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Title

Report of Scallop Investigations and Explorations
in the Southern Gulf of St. Lawrence - 1949.

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- 395 Chiasson, L.P. Report of Scallop Investigations and Explorations in the southern Gulf of St. Lawrence - 1949.
- 397 Hachey, H.B. Vertical Temperature Distribution in the Great Lakes.
- 398 Giglioli, M.E.C. Some observations on the biology of the whelk, Polynices heros Say (1822), and Polynices triseriata, Say (1826), at Belliveau Cove, Nova Scotia.
- 399 Thurber, L.W. Meat Yield of Clams (Mya arenaria) and Percentage Total Dry Solids of Clam Meats.

Report of Scallop Investigations and Explorations
in the southern Gulf of St. Lawrence - 1949.

During the summer of 1949 the Fisheries Research Board sponsored a survey of the southern Gulf of St. Lawrence for the purpose of locating scallops in commercial quantities. In addition to this primary exploratory work, valuable information was obtained regarding the size distributions of scallops in different areas, the yield of meat of scallops in the Gulf, their growth rate, and scallop investigations that have been undertaken in the Gulf in the past. The summer's work is discussed under the following headings:

- I. 1949 Scallop Explorations.
 - (a) Daily Synoptic Reports.
 - (b) Charts indicating positions of hauls, and catches in these hauls.
- II. Size Distribution Frequencies of Scallops.
- III. Growth Rate of Scallops in Gulf.
- IV. Meat Yield in Gulf Scallops.
- V. Past Scallop Surveys in the Gulf.

I 1949 Scallop Exploration in the Gulf

The 1949 scallop survey in the Gulf of St. Lawrence was made on board the M. V. "Della May", a scallop dragger chartered from Bernard Longnair, Hillsburn, Annapolis Co., N.S. The crew for the summer operations consisted of Roy Pyne, master, George Morash, engineer, Vernon Kay, cook, and Roland Young, deckhand. The gear used for the explorations was the six-gang drag presently installed aboard commercial draggers in the Digby area.

Special equipment:

A Bendix depth sounder (Bantam model) was installed aboard the "Della May" with two purposes in mind: to obtain an accurate record of water depths in all areas surveyed, and to obtain immediate information regarding the character of the bottom. It was planned initially to cruise over fairly large areas with the sounder in operation in order to detect the bottoms that would give promise of supporting scallops.

The results obtained with the sounder throughout the summer were rather disappointing. Turbulence in the water immediately below the transducer made the apparatus useless at cruising speeds, and of doubtful value even with the engine out of gear if a wind was blowing or a "chop" was present. The writer was confident that he could detect a muddy bottom from the record, but there were several instances where such interpretations were erroneous.

Without any claim of expertness in this field, the writer early suggested two possibilities to account for the poor performance of the sounder: Either the boat's "lines" may be such as to cause an exceptional turbulence in the vicinity of the transducer, or the Bendix Bantam model may not be sufficiently powerful to give the results desired.

Selection of areas explored:

It was impossible to cover in one summer all the parts of the Gulf which had been reported to have promising possibilities for commercial scallop dragging. The following considerations were kept in mind in selecting certain areas to be given first attention: records of commercial concentrations of scallops in the past, type of bottom, hydrographic information available, local information, and requests for surveys, and fishing operations being pursued at the time. (In connection with the last consideration, it was not considered prudent to drag for scallops where lobster traps or set cod trawls were legitimately fishing.)

Procedure:

The only items of procedure in the survey that differed from those in commercial dragging were those referring to the determination of the boat's position, to the uniformity of duration of the hauls, and to the records that were kept of the catches. These items are therefore the only ones discussed below.

During the first week of dragging, the positions of the boat were established several times a day by taking bearings on prominent landmarks; intermediate positions were estimated by taking into account the courses that had been steered as well as the distances that had been travelled. In view of the fact that tides in many of the areas surveyed, were rather strong and of changeable strength and direction, it was decided to obtain the position of the boat, whenever possible, at the end of each haul.

Most hauls were of fifteen minutes' duration. The exceptions were occasioned mostly by the drags getting caught on bottom rocks. It was determined on different occasions that, during a normal fifteen-minute haul, the boat travelled over about one third of a mile of bottom. An interval timer was used as an aid in keeping the hauls of uniform duration.

Records:

Each haul was recorded on a form, a sample of which is included in this report.

Each series of hauls was identified by a capital letter, and each individual haul by a number. Particular hauls are thus identified by A23, B12, etc.

SCALLOP DRAGGING REPORT

Series _____ Haul _____

1. Date _____ Time _____ Weather & tide _____
2. Position (Compass bearings on land marks) _____

3. Distances off land marks _____
4. Latitude _____ Longitude _____
5. Depth _____
6. Bottom character _____
7. Length of haul (minutes) _____
8. Direction of haul _____
9. Gear _____ Cable length _____
10. Catch commercial drags _____ bushels
no. above 4" _____ no. below 4" _____
11. Catch small-mesh drag _____ bushels
no. above 4" _____ no. below 4" _____
12. Associate animals. _____
13. Remarks:

The quantity of scallops brought up in each haul was recorded in bushels, save those instances where counting would not delay dragging operations.

Synopsis of daily operations:

Table I is a synopsis of the daily dragging operations of the "Della May" in the Gulf. Hauls in series A were made from Georgetown as a base, those in B from Wood Islands, those in C from Borden and Tormentine, those in D from Alberton, those in E from Scuris, and those in F from Ballantyne's Cove, Antigonish Co.

Table I. Synopsis of Daily Operations of "Della May" in Gulf of St. Lawrence during 1949.

<u>Date</u>	<u>Hauls made</u>	<u>Date</u>	<u>Hauls made</u>	<u>Date</u>	<u>Hauls made</u>
July 4	A1 - A14	July 25	B44 - B49	Aug. 13	D21 - D25
" 5	A15 - A20	" 26	B50 - B59	" 15	D26
" 6	Windy	" 27	B60 - B69	" 16	D27 - D36
" 7	A21 - A28	" 28	C1 - C4	" 17	D37 - D48
" 8	A29 - A39	" 29	Windy	" 18	Windy
" 9	A40 - A47	" 30	Windy	" 19	D49
" 11	A48 - A59	Aug. 1	C5 - C17	" 20	Windy
" 12	A60 - A68	" 2	C18 - C28	" 22	Windy
" 13	Windy	" 3	Windy	" 23	D50 - D61
" 14	A69 - A78	" 4	C29 - C35	" 24	Windy
" 15	A79 - A83	" 5	Windy	" 25	Windy
" 16	B1 - B3	" 6	Boat under	" 26	E1 - E11
" 18	B4 - B14		repair	" 27	E12
" 19	B15 - B24	" 8	Windy	" 29	F1 - F5
" 20	B25 - B34	" 9	Windy	" 30	Windy
" 21	Windy	" 10	Windy	" 31	F6 - F14
" 22	B35 - B40	" 11	D1 - D9	Sept. 1	F15
" 23	B41 - B43	" 12	D10 - D20		

Of 52 potential dragging days, only 36 were fit for dragging. In these 36 days, 275 separate hauls were made.

Positions of hauls, and quantities of scallops landed:

Chart I indicates the position of each individual haul. All these calculations were determined or estimated at the conclusion of the hauls. They are plotted to the closest 15' of latitude and of longitude.

Chart II records the catches made in the various hauls of the summer. An analysis of the records represented on this chart will reveal that the only worthwhile areas explored during the summer lay several miles to the north of Pictou Island. This area appeared very promising, and news releases concerning it were published by means of press and radio. In this report, Chart III illustrates the areas in this vicinity that have promise as commercial

scallop beds. The areas marked "Apparently Commercial Quantities" yielded from 2 to 6 bushels of scallops per haul during the survey. The western end of this area, where the scallops were most concentrated, was located at 45° 50' 45" N latitude and 62° 42' 0" W longitude. This location is 6.5 miles from Wood Islands, and 4.5 miles from the western end of Pictou Island: Wood Islands bears due North and the western end of Pictou Island, SE x S $\frac{1}{2}$ S. The area of the bed was estimated at approximately 4 square miles. According to the exploratory catches, it was suggested that 50 bushels should be hauled up in a day's dragging. The small bed shown at 45° 51' 30" N latitude and 62° 34' 15" W longitude was not publicized because, as will be shown below, the average size of scallops in one part of this bed was rather small, and the bed itself did not seem very extensive in area.

Of the various other regions explored, none showed very great potentialities. A small piece of good bottom was located off Judique on the last dragging day, but it was impossible to explore it fully.

II Size Frequency Distributions of Samples of Scallop Catches

The measurement used as an index of the lineal dimension of scallops was the greatest distance from the hinge to the distal circular margin of the upper shell, and is called the "height" in this report. The measurements were first punched on celluloid sheets, and then read against a divided scale. These measurements were grouped in classes with a range of 5 mm.; thus, all specimens from 60 to 64 mm. in height were placed in one class, those from 65 to 69 in the next class, and so forth. The corresponding class values were taken as 62.5 mm., 67.5 mm., etc. Samples from hauls A33, A44, A46, A57, A59, A76 and A77, A83, B9, B15, B27, B37, B44, and B45 were measured. The size frequency distributions of these various hauls are represented in the form of histograms on the accompanying sheets of graph paper (Graph 1-13). Table II summarizes the statistics of these same distributions. From this table it is observed that B37 has the highest mean of samples measured. This haul was made in a region known as Indian Rocks, where some commercial dragging had been successful a few years ago. The paucity of small scallops on this bed indicates that it is an old bed, and that it is not being built with young stock. The other samples show fairly good consistency although there are significant differences between the means of some of the samples.

Table II. Statistics of Heights of Measured Samples of Scallops from Various Hauls.

Haul No.	Range mm.	No. in Sample	Mean mm.	Standard Deviation of Sample	Coefficient of Variability
A33	52.5 - 117.5	134	89.8±1.2	13.8	15.4
A44	52.5 - 117.5	155	81.2±1.0	11.9	14.6
A46	42.5 - 117.5	148	77.5±1.0	12.0	15.8
A57	62.5 - 122.5	266	81.1±.6	9.5	11.7
A59	42.5 - 117.5	340	80.0±.8	15.0	18.2
A76 &					
A77	57.5 - 127.5	217	87.6±1.0	14.0	15.9
A83	37.5 - 117.5	319	73.0±.8	14.8	20.3
B9	32.5 - 107.5	348	74.6±.3	11.8	15.9
B15	27.5 - 117.5	281	78.7±.8	13.8	17.5
B27	52.5 - 112.5	237	81.2±.7	10.4	12.8
B37	62.5 - 127.5	58	95.0±2.0	14.6	15.4
B44	27.5 - 102.5	301	74.1±.7	11.8	15.9
B45	32.5 - 112.5	241	81.4±.8	12.1	14.9

III Growth Rate of Scallops in Northumberland Strait

Only one sample of scallops, out of haul B45, was studied to determine the sizes attained by these at different ages. This information was obtained by measuring the distances between the hinge and successive annual rings of each scallop. The results obtained are plotted on Graph 14 and on Graph 15. Since the measurements in each graph represent those at the end of the summer and fall period of growth, the ages designated as 1, 2, or 3 years may well represent actual ages closer to $\frac{1}{2}$, $1\frac{1}{2}$, or $2\frac{1}{2}$ years. The greatest linear increment is added during the second year of growth, and there is a progressive decrease in these increments during the years that follow.

Graph 15 shows the parallel course of growth in scallops of different ages. The growth-curves of all year-classes are quite similar although slight variations are apparent.

IV Yield of Meats of Scallops in the Gulf of St. Lawrence

Two different methods were used to determine the yield of Gulf scallops in terms of meats. The first method was the simple matter of weighing the meats shelled out of a bushel of scallops. Four bushels shelled at different times of the summer yielded the following weights of meats: $5\frac{1}{2}$, $5\frac{3}{4}$ and two of $5\frac{1}{2}$ lbs.

The other method, more time-consuming, involved establishing the regression of meat weight on shell height of individual scallops. When these measurements were plotted on log-log paper, they had a distribution suggesting a linear relationship. By the use of the Method of Least Squares, the points were calculated to conform to the relationship expressed by the

equation: $y = 2.92x - 1.7740$, where x represents the logarithm of the shell height in cm., and y , the logarithm of the weight of meats in grams. This equation converted to arithmetical terms becomes $59.43y = x^{2.92}$. Graph 16 shows the actual distribution of meat weights of scallops of different heights, and the path followed by a curve based on the latter equation.

Graph 17 shows the weights of meats of scallops in the Borden area. These meats were watery, and obviously appeared abnormal.

V Past Scallop Surveys in the Gulf of St. Lawrence

The writer has attempted to gather available records of past scallop surveys in the Gulf of St. Lawrence, and to present them in summarized form in the chronological order of their occurrence. Efforts were made to obtain accurate information respecting the following points: name of scientific observer, name of boat, name of captain or navigator, type of gear used, areas surveyed, quantities of scallops hauled up, and prospects of commercially valuable beds of scallops. Little information seems available on such subjects as duration of hauls, sizes of scallops, etc. for many surveys. It is therefore quite difficult to form any accurate concept of the quantities of scallops discovered in the various surveys.

Among the various sources of information used were the Annual Reports of the Department of Fisheries, and File 721-A-19 of the Department, and various interviews with persons who had been directly or indirectly interested in such surveys.

It is hoped that more information will be obtained than is available at the moment, and that eventually the sketchy outline presented here may be made fairly complete.

1921 Mr. A. Halkett made 21 drags in one day with 4 "rakes" off Petit Rocher, Gloucester Co., bringing up 1800 scallops. The next day 1400 scallops were brought aboard in an unrecorded number of hauls.

1923 Captain Sandall and Thomas Oulton, Little Shemogue, surveyed the waters off Shippegan, Miscou, and Caraquet with Patrol Boat "C". According to Oulton, a single hand drag was used. Prospects for a scallop fishery were reported to be good off Caraquet, but poor off Shippegan and Miscou.

1925 Mr. Alphonse Robichaud, now Postmaster at Shippegan, worked on a scallop survey in a small boat with a single hand drag, off Belledune, Jacquet River, New Mills, Heron Island, and Trap Point. Four large beds were reported:

- 1 - Ranging from NE of Belledune lighthouse along the shore to WNW of Jacquet River Church, 1-3 miles off shore in 7 to 15 fathoms of water.
- 2 - From E to ENE of New Mills, 1-3 miles off shore, in 11 fathoms.

- 3 - From NE x E to NxE of Trap Pt., 3 miles off shore in 12-13 fathoms.
- 4 - From ENE to NW of Heron I. Lighthouse, 2-3 miles off, in 10 to 13 fathoms.

(The depths reported above were suspected by J. A. D. Robertson of Hampton, N.B., of being somewhat inaccurate.)

1927 Mr. A. Halkett aboard the "Mildred McGill" surveyed areas in the vicinity of Alberton, North Point, Buctouche, Cape Ste-Anne, Richibucto, Pt. Sapin, Wallace, Oak I., and Merigomish. Fair quantities were reported north of western P.E.I., and off Pt. Sapin 10 miles to the SxSE $\frac{1}{2}$ E. Scallop sizes ranged from 1 $\frac{1}{2}$ to 6 inches, and were said to be "fairly uniform".

1928 Mr. A. Halkett continued exploring for scallops concentrating his efforts to areas off Cape Kildare, Tignish, North Point, Cape Tryon, etc. The results of this year's dragging are combined with those of 1927 and 1929 in the construction of a chart showing areas that seemed to show promise as scallop bottoms.

1929 Capt. Seymour Young with Maurice Perry on the boat "Alberton" tried the scallops off Charlottetown Harbour, Alberton, Malpeque, Wood I., Miminegash, and Murray Harbour. Abundant scallops were reported off Alberton and Georgetown. Mortalities off South Point, Miminegash, and Murray Harbour are said to be considerable.

1932 Capt. Zinck on the experimental dragger "A. Halkett" worked off P.E.I. from East Lake to DesBarres Point, and in vicinity of Rustico and Tracadie Harbour, as well as south of Magdalen Islands. Prospects between East Lake and DesBarres Point looked good.

1933 Capt. Zinck in the "A. Halkett" seems to have surveyed the same areas as the year before. A heavy mortality is reported in the beds that looked promising the year before.

1934 The "Campbellton Graphic" in December 1935 refers to the discovery of beds in the Bay of Chaleur in the year 1934. No record of any exploration sponsored by the government in that area in 1934 has yet been found by the writer.

1936 Capt. Seymour Young surveyed the following regions for scallops: Miminegash, Tignish, St. Peter's, North Lake, South Lake, Georgetown, and Souris. Scallops were believed to exist in commercial quantities off Alberton, South Lake, Georgetown, and Souris. The best beds were said to be off Georgetown where a clean run of scallops from 2 $\frac{1}{2}$ to 4 inches was found.

1937 The "Mary A. II" belonging to C.R. Morton, of Centreville, Digby Co., worked areas off Boughton Island, Cape Bear, Rolfe Bay, Bell River, Wood Islands, Indian Rocks, Miminegash, Cape Wolf, Cascompeque, Cape Kildare, Conway Inlet, Cape Turner, Malpeque, Cape Stanhope, Rustico, Basin Head, East Point. The

observers were apparently Milton Hemphill, C.R. Morton, and M.W. Burhan. Only in the Georgetown area was anything worthwhile discovered; from the actual numbers of scallops captured per drag, it seems doubtful that as much as 1 bushel of scallops was ever taken up. As a standard Digby dragger was used presumably with 5 or 6 drags, it would appear that scallops were not then present in any worthwhile concentrations. While this work was more or less exploratory, it seems, from the correspondence, that the scallops hauled up were to be used as compensation (partial?) to the owner. Insofar as they could remember, Inspectors Larabee and Johnston did not think the expectations offered by the reports of 1936 were borne out by the dragging of the "Mary A II" in 1937.

Apart from the above surveys which were supported by the Government, the following attempts at locating scallops may be mentioned.

1940 Harvey Mason of Merigomish tried a single drag (taken off the "Balkett" or the "Arleux") off Arisaig, where a single scallop was caught in one day's trial. George Mason thought they must have been escaping from the slow-moving drag.

1941 (a) Gorton-Pew Co. of Caraquet, N.B., obtained the use of the "Earl H." of Digby, Victor Halliday, captain, to cover some of the grounds surveyed by Robichaud in 1925. Few scallops were found alive, and these were mostly of small size. The best results were obtained in Shippegan Gully, and in Pokemouche Gully, but the best hauls yielded only $\frac{1}{2}$ gallon of meats. Starfish were apparently numerous.

(b) Edgar Mason of Grand Manan, obtained the Department's permission to survey scallop possibilities between P.E.I. and Westmorland Co. shore. Edgar Jr., an experienced scallop dragger of Grand Manan, claims that the bottom is generally too rough in this region for good dragging. He claims having dragged from Buctouche southwards without encountering any worthwhile scallop beds. According to him, the most promising grounds are immediately to the westwards of the West Point light.

Suggestions regarding Future Work

A few suggestions may be made at present with respect to the pursuance of future explorations in the Gulf of St. Lawrence. One of the most important ones is that the western portion of Northumberland Strait be explored early during the summer so that it may be completed before the lobster season opens on August 10th.

Scallop Mortalities

A word must be added by way of postscript on the subject of scallop mortalities. During the summer the writer was on the

watch for indications of recent wide-scale mortalities. No such observations were made as no more than 10 dead scallop shells with both valves were ever noted.

In the middle of October, at the demand of the Department of Fisheries of the Province of Prince Edward Island, the writer went out to assist some fishermen in locating the scallop beds that had been reported in the vicinity of Pictou Island. Two days were spent aboard the Fairmile "Nine One" owned and skippered by Grant Graham, of Montague. Horace Hewitt was also aboard as an observer. Bad weather limited the actual work to the equivalent of one day. The discovery was then made that in some of the most productive locations, from one third to one half of the scallops had apparently died quite recently. Externally, these dead shells had the appearance of live scallops, as they still had their natural colour. A few scallops were found with only part of the adductor muscle remaining to represent the living contents.

The mortality seems to have reduced the concentration of available scallops to the point where commercial fishing of the area is no longer profitable. This seems to have happened at least three times before in the Gulf of St. Lawrence. It was reported by Mr. L. M. Dickie in 1946 off Boughton Island, P.E.I., by Dr. A. W. H. Needler in 1933 off Souris, P.E.I., and Carleton, P.Q., and by agents of the Department of Fisheries in 1927-28 who were working in the Gulf area. We can only guess at the cause of these mortalities and we knew very little about the recovery period.

Key map for charts I and II showing areas explored in each series of hauls, A - F.

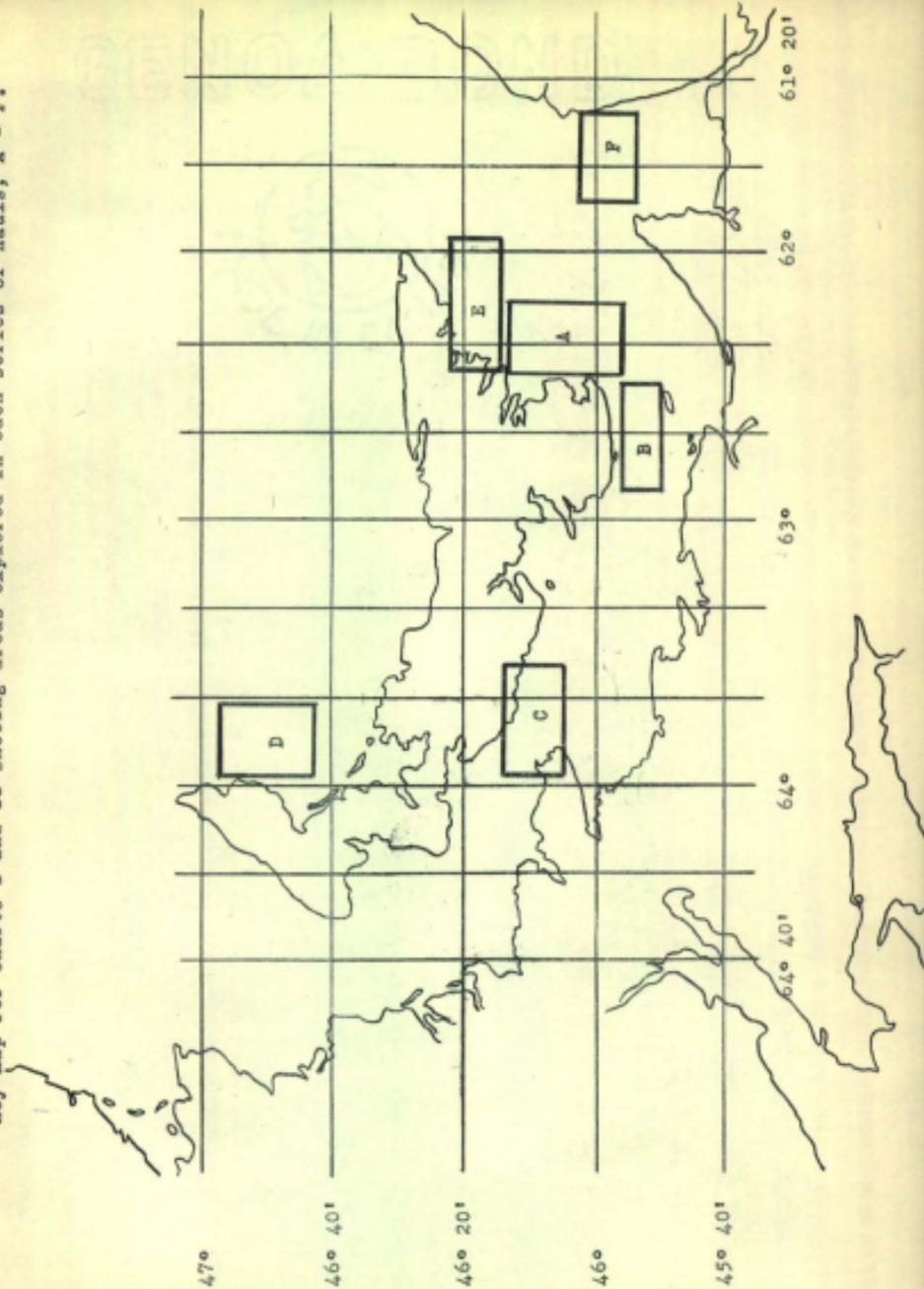


Chart I Part 1

Position of hauls in Series A and E. (See key map)

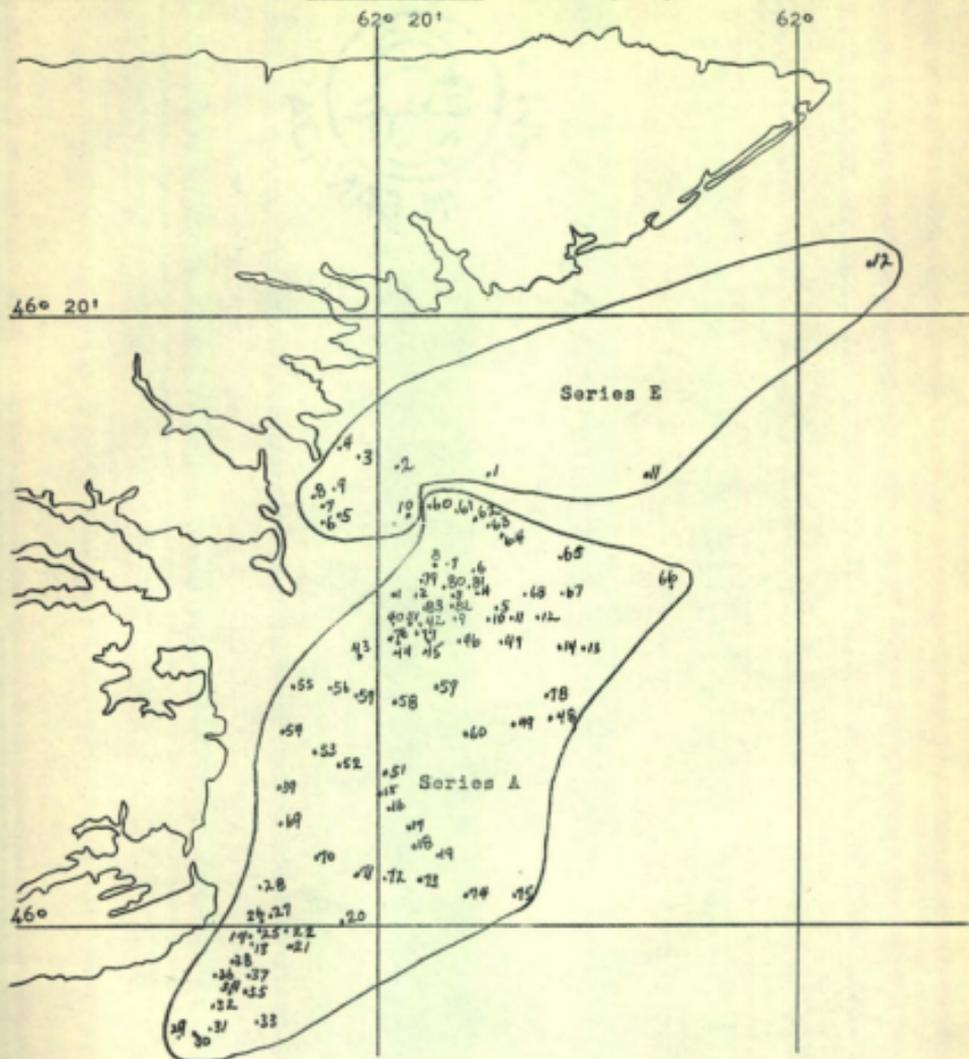


Chart I Part 3

Position of hauls in Series C and D. (See key map)

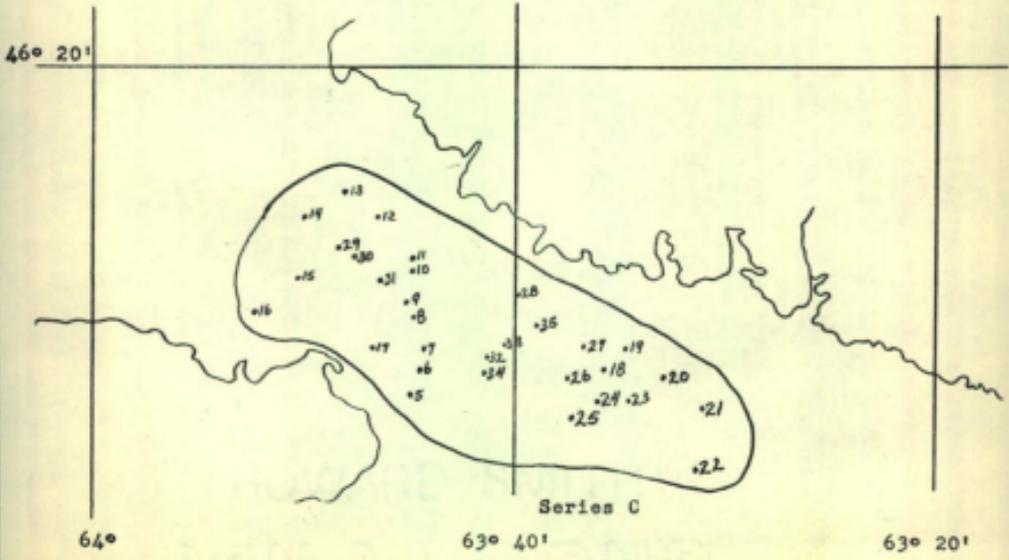
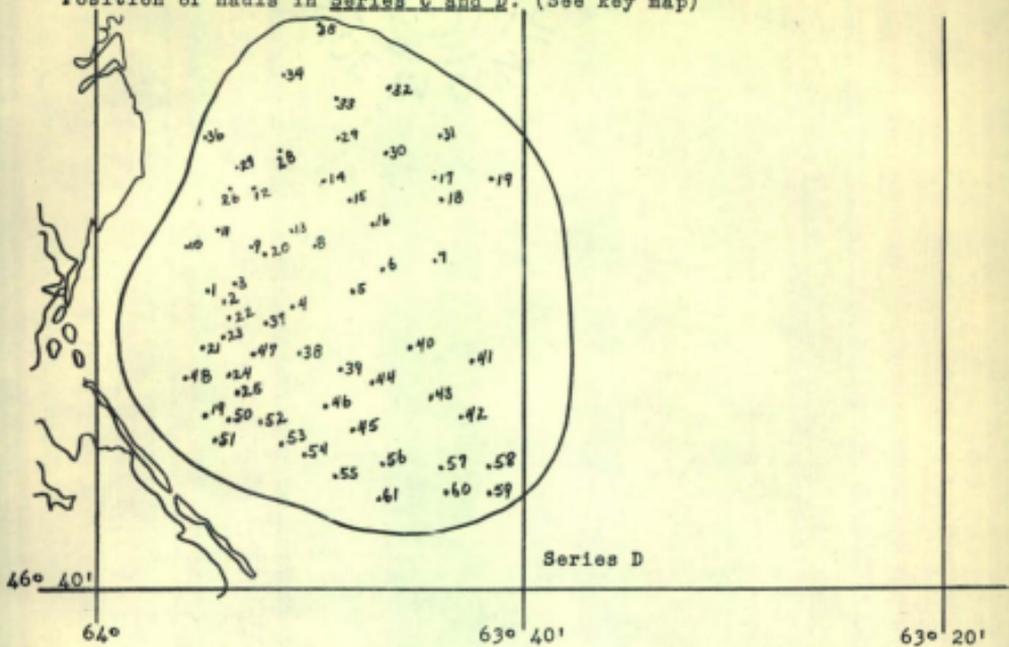


