F I S H E R I E S R E S E A R C H B O A R D

O F C A N A D A

MANUSCRIPT REPORTS OF THE BIOLOGICAL STATIONS

No. 374

Title

The Growth Rate and Age Group Distribution of the Giant Scallop in the Bay of Fundy, 1940.

Author

R. E. Brannen

THE GROWTH RATE AND AGE GROUP DISTRIBUTION OF THE GIANT SCALLOP IN THE BAY OF FUNDY

1940

by

R. E. Brannen

THE GROWTH RATE AND AGE GROUP DISTRIBUTION OF THE GIANT SCALLOP Placopecten grandis (Solander) IN THE BAY OF FUNDY

By R. E. Brannen

Atlantic Biological Station

ABSTRACT

The Giant Scallop, Placopecten grandis (Solander), which is fished extensively in the Bay of Fundy, varies considerably in growth rate from year to year and from place to place. Slowest growth appears to take place in deeper offshore waters. In the Bay of Fundy fastest growth occurs during the second year of the scallop's life.

INTRODUCTION

During the latter part of the month of April, 1940, the Station boat "Zoarces" carried out scallop dragging operations in the Digby region of the Bay of Fundy and brought back to the Biological Station at St. Andrews, New Brunswick, several thousands of shells. These shells were taken from ten different localities in that area and each catch was kept carefully separated from the others so as to avoid mixing of the shells.

The standard commercial scallop drag was used but this was modified slightly by the addition of a fine mesh accessory net, lining the inside of the standard four inch ring net. This fine mesh net retained scallops of small size that are normally lost through the rings of the standard scallop drag net.

All shells taken were carefully measured and recorded as to age and diameter of shell. In most cases where possible each year's growth was determined and tabulated.

This paper constitutes an analysis of the data so obtained.

LOCATIONS OF SECTIONS

The ten sections in the Digby area that were sampled are illustrated in fig. I. An additional section, Section XI,

just inside Digby Gut, was dragged, but no scallops were obtained from this formerly very productive area.

GENERAL DATA

Careful measurements show that scallops in this area grow very much faster during their second and third years of life than during their first and all years subsequent to the third. In all Digby scallops a steady decline was found in the rate of growth after the second year.

The average growth for each corresponding year of life of the scallops taken in the various sections dragged off Digby is listed in Table I, together with the number of shells examined for that particular growth ring.

Table I. Average growth for each corresponding year of life of scallops taken from Sections I to X inclusive. Measurements in mm.

Section	1st. ring	2nd. ring	3rd. ring	4th. ring	5th. ring	6th. ring	7th. ring	8th. ring	9th. ring	10th. ring
Sect. I	19.2	30.0	24.4	16.8	10.5	8.8	5.6B	2.7		
#shells exam'd	298	298	293	79	29	12	12	7		
Sect. II	21.3	34.6	27.9	18.6	10.6	7.6	4.8	2.9		
#shells exam'd	473	473	433	107	29	13	10	10		
Sect.III	21.9	34.7	27.4	18.9	12.2	8.4	5.5	3.5	2.6	2.0
#shells exam'd	497	497	457	137	92	75	71	66	44	28
Sect.IV	no measurements.									
Sect. V	no measurements.									
Sect.VI	21.2	33.9	27.7	19.0	10.7					
#shells exam'd	66	66	66	17	3					
Sect.VII	18.7	32.3	26.7	19.4	10.8	7.4	5.3	3.5	3.1	2.5
#shells exam'd	77	77	77	55	42	27	24	20	15	10
Sect.VIII	20.5	30.8	26.0	18.6	11.3	7.4	5.6	4.1	2.9	2.3
#shells exam'd	79	79	77	66	52	45	41	38	36	21
Sect. IX	21.5	31.7	27.0	16.4	9.5					
#shells exam'd	42	42	42	12	9					
Sect. X	18.5	26.7	23.2	16.9	11.2	7.7	5.4	3.6	2.7	2.3
#shells exam'd	130	130	130	120	115	107	107	106	90	60

Although no great difference is to be noted between the first year's growth of the various samples, second year growth of Section X scallops averages from 3.3 mm. to 8. mm. less than the others. This section is located 12 miles due north of Point Prim, and is the farthest offshore sample of which we have record.

Sections VII, VIII and IX, located 8 miles offshore, give a second year growth average in each case lower than that for Sections II and III which are only 2 to 3 miles offshore. Thus there appears to be an offshore gradient in growth rate of Digby scallops.

Section I scallops, which are, however, from inshore beds, exhibit a growth rate in between that of Sections VII, VