430622	654940	94.0	0.	0.	0.	0.	0.	2.0
123	413515	664444	94.0	0.	0.	0.	0.	0.	19.0
124	413727	664257	83.0	0.	0.	0.	1.	8.	0.0
125	414001	664000	86.0	0.	0.	0.	2.	3.	2.0
126	413223	663633	86.0	0.	0.	1.	1.	1.	2.0
127	413347	662925	82.0	0.	0.	40.	23.	0.	1.0
128	413353	662854	87.0	0.	0.	25.	34.	1.	1.0
129	413755	662211	88.0	0.	0.	53.	67.	12.	5.0
130	413516	661830	92.0	0.	0.	38.	55.	0.	4.0
131	413631	661432	108.0	0.	0.	221.	21.	0.	4.0
132	413223	661504	88.0	0.	0.	206.	93.	0.	2.0
133	413100	660427	88.0	0.	0.	73.	55.	2.	3.0
134	414231	661130	85.0	0.	0.	26.	29.	2.	5.0
135	414440	661031	84.0	0.	0.	142.	115.	1.	4.0
136	414508	661623	88.0	0.	0.	81.	67.	1.	4.0
137	414701	661007	83.0	0.	0.	386.	79.	0.	8.0
138	414634	661131	82.0	0.	0.	438.	85.	0.	6.0
139	414807	661017	83.0	0.	0.	971.	66.	91.	12.0
140	414826	661128	83.0	0.	0.	98.	48.	1.	12.0
141	414903	661019	81.0	0.	0.	612.	35.	0.	9.0
142	414902	661338	84.0	0.	0.	412.	31.	0.	4.0
143	414915	661052	83.0	0.	0.	623.	52.	0.	10.0
144	414837	661002	82.0	0.	0.	562.	124.	0.	10.0
145	414926	661103	83.0	0.	0.	445.	69.	0.	10.0
146	414927	661208	81.0	0.	0.	516.	127.	1.	8.0
147	414929	661103	81.0	0.	0.	771.	85.	0.	11.0
148	414936	661206	81.0	0.	0.	467.	75.	0.	15.0
149	414941	661133	82.0	0.	0.	1171.	67.	0.	13.0
150	414948	661153	79.0	0.	0.	742.	49.	0.	12.0
151	415040	661110	83.0	0.	0.	1613.	84.	0.	18.0
152	415007	661209	85.0	0.	0.	471.	41.	0.	13.0
153	415053	661045	81.0	0.	0.	754.	57.	0.	14.0
154	415213	661058	83.0	0.	0.	799.	93.	0.	17.0
155	415236	661251	82.0	0.	0.	1211.	81.	0.	13.0
156	415201	661111	80.0	0.	0.	1180.	85.	0.	15.0
157	415209	661158	83.0	0.	0.	755.	37.	0.	14.0

Table 4 (cont'd)

158	415158	661245	80.0	0.	0.	360.	38.	0.	14.0
159	415252	661154	82.0	0.	0.	1241.	110.	0.	0.0
160	415242	661334	80.0	0.	0.	1768.	137.	0.	11.0
161	415204	661135	83.0	0.	0.	550.	29.	0.	13.0
162	415207	661314	81.0	0.	0.	1570.	140.	0.	16.0
163	415259	661130	83.0	0.	0.	1147.	121.	0.	11.0
164	415330	661326	82.0	0.	0.	1046.	67.	0.	25.0
165	415255	661149	81.0	0.	0.	622.	104.	0.	17.0
166	415149	661237	82.0	0.	0.	1166.	21.	0.	16.0
167	415002	661137	77.0	0.	0.	231.	89.	0.	12.0
168	415233	661755	85.0	0.	0.	493.	33.	0.	14.0
169	415607	662345	73.0	0.	0.	11.	7.	0.	9.0
170	415840	662215	71.0	0.	0.	1.	5.	3.	12.0
171	414304	663243	75.0	0.	0.	20.	19.	0.	3.0
172	414611	663450	73.0	0.	0.	510.	10.	0.	1.0
173	414932	663043	70.0	0.	0.	2632.	98.	0.	6.0
174	420118	664252	71.0	13.	7.	1466.	43.	0.	6.0
175	420118	664333	78.0	78.	8.	1088.	114.	0.	14.5
176	420011	664223	70.0	49.	8.	1445.	119.	0.	9.0
177	420016	664337	73.0	40.	9.	621.	12.	0.	7.0
178	420016	664246	74.0	48.	6.	273.	10.	0.	8.0
179	420013	664449	67.0	22.	3.	204.	6.	0.	7.0
180	420111	664624	72.0	10.	2.	1580.	93.	0.	4.8
181	415807	664824	65.0	9.	3.	866.	37.	1.	3.3
182	420137	664713	62.0	60.	12.	2175.	44.	0.	10.3
183	420506	665654	66.0	26.	6.	648.	18.	0.	9.0
184	420547	665434	84.0	36.	3.	114.	26.	2.	18.8
185	420622	665713	62.0	9.	2.	11592.	193.	0.	4.0
186	420759	665721	77.0	9.	9.	200.	26.	1.	4.0
187	420619	670132	61.0	207.	9.	3138.	11.	0.	11.5
188	420721	670314	60.0	10.	10.	10441.	18.	0.	6.0
189	420609	670351	60.0	134.	10.	4936.	73.	0.	13.0
190	420521	670242	59.0	97.	5.	1559.	0.	0.	10.5
191	420520	670317	56.0	75.	6.	400.	56.	0.	9.8
192	420507	670256	55.0	94.	5.	578.	93.	0.	13.8
193	420433	670339	49.0	23.	23.	57.	36.	0.	7.0
194	420507	670436	59.0	46.	28.	0.	0.	0.	20.0
195	420358	671050	56.0	10.	10.	0.	0.	0.	7.0
196	415411	671211	50.0	0.	0.	0.	0.	0.	1.0
197	415109	671112	58.0	0.	0.	1.	0.	0.	4.0
198	415302	670602	57.0	0.	0.	0.	1.	0.	.3
199	415031	670434	59.0	0.	0.	0.	1.	0.	5.0
200	414954	670248	60.0	0.	0.	0.	0.	0.	.5
201	415528	670212	61.0	0.	0.	41.	25.	3.	.5
202	415059	665520	63.0	0.	0.	64.	17.	1.	.5
203	415425	664854	64.0	10.	10.	25.	82.	1.	6.0
204	415441	664745	66.0	10.	10.	142.	14.	0.	4.0
205	415650	664952	62.0	20.	20.	84.	32.	0.	6.0
206	415746	664541	63.0	9.	9.	8.	2.	1.	4.0
207	415331	664714	64.0	16.	16.	4.	4.	0.	10.0
208	414842	664638	59.0	3.	3.	0.	1.	0.	4.0
209	414603	664320	68.0	3.	3.	0.	0.	0.	9.0
210	414435	664332	67.0	0.	0.	0.	0.	0.	.5
211	414026	664218	56.0	0.	0.	0.	0.	0.	.5
212	414219	664648	52.0	0.	0.	4.	13.	0.	8.0
213	414409	671209	41.0	0.	0.	0.	0.	0.	.8

Table 4 (cont'd)

214	414037	671600	46.0	3.	3.	0.	0.	0.	5.0
215	414105	671950	42.0	0.	0.	0.	0.	0.	.5
216	413909	671854	43.0	0.	0.	0.	0.	0.	.3
217	413930	671927	47.0	0.	0.	0.	0.	0.	.3
218	413910	671752	47.0	0.	0.	0.	0.	0.	3.0
219	413902	671917	47.0	0.	0.	0.	0.	0.	2.0
220	413823	671703	30.0	0.	0.	0.	0.	0.	7.0
221	413737	671636	55.0	0.	0.	0.	0.	0.	1.5
222	413820	671640	52.0	0.	0.	0.	0.	0.	1.0
223	413730	671749	58.0	0.	0.	0.	4.	0.	.5
224	413744	671923	49.0	0.	0.	0.	0.	0.	2.5
225	413648	671821	53.0	1.	1.	0.	0.	0.	4.0
226	413637	671551	48.0	0.	0.	1.	0.	0.	13.0
227	413542	671628	52.0	0.	0.	0.	0.	0.	3.0
228	413425	671859	49.0	0.	0.	0.	1.	0.	10.0
229	413310	671523	81.0	0.	0.	245.	40.	0.	2.0
230	413255	671701	84.0	0.	0.	527.	60.	1.	10.0
231	415752	662345	87.0	13.	13.	102.	19.	1.	11.0
232	415852	662123	82.0	21.	21.	4358.	29.	0.	10.0
233	415847	661152	82.0	9.	9.	8862.	198.	0.	11.0
234	415529	661243	86.0	58.	6.	1896.	100.	5.	20.0
235	415514	661310	82.0	133.	8.	2842.	207.	0.	25.5
236	415333	661133	81.0	44.	3.	147.	59.	0.	22.5
237	415305	661229	82.0	121.	6.	1180.	29.	0.	22.0
238	415141	661431	82.0	18.	4.	742.	90.	2.	10.0
239	415132	661902	82.0	34.	5.	280.	5.	0.	8.3
240	415128	661809	82.0	32.	5.	1565.	45.	2.	8.3
241	415045	661847	88.0	12.	2.	43.	79.	2.	7.5
242	415055	661739	86.0	46.	9.	66.	76.	0.	7.5
243	415008	660739	85.0	15.	15.	109.	145.	1.	9.0
244	414938	660858	84.0	18.	18.	440.	92.	0.	7.0
245	414838	660837	84.0	15.	15.	158.	17.	0.	9.0
246	414857	661010	85.0	27.	4.	73.	65.	0.	9.5
247	414843	661028	85.0	7.	7.	151.	55.	0.	9.0
248	414735	660914	85.0	12.	12.	64.	46.	0.	15.0
249	414744	660954	86.0	15.	15.	28.	40.	0.	10.0
250	414729	660941	102.0	9.	9.	47.	128.	0.	12.0
251	414729	660855	99.0	9.	9.	16.	198.	0.	7.0
252	415002	655635	99.0	23.	23.	178.	33.	0.	13.0
253	415319	655747	96.0	17.	17.	208.	111.	0.	11.0
254	415212	660159	96.0	17.	17.	171.	107.	1.	6.0
255	415337	660033	95.0	37.	14.	162.	155.	0.	12.0
256	415354	660114	96.0	28.	14.	470.	122.	0.	12.0
257	415420	660208	96.0	39.	16.	373.	77.	1.	23.0
258	415223	660332	96.0	36.	14.	223.	65.	0.	6.0
259	415208	660348	95.0	40.	14.	281.	61.	0.	8.0
260	415130	660505	91.0	12.	12.	204.	81.	1.	8.0
261	415156	660357	89.0	25.	12.	32.	39.	1.	5.0
262	415232	660905	83.0	17.	17.	34.	48.	2.	10.0
263	414805	660807	85.0	10.	10.	118.	79.	1.	6.0
264	414710	660919	85.0	16.	16.	42.	54.	0.	6.0
265	414711	660839	84.0	12.	12.	34.	107.	0.	4.0
266	414651	661018	84.0	12.	12.	54.	78.	0.	14.0
267	414629	660847	86.0	17.	17.	51.	32.	1.	7.0
268	414654	661004	85.0	17.	17.	31.	130.	3.	4.0
269	414727	660856	87.0	9.	9.	9.	47.	0.	6.0
270	414713	660855	89.0	25.	25.	47.	55.	0.	7.0

Table 4 (cont'd)

271	414628	660815	91.0	10.	10.	73.	59.	1.	7.0
272	414607	660740	40.0	11.	11.	7.	47.	4.	16.0
273	414601	660642	41.0	14.	14.	5.	35.	28.	10.0
274	415931	673244	44.0	12.	12.	13.	49.	1.	11.0
275	415818	673444	44.0	27.	14.	0.	7.	2.	14.0
276	415703	673535	47.0	14.	14.	7.	0.	7.	8.0
277	415824	673717	50.0	4.	4.	0.	1.	3.	6.0
278	415834	674016	85.0	4.	4.	1.	6.	3.	3.0
279	415742	674434	91.0	3.	3.	1.	3.	4.	9.0
280	415929	674643	101.0	2.	2.	0.	2.	0.	1.0
281	415856	674838	94.0	2.	2.	0.	2.	3.	2.0
282	415941	674837	100.0	1.	1.	0.	1.	2.	1.0
283	415832	674946	94.0	1.	1.	1.	1.	0.	1.0
284	415804	675055	114.0	2.	2.	0.	1.	0.	1.0
285	415522	675548	88.0	0.	0.	0.	7.	8.	1.0
286	415532	675755	75.0	0.	0.	17.	13.	1.	4.0
287	415418	675652	43.0	4.	4.	16.	28.	4.	1.0
288	415330	675547	47.0	4.	4.	2.	3.	1.	.5
289	414935	675330	41.0	11.	11.	0.	0.	0.	2.5
290	414922	675530	57.0	1.	1.	0.	0.	2.	1.0
291	414808	675847	56.0	0.	0.	0.	1.	4.	12.5
292	414912	675938	50.0	0.	0.	0.	0.	0.	1.0
293	414946	675813	59.0	3.	3.	0.	4.	2.	4.0
294	414813	680153	44.0	0.	0.	0.	0.	0.	7.0
295	414709	680804	48.0	2.	2.	0.	0.	0.	1.0
296	414628	680616	59.0	0.	0.	1.	0.	1.	11.0
297	405940	674936	60.0	0.	0.	0.	0.	0.	10.0
298	405818	674437	64.0	0.	0.	8.	10.	3.	8.0
299	405326	675024	70.0	0.	0.	5.	9.	2.	1.0
300	405210	674815	70.0	4.	4.	1.	12.	4.	4.0
301	405144	674016	68.0	3.	3.	6.	14.	4.	4.0
302	405431	673806	69.0	5.	5.	4.	23.	8.	4.0
303	405545	673837	74.0	4.	4.	15.	6.	1.	7.0
304	405606	673547	73.0	7.	7.	95.	27.	0.	5.0
305	405248	673249	81.0	2.	2.	76.	3.	7.	3.0
306	405454	672935	77.0	8.	8.	95.	18.	0.	1.0
307	405207	672455	70.0	7.	7.	33.	27.	5.	5.0
308	405509	672410	68.0	9.	9.	5.	10.	5.	2.0
309	405817	672604	71.0	8.	8.	19.	22.	8.	4.0
310	405909	672737	73.0	4.	4.	20.	19.	0.	1.5
311	405900	672041	90.0	4.	4.	1.	12.	8.	2.0
312	405843	671823	82.0	4.	4.	8.	3.	10.	3.0
313	405007	671824	81.0	8.	8.	27.	4.	8.	5.0
314	405354	671512	75.0	6.	6.	93.	26.	3.	2.0
315	405428	671650	88.0	5.	5.	12.	41.	12.	1.0
316	405851	671059	76.0	9.	9.	25.	1.	3.	2.0
317	405147	670305	79.0	15.	15.	15.	10.	7.	9.0

Table 4 (cont'd)

318	405757	670402	72.0	1.	1.	6.	2.	3.	2.0
319	405646	671009	73.0	7.	7.	18.	13.	9.	2.0
320	405937	670803	70.0	2.	2.	18.	8.	3.	2.0
321	405950	670643	63.0	8.	8.	0.	0.	2.	2.0
322	410107	670242	60.0	3.	3.	1.	7.	6.	2.0
323	410440	671040	62.0	1.	1.	0.	2.	4.	2.0
324	410617	671244	63.0	5.	5.	0.	0.	1.	2.0
325	410546	671154	57.0	3.	3.	0.	0.	0.	2.0
326	410420	671104	60.0	1.	1.	0.	0.	0.	2.0
327	410901	671726	59.0	0.	0.	0.	0.	0.	3.0
328	411928	670544	60.0	0.	0.	0.	0.	0.	12.0
329	411809	670708	66.0	0.	0.	1.	1.	4.	9.0
330	411653	670459	63.0	0.	0.	5.	1.	2.	5.0
331	411615	665936	69.0	3.	3.	6.	4.	6.	2.0
332	410851	670320	70.0	2.	2.	15.	4.	7.	2.0
333	410913	665604	71.0	4.	4.	14.	3.	5.	5.0
334	410524	665509	71.0	4.	4.	4.	7.	5.	3.0
335	410328	665708	71.0	3.	3.	22.	11.	6.	3.0
336	410413	665200	77.0	5.	5.	6.	1.	1.	4.0
337	410206	664845	70.0	6.	6.	1.	2.	22.	1.0
338	410342	664554	80.0	8.	8.	21.	18.	3.	2.0
339	410734	664623	88.0	10.	10.	137.	28.	0.	4.0
340	410742	664140	90.0	6.	6.	262.	29.	3.	1.5
341	410635	663609	92.0	7.	7.	262.	26.	0.	1.0
342	410735	663542	93.0	10.	10.	312.	22.	2.	4.5
343	410616	663412	97.0	10.	10.	120.	32.	1.	2.0
344	410708	663318	95.0	0.	4.	38.	15.	0.	5.0
345	411000	662906	97.0	8.	8.	144.	34.	0.	2.0
346	411654	662716	96.0	4.	4.	112.	28.	1.	2.0
347	411701	662533	92.0	11.	11.	260.	55.	0.	.5
348	411945	662247	85.0	8.	8.	31.	30.	8.	1.5
349	411834	663111	80.0	16.	7.	12.	10.	9.	2.0
350	411919	663757	77.0	11.	11.	3.	22.	5.	4.0
351	411732	663937	75.0	7.	7.	2.	10.	6.	3.0
352	411446	664019	73.0	7.	7.	3.	6.	4.	2.0

Table 5. Average Canadian offshore scallop vessel characteristics by port and statistical district in 1981. ( ) = standard deviation.

Statistical District	Port	n	Gross vessel Tonnage	Length (m)	HPR
26	Lunenburg	33	204.6(45.4)	32.3(2.6)	715.5(91.7)
26	Riverport	12	209.3(42.0)	31.3(1.9)	703.3(137.9)
28	Liverpool	7	159.4(26.6)	29.7(2.3)	612.9(71.8)
29	Lockeport	1	210	33.5	800
34	Yarmouth	9	202 (36.7)	32.1(2.0)	805.0(192.3)
36	Meteghan	2	434.0(0.7)	39.0(0.0)	1775.0(106.1)
36	Saulnierville	11	167.2(28.3)	30.1(1.4)	624.6(213.1)
	Total	76	203.0(58.3)	31.9(2.8)	731.0(226.2)

Table 6. Annual effort statistics per trip for the offshore scallop fleet fishing NAFO Subarea 5Ze.

Year	Average fishing days/trip	Average hrs/trip	Average hrs/day	Estimated % of fishing time on Georges Bank
1966	6.3	80	12.7	98
1967	8.9	113	12.8	100
1968	7.6	102	13.5	97
1969	8.4	114	13.6	94
1970	8.5	122	14.4	100
1971	8.2	116	14.2	99
1972	8.3	113	13.9	100
1973	4.8	68	14.2	100
1974	5.7	83	14.6	100
1975	6.4	90	14.1	100
1976	6.7	101	14.9	94
1977	6.7	75	11.1	99
1978	6.5	83	12.6	100
1979	7.0	101	14.5	97
1980	5.4	75	13.9	78

Table 7. Annual fleet size and landings per vessel statistics for the Canadian offshore scallop fleet. Data is for NAFO Subarea 5Ze (+: for subarea 5Z).

Year	No. of trips*	No. of vessels	Average no. trips/ vessels	Average catch (t) per vessel		Average landing value (10^{-3}/ vessel)	
				daily	annual	daily	annual
1966+	898	40	22.5	0.86	122.0	0.77	109
1967+	772	41	18.8	0.73	122.4	0.93	157
1968	887	44	20.2	0.72	109.6	1.37	208
1969	912	43	21.2	0.57	100.4	1.12	197
1970	903	39	23.2	0.53	105.1	1.27	252
1971	957	40	23.9	0.50	97.7	1.29	252
1972	1008	43	23.4	0.50	96.8	1.85	358
1973	1702	65	26.2	0.52	65.0	1.74	218
1974	1465	66	22.2	0.74	93.0	2.15	271
1975	1320	66	20.2	0.88	112.3	2.79	356
1976	1117	70	16.0	1.30	139.4	4.45	477
1977	1301	73	17.8	1.49	179.3	4.63	558
1978	1335	73	18.3	1.39	167.0	6.71	807
1979	1250	75	16.7	1.05	122.8	7.27	850
1980	1267	77	16.5	0.76	67.8	6.15	549

*Prorated by catch-prorating coefficient (Table 1).

Table 8. Annual scallop CPUE values, with three measures of effort, for Georges Bank and the Scotian Shelf (Browns and German Banks), and the percentage of annual landings fished on the Scotian Shelf.

	CPUE										
	kg/h			kg/h-m			kg/h-m-men			% Total catch	
Year	Georges	Browns	German	Georges	Browns	German	Georges	Browns	German	Browns	German
1966	67.9	67.7	-	8.75	8.73	-	0.55	0.56	-	2.1	-
1967	57.7	-	-	7.50	-	-	0.48	-	-	-	-
1968	53.5	43.6	53.4	6.83	5.69	6.86	0.44	0.36	0.46	1.2	1.4
1969	41.5	35.7	37.3	5.24	4.59	4.71	0.34	0.30	0.32	2.1	1.2
1970	37.0	33.4	-	4.64	4.22	-	0.31	0.27	-	0.4	-
1971	35.2	25.9	26.1	4.28	3.15	3.18	0.28	0.20	0.22	0.3	0.4
1972	36.5	22.9	-	4.52	2.83	-	0.30	0.19	-	0.0	-
1973	36.6	35.7	-	4.62	4.51	-	0.31	0.33	-	0.3	-
1974	50.6	-	-	6.33	-	-	0.42	-	-	-	-
1975	62.5	-	-	7.73	-	-	0.49	-	-	-	-
1976	86.4	134.6	-	10.49	16.28	-	0.64	1.01	-	5.9	-
1977	134.4	103.0	-	16.55	12.68	-	1.01	0.76	-	0.6	-
1978	110.3	130.2	-	13.42	15.84	-	0.80	0.97	-	0.2	-
1979	72.6	76.6	118.0	8.71	9.18	14.15	0.53	0.54	0.91	1.1	1.8
1980	54.6	57.9	76.3	6.48	6.87	9.05	0.40	0.43	0.61	3.7	18.7

Table 9. Average offshore scallop gear size and crew number statistics as a component of "effort", for the years 1966-1980 inclusive (derived from log reports).

Year	Gear width	Crew number	Average meter-men per vessel
1966	7.76	15.8	122.6
1967	7.66	15.8	121.0
1968	7.78	15.7	122.2
1969	7.92	15.3	121.2
1970	7.99	14.9	119.0
1971	8.21	15.3	125.6
1972	8.08	15.2	122.8
1973	7.92	14.8	117.2
1974	8.00	15.1	120.8
1975	8.09	15.9	128.6
1976	8.27	16.3	134.8
1977	8.12	16.4	133.2
1978	8.22	16.7	137.2
1979	8.34	16.5	137.6
1980	8.43	16.2	136.6

Table 10. Average annual landed scallop prices for the years 1952-1980 inclusive.

Year	Average price* per kg scallop meat ($)	Year	Average price* per kg scallop meat ($)
1980	8.09	1965	1.21
1979	6.92	1964	0.97
1978	4.83	1963	0.84
1977	3.11	1962	0.73
1976	3.42	1961	0.64
1975	3.17	1960	0.57
1974	2.91	1959	0.84
1973	3.35	1958	0.84
1972	3.70	1957	0.84
1971	2.58	1956	0.95
1970	2.40	1955	0.95
1969	1.96	1954	0.77
1968	1.90	1953	0.86
1967	1.28	1952	1.06
1966	0.90		

*1952-1970 based on landings of Canadian East Coast;
1971-1980 based on Nova Scotian landings. Source:
calculated from data in annual Statistics Branch, Department of Fisheries and Oceans, summaries.

Table 11. Distance (km) discrepancy statistics in the years 1978 - 1980 between daily vessel location as reported by logs and Department of National Defence surveillance reports.

A.

Year	Number records	Number vessels	No. Matched Records/Vessel Avg SD	Distance Apart (km) min	max	avg	SD	SE
1978	243	62	3.9 (1.9)	1.3	260.5	36.0	31.3	2.0
1979	667	72	9.3 (4.1)	0.5	427.8	20.6	30.8	1.2
1980	863	73	8.6 (4.7)	0.4	479.4	25.9	40.8	1.6

B.

Year	No. Vessels	Avg distance apart (km) 0-10	10-20	20-30	30-40	40-50	50
1978	62	0	10	14	19	10	9
1979	72	8	38	15	7	2	2
1980	73	9	8	20	8	5	24

Table 12. Explanations for those occurrences where the distance discrepancy between reported vessel locations exceeded 90 km. Locations were reported by both fishery logs and DND surveillance reports.

Explanation	Year		
	1978	1979	1980
Extensive travelling by boat on Georges Bank in one day	7	7	11
Boats steaming into or out of port	3	4	3
Boats steaming from one bank to another in one day			1
Surveillance states boat location on land or not in vicinity of any fishing area		3	4
Surveillance states boat in unlikely fishing area	7 (all same day & area)		4 (3 same area & day)
Log coded wrong		1	3
Wrong Fishing Bank Reported			
1) log states Browns, surv. states Georges		1	
2) log states Lurcher, surv. states Georges			2
3) log states German, surv. states Browns			1
4) log states German, surv. states Georges			1
Total	17	17	30

Table 13. Characteristics of commercially fished scallops landed in 1978-80 inclusive.

A. Year = 78

Total MT WT Landed = 12189 (t)
Total MT WT Measured = 133.49 (kg) or .00109%

	AGE		WEIGHT (g)				MEATS/.5 kg		SAMPLE SIZE	
MONTH	AVG	SE	AVG	MIN	MAX	SE	PORT SAMPLER	FISHERIES OFFICER	PORT SAMPLER	FISHERIES OFFICER
JAN	4.7	0.1	15.9	4.6	44.1	0.4	31.4	0.0	293	0
FEB	4.9	0.1	17.1	3.7	56.0	0.3	29.3	36.5	385	12
MAR	4.8	0.1	15.9	5.7	50.1	0.3	31.4	25.4	404	20
APR	6.2	0.2	23.5	7.9	65.5	0.6	21.4	0.0	213	0
MAY	5.8	0.1	22.3	4.2	64.4	0.3	22.5	31.9	740	16
JUN	6.5	0.1	24.3	6.2	70.0	0.4	20.6	29.6	756	53
JUL	5.6	0.2	20.1	8.0	63.4	0.3	24.9	22.9	268	67
AUG	5.9	0.1	22.5	5.5	84.2	0.4	22.2	31.1	664	21
SEP	5.2	0.1	18.9	7.5	51.9	0.4	26.3	28.5	402	40
OCT	5.2	0.1	18.3	4.7	55.7	0.3	27.4	36.7	543	138
NOV	5.3	0.1	18.4	2.9	63.7	0.2	27.3	0.0	1592	0
DEC	4.1	0.0	11.3	3.2	47.4	0.2	44.1	34.3	787	48
TOTAL*	5.3	0.0	18.9	2.9	84.2	0.1	26.4	31.0	7074	415

B. Year = 79

Total MT WT Landed = 9206 (t)
Total MT WT Measured = 704.43 (kg) or .00765%

	AGE		WEIGHT (g)				MEAT/.5 kg		SAMPLE SIZE	
MONTH	AVG	SE	AVG	MIN	MAX	SE	PORT SAMPLER	FISHERIES OFFICER	PORT SAMPLER	FISHERIES OFFICER
JAN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
FEB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
MAR	4.6	0.0	14.6	3.4	55.9	0.1	34.4	0.0	2441	0
APR	5.2	0.1	17.7	3.1	74.6	0.2	28.3	0.0	2191	0
MAY	4.8	0.0	15.0	2.9	78.2	0.1	33.3	29.8	7949	8
JUN	5.1	0.0	16.4	2.4	81.8	0.1	30.5	0.0	9814	0
JUL	5.9	0.0	20.2	2.2	93.5	0.1	24.8	29.9	8170	10
AUG	5.6	0.0	19.1	3.0	88.9	0.2	26.2	28.8	4714	40
SEP	4.7	0.0	14.6	2.9	63.5	0.2	34.3	47.6	2516	48
OCT	4.8	0.0	15.8	3.1	65.2	0.1	31.7	41.8	2591	325
NOV	4.9	0.1	16.3	3.6	56.4	0.3	30.8	0.0	1088	0
DEC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.1	0	151
TOTAL*	5.2	0.0	16.9	2.2	93.5	0.1	29.4	41.3	41474	582

*Weighted mean

Table 13.(Cont'd)

Year = 80

Total MT WT Landed = 5221.00 (t)
Total MT WT Measured =1473.73 (kg) or 0.02821%

	AGE		WEIGHT (g)				MEAT/.5 kg		SAMPLE SIZE	
MONTH	AVG	SE	AVG	MIN	MAX	SE	PORT SAMPLER	FISHERIES OFFICER	PORT SAMPLER	FISHERIES OFFICER
JAN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
FEB	4.0	0.0	10.7	2.3	52.7	0.2	46.8	39.5	1658	26
MAR	4.3	0.1	12.6	2.9	45.0	0.4	39.7	0.0	369	0
APR	4.6	0.0	14.1	1.7	68.8	0.1	35.5	41.7	3837	64
MAY	4.4	0.0	12.6	1.2	86.3	0.1	39.5	27.7	20662	21
JUN	4.6	0.0	13.9	1.3	92.1	0.1	35.9	40.1	28506	47
JUL	4.4	0.0	12.9	1.9	67.5	0.1	38.7	38.9	30054	297
AUG	4.5	0.0	14.1	2.2	80.9	0.1	35.6	45.7	15581	68
SEP	4.1	0.0	11.1	2.9	74.9	0.1	44.9	46.1	7954	342
OCT	3.9	0.0	10.5	2.9	67.9	0.1	47.9	45.1	4093	469
NOV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
DEC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
TOTAL*	4.5	0.0	13.1	1.2	92.1	0.0	38.2	43.3	112714	1334

*Weighted mean

Table 14. Average scallop abundance at age in the CPUE strata in the regions surveyed in the 1978 to 1980 Georges Bank scallop stock assessment cruises (weighted).

Region and Strata Value Range	No. stations	Age (yr)												Average yield/tow (kg)
		1	2	3	4	5	6	7	8	9	10+	1-3	4^+	
A. Cruise P237 (1980														
Strata (kg/h-m-men)														
Northern part														
< 1	70	0	65	28	18	8	3	1	1	0	1	93	32	0.90
1-2	79	0	540	45	26	8	2	1	0	0	0	585	35	2.10
> 2	120	1	719	100	61	6	2	1	0	0	1	820	70	2.91
Unknown	39	1	39	5	6	4	2	2	1	1	2	45	18	0.39
Total average	308	1	432	56	34	6	2	1	0	0	1	492	46	1.93
Southern part														
Unknown	39	0	0	0	0	0	0	0	0	0	0	0	0	
B. Cruise P220 (1979)														
Strata (kg/h)														
Northern part														
< 45	38	0	17	36	26	26	9	4	3	2	7	53	77	2.12
45-91	54	0	41	117	39	21	9	5	2	1	3	158	80	2.61
> 91	39	0	27	147	42	19	9	3	1	0	1	174	76	2.63
Unknown	24	0	3	18	6	9	8	4	2	1	5	21	35	1.14
Total average	155	0	26	108	31	20	9	4	2	1	4	115	71	2.27

Table 14 (cont'd)

	No. stations	Age (yr)												Average yield/tow (kg)
		1	2	3	4	5	6	7	8	9	10+	1-3	4^+	
C. Cruise P199 and P201 (1978)														
Strata (kg/h-m-men)														
Northern part														
.05-.49	24	0	86	51	51	41	11	3	1	1	2	137	59	2.76
.50-.99	60	0	92	33	66	42	10	4	2	1	2	125	127	2.94
1.0-1.49	112	1	74	34	79	50	12	4	2	0	1	109	148	3.30
1.5-1.99	17	0	312	54	93	48	11	4	1	0	0	366	157	3.86
>2.0	11	0	640	58	89	46	12	6	2	1	1	698	157	4.32
Unknown	37	0	22	21	38	23	9	3	1	1	2	43	77	1.79
Total average	261	0	111	36	77	43	11	4	2	1	1	147	126	3.03

SCALLOP LOG BOOK

19 _____ VESSEL _____ SIZE OF GEAR _____ CAPTAIN _____

TRIP No. _____ DATE AND HOUR SAILED _____ TOTAL CREW _____

AREA _____ DATE AND HOUR RETURNED _____ PORT DISCHARGED _____

Date	Position	Depth (Fath.)	Type of Bottom	Number of Bags Caught				Total No. Bags	No. of Tows	Time per Tow on Bottom	Remarks
	Loran or Decca Reading			1st Watch	2nd Watch	3rd Watch	4th Watch				

USE NEW SHEET EACH TRIP ENTER EACH WATCH CONFIDENTIAL

Fig. 1. Format of the commercial fisheries log used with the offshore scallop fleet.

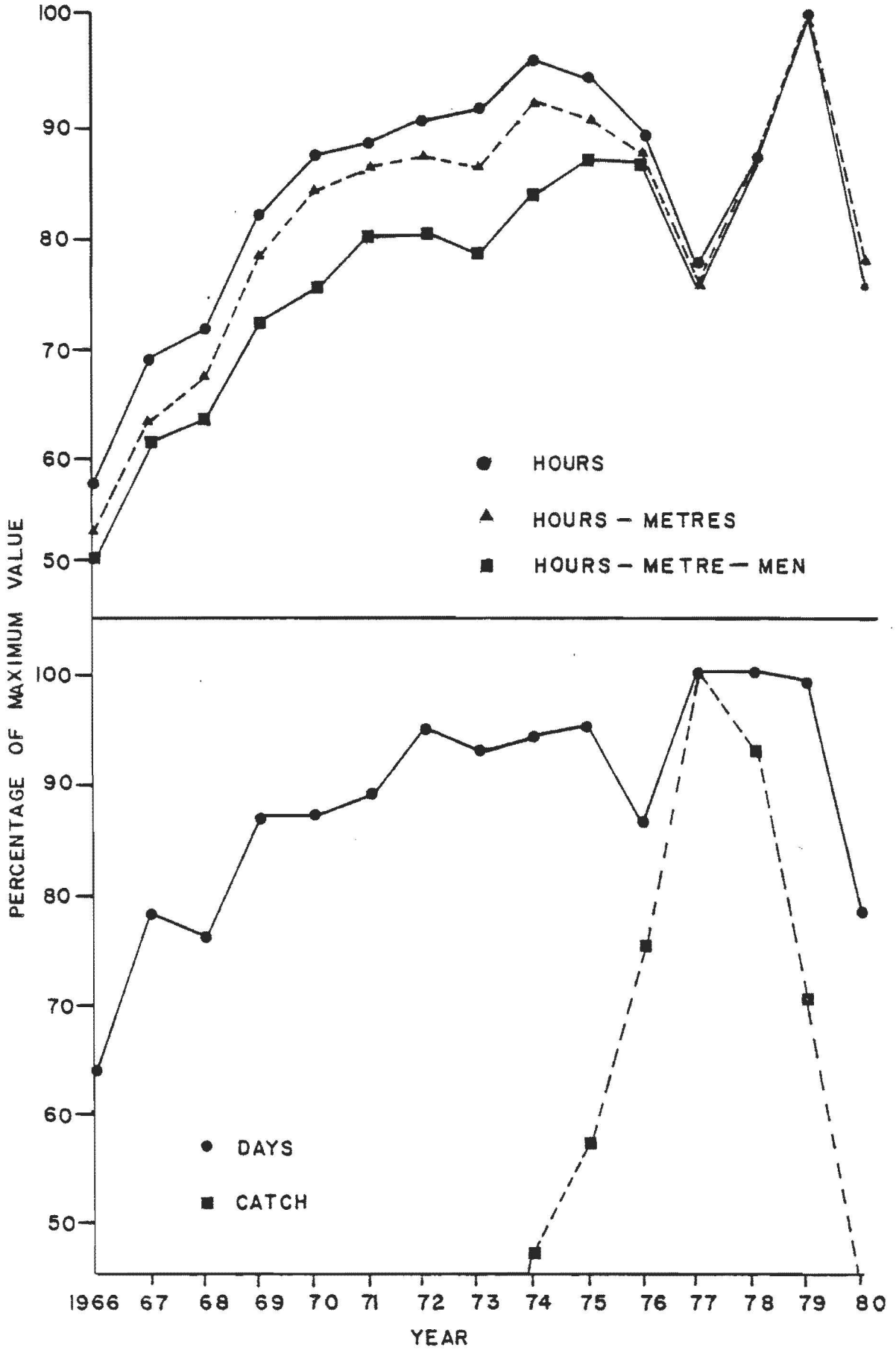

Fig. 2. Annual effort measures and catch, expressed as a percentage of the maximum value for each unit observed in the period 1966-80 inclusive.