Chart II Part 2

Catch per haul in Series C and D. (See key map)

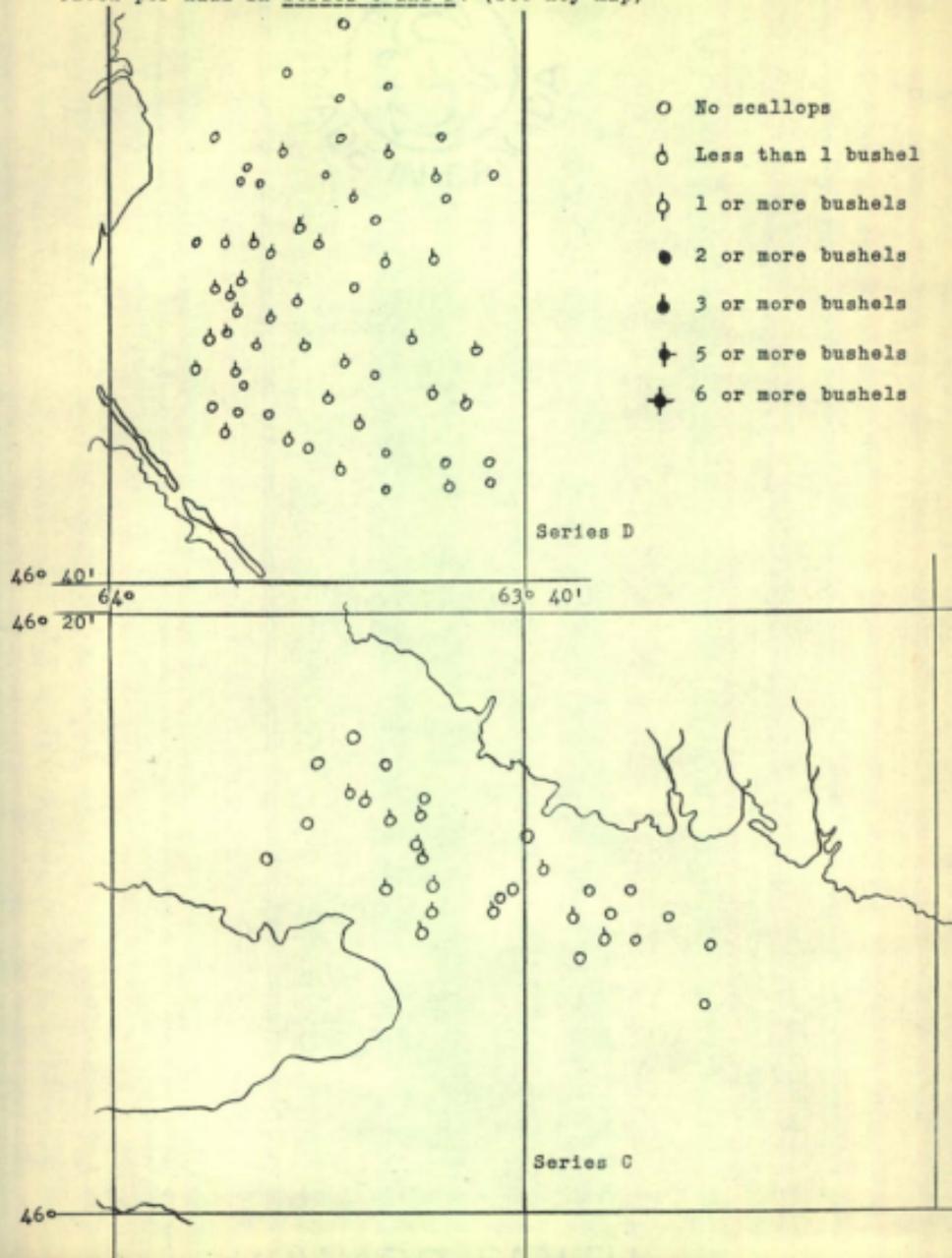
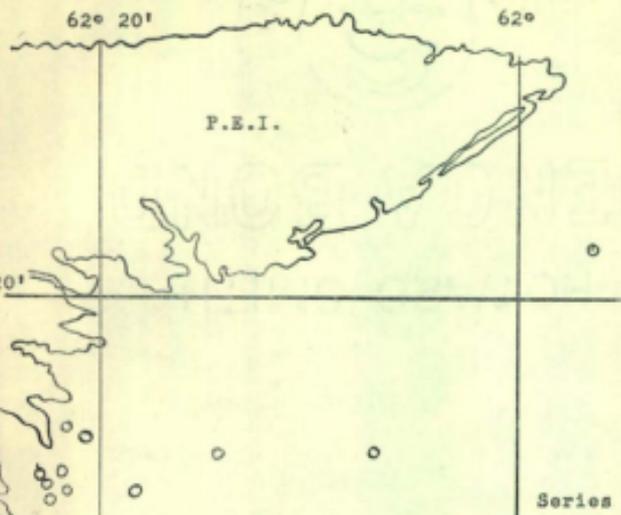


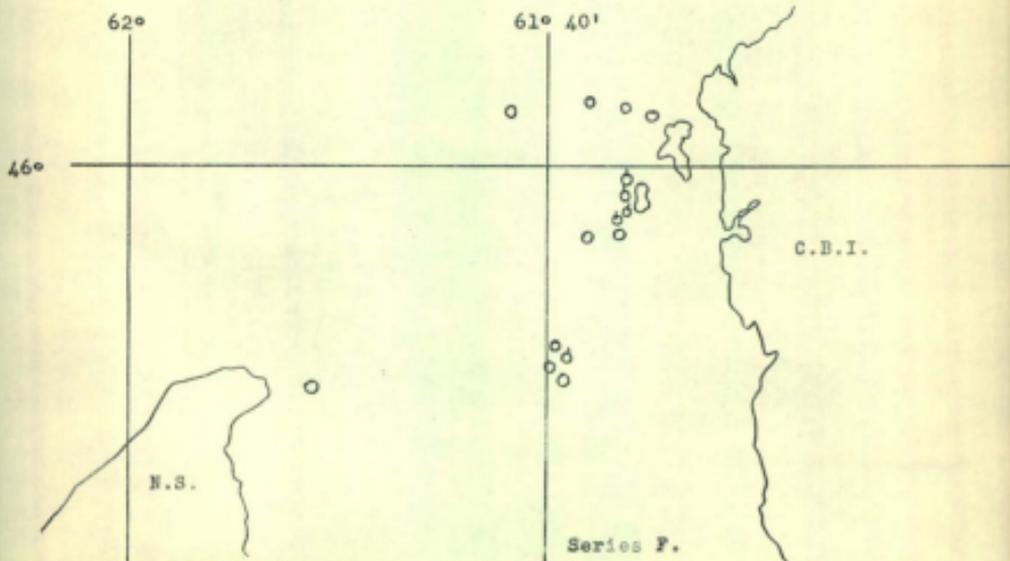
Chart II Part 3.