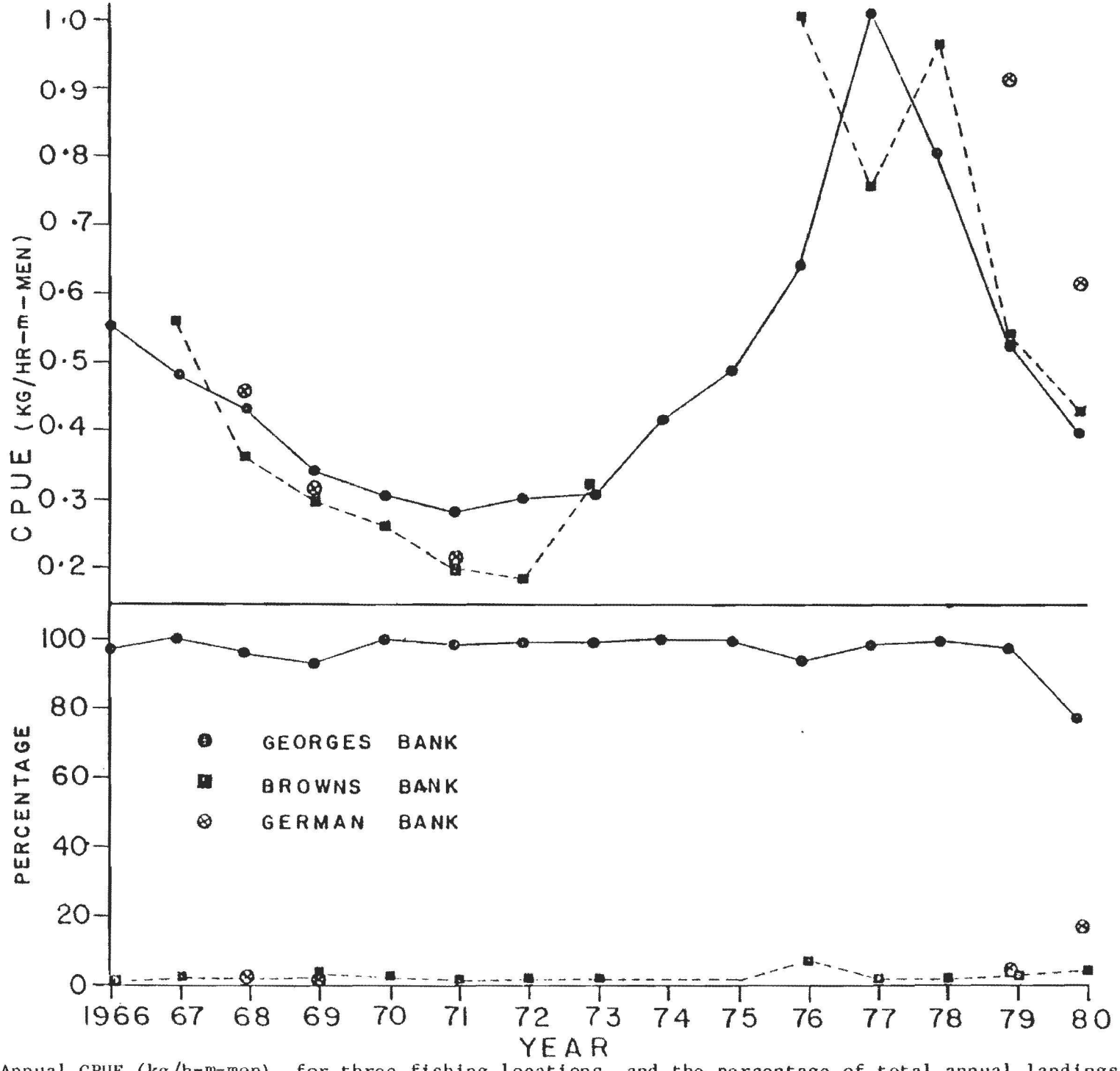

Fig. 3. Annual CPUE (kg/h-m-men) for three fishing locations, and the percentage of total annual landings fished at each location.

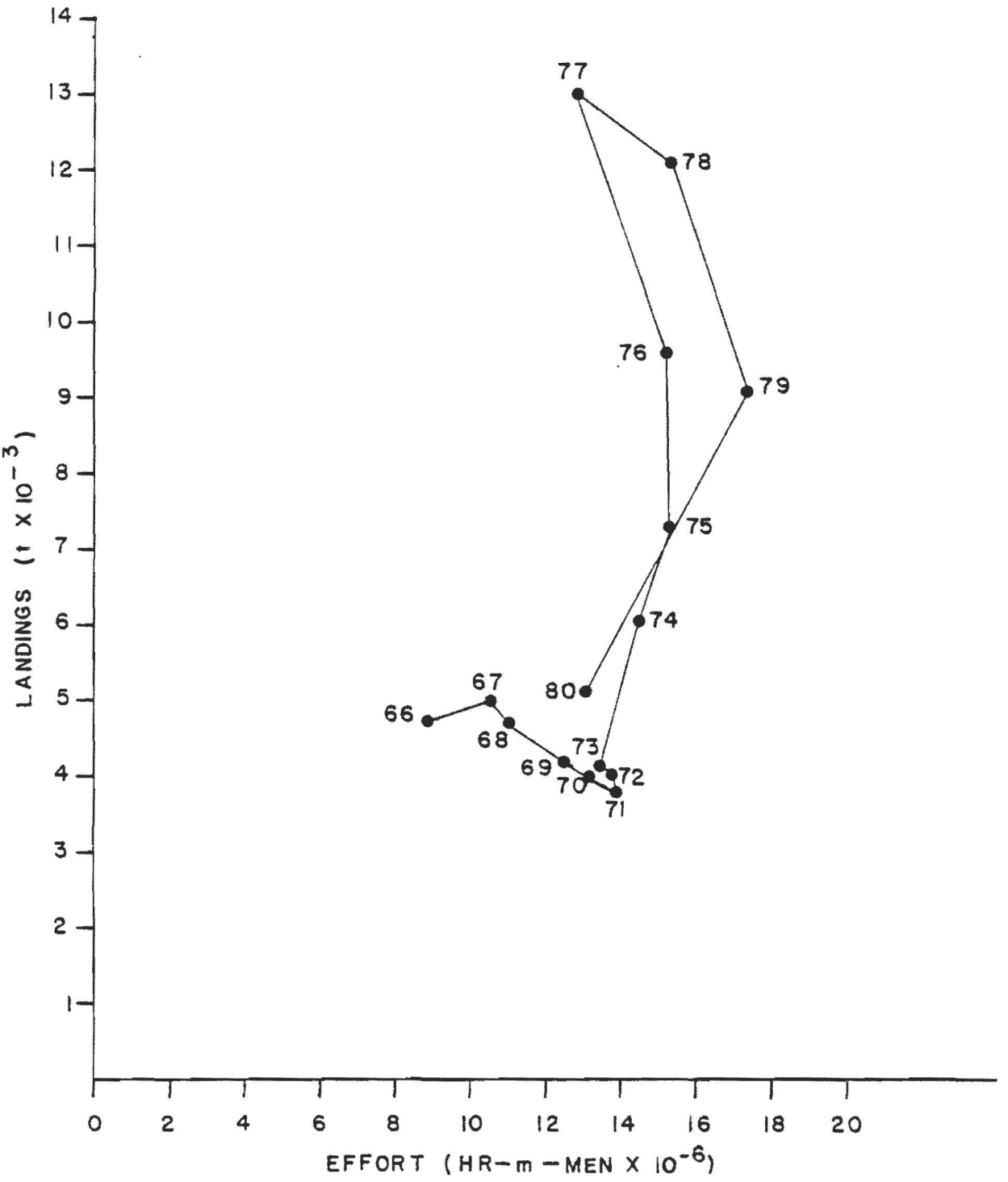

Fig. 4. The relation between catch and effort for the years 1966-1980 inclusive.