Catch per haul in Series E and F. (See key map)

- No scallops
- Less than 1 bushel
- ◊ 1 or more bushels
- 2 or more bushels
- ⬇ 3 or more bushels
- ⬆ 5 or more bushels
- ⬇ 6 or more bushels



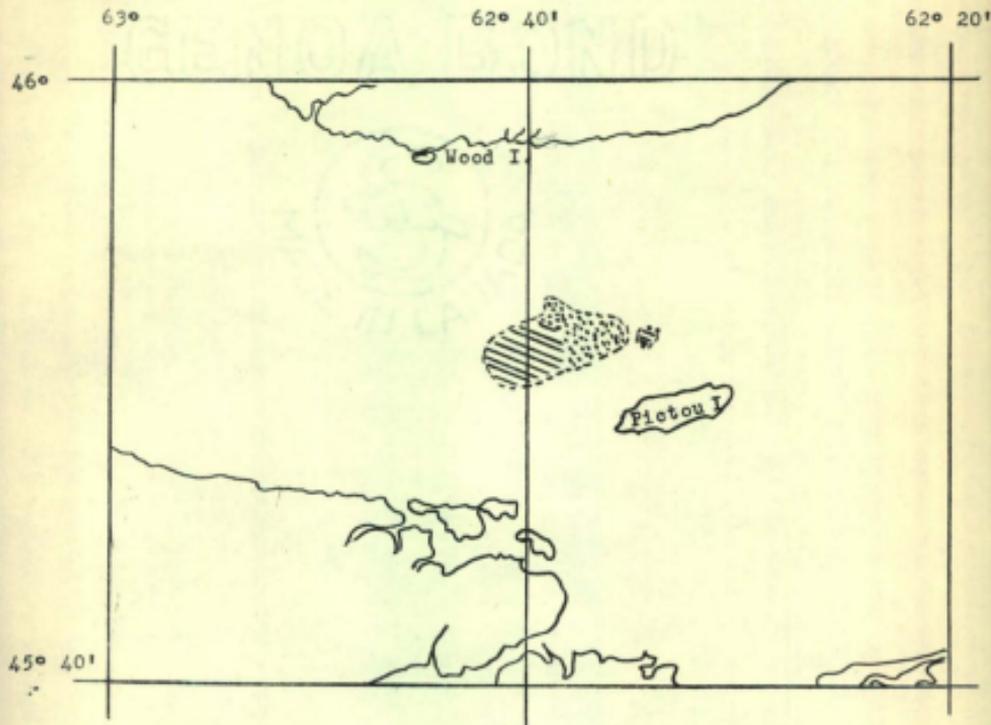
Series E.



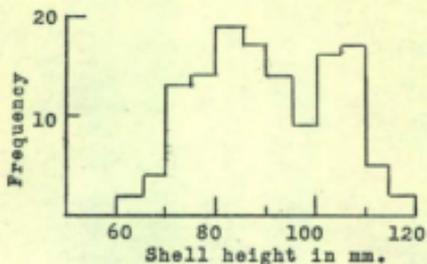
Series F.

Chart III

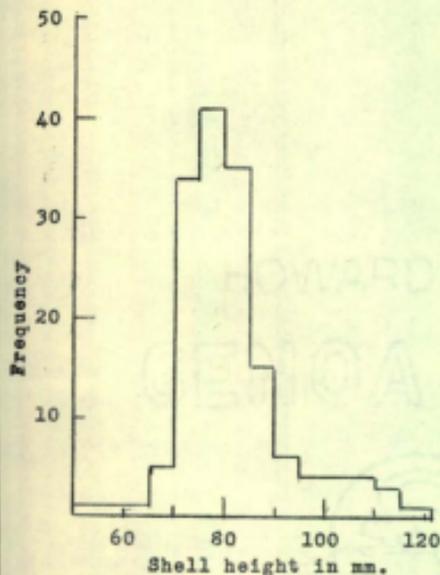
The Pictou Island scallop bed discovered in 1949.



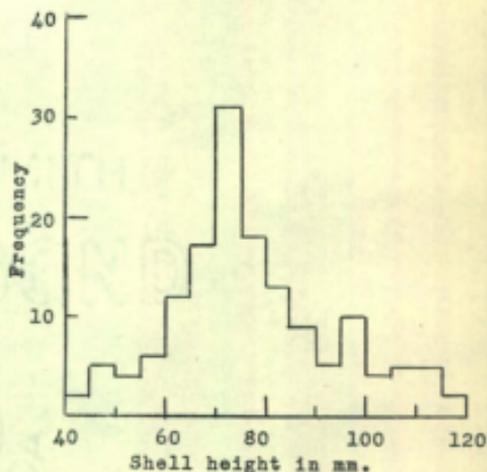
- Apparently
Commercial quantities
- Sub-commercial quantities



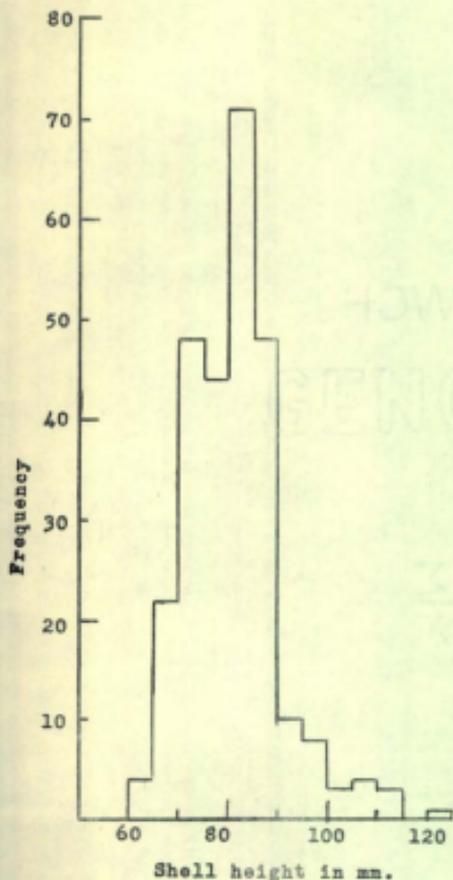
Graph 1. Size frequency distribution of scallops in haul A33.



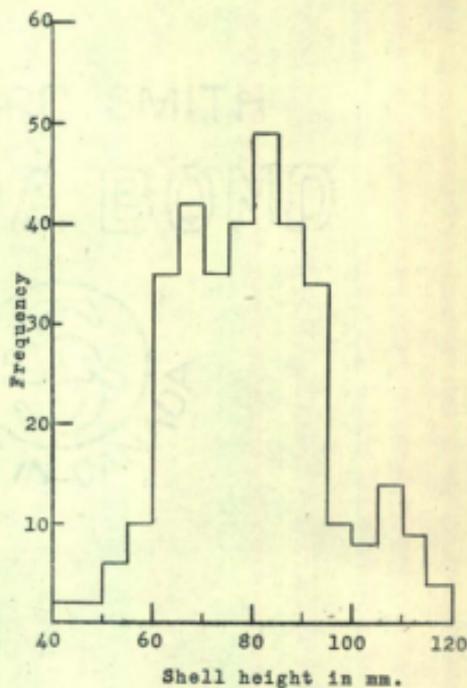
Graph 2. Size frequency distribution of scallops in haul A44.



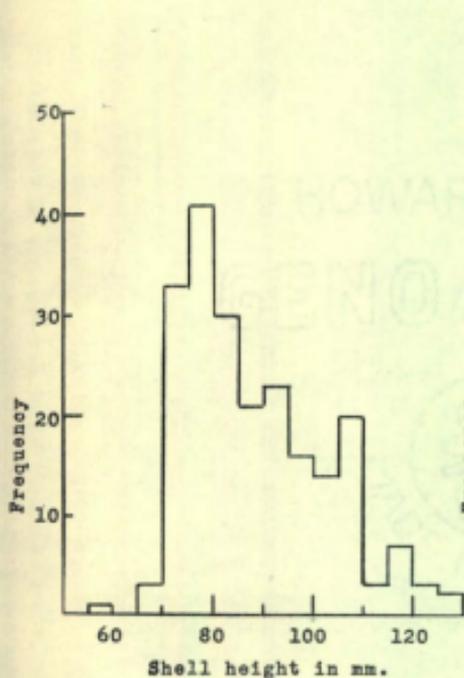
Graph 3. Size frequency distribution of scallops in haul A46.



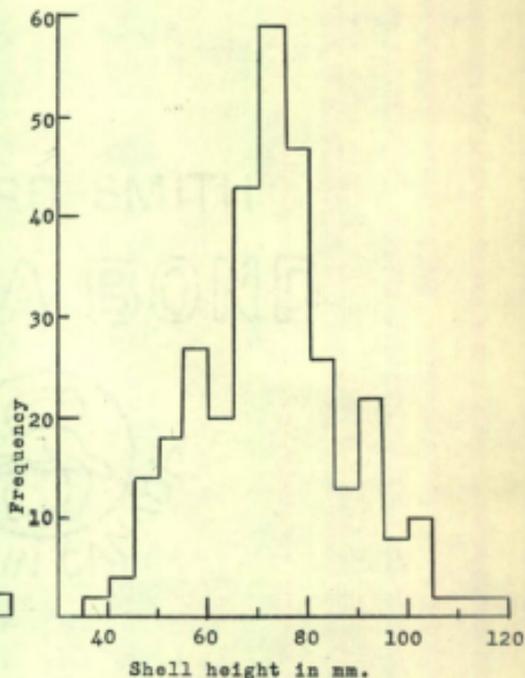
Graph 4. Size frequency distribution of scallops in haul A57.



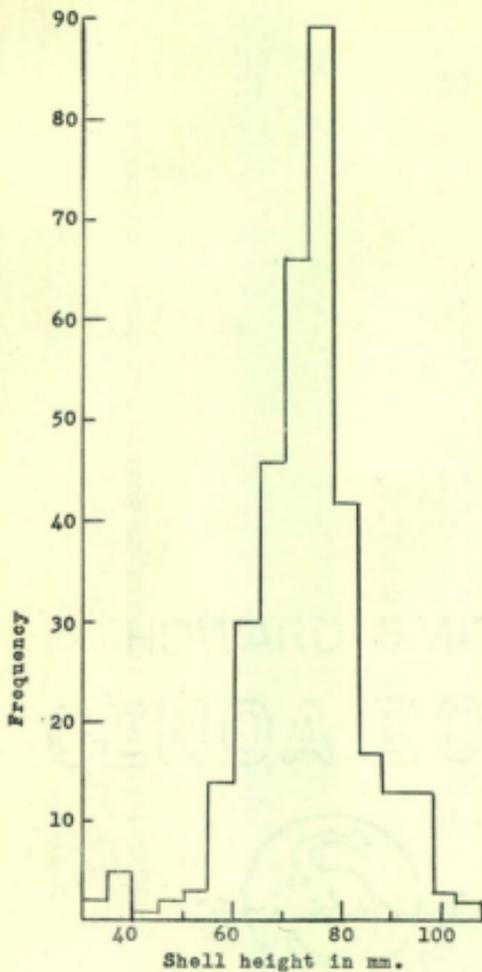
Graph 5. Size frequency distribution of scallops in haul A59.



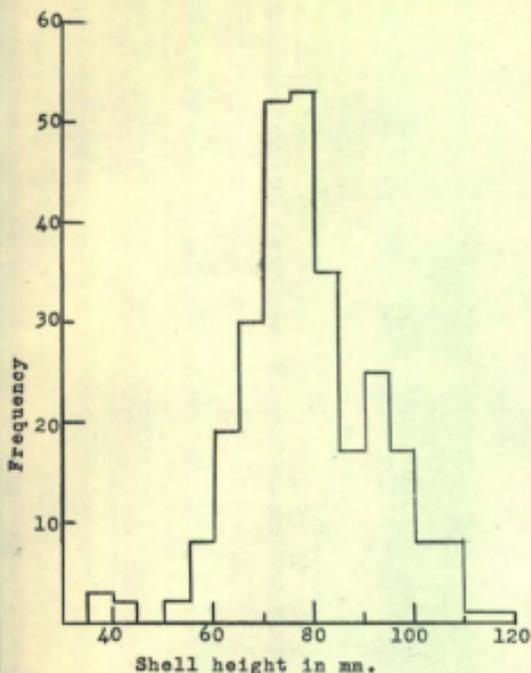
Graph 6. Size frequency distribution of scallops in hauls A76 and A77.



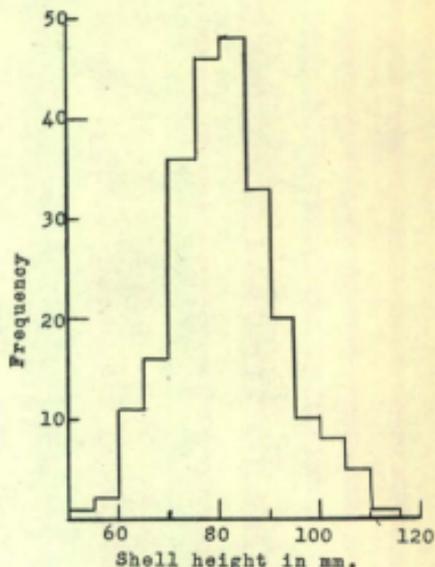
Graph 7. Size frequency distribution of scallops in haul A83.



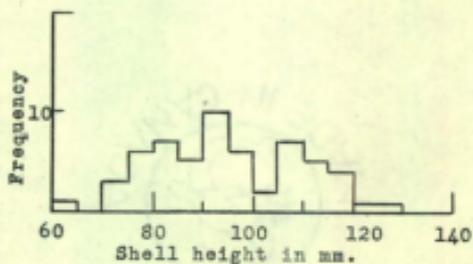
Graph 8. Size frequency distribution of scallops in haul B9.



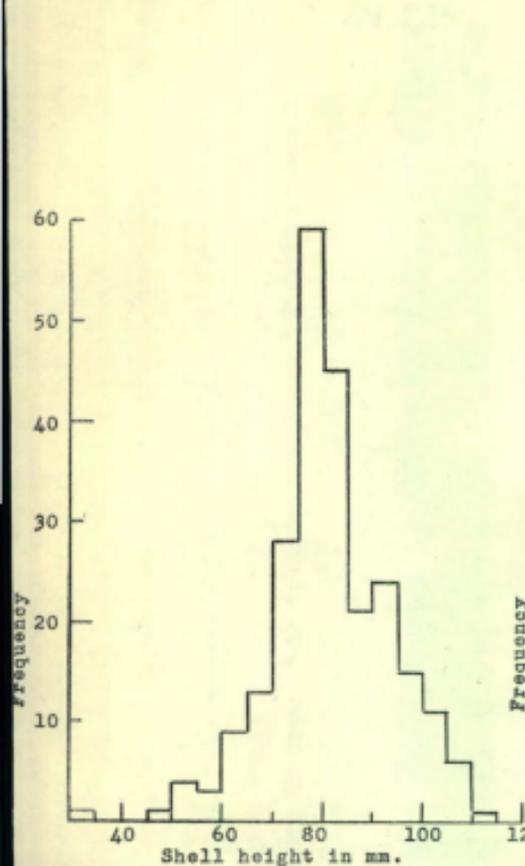
Graph 9. Size frequency distribution of scallops in haul B15.



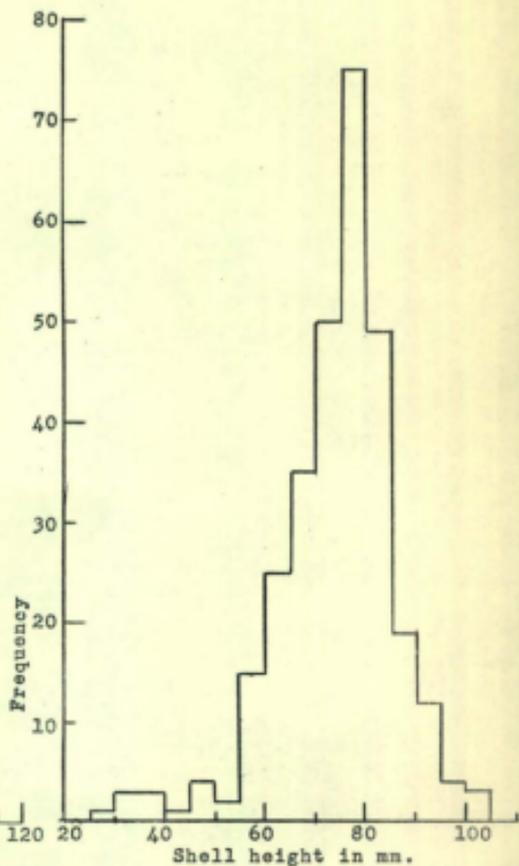
Graph 10. Size frequency distribution of scallops in haul B27.



Graph 11. Size frequency distribution of scallops in haul B37.

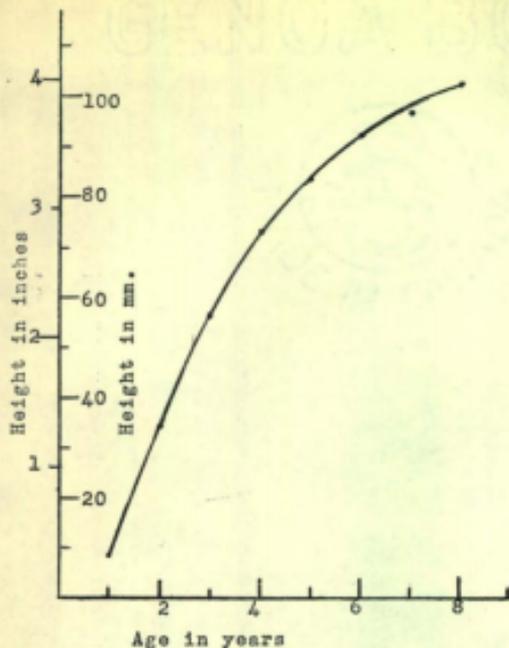


Graph 13. Size frequency distribution of scallops in haul B45.

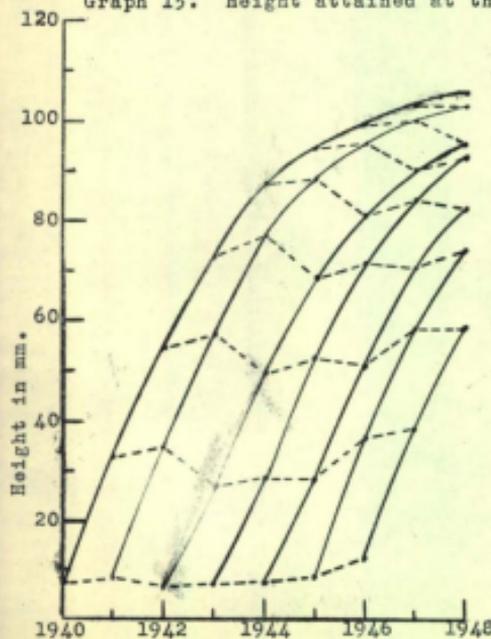


Graph 12. Size frequency distribution of scallops in haul B44.

Graph 14. Heights attained by scallops of sample B45 at the end of various years of growth.



Graph 15. Height attained at the end of each year of growth sample B45

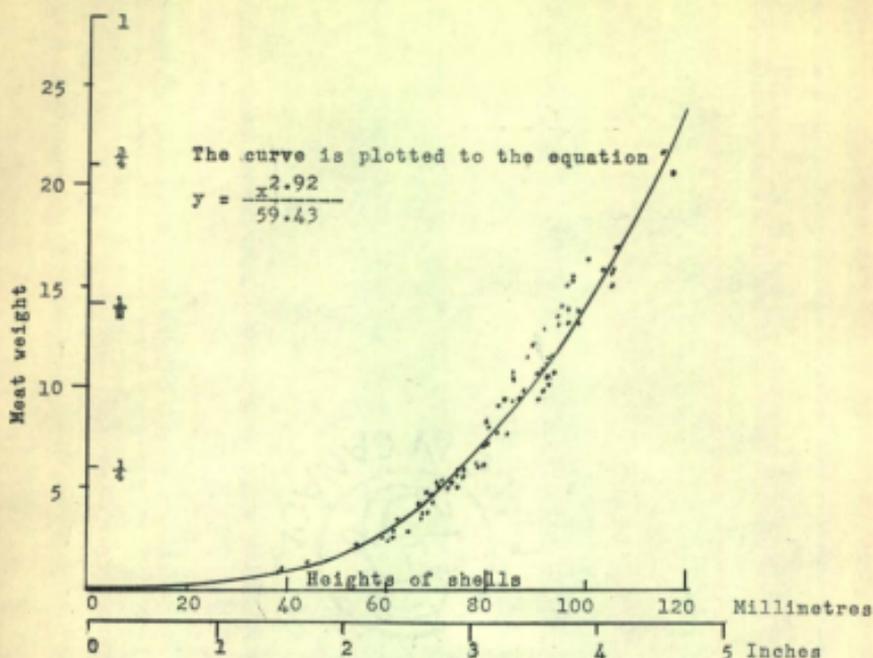


— The solid line indicates the successive heights attained by individual year-classes.

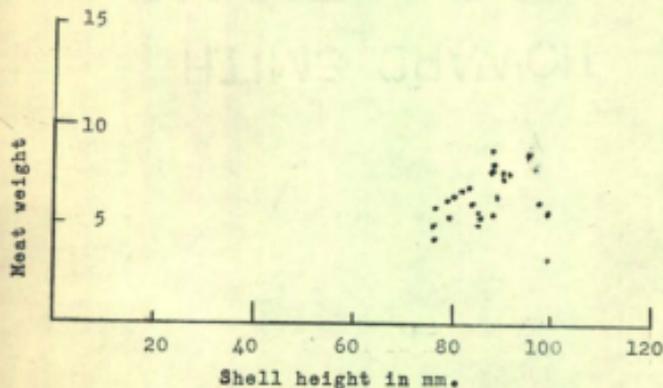
- - - - - The broken line indicates the relative heights attained by the various year-classes at corresponding ages.

(The first height recorded for each year-class is supposedly that attained by the scallops in the fall or early winter of their first year of growth.)

gms. oss.



Graph 16. Meat-yield of scallops at different sizes from Pictou Island area.



Graph 17. Meat-yield of scallops from haul C9 in Borden area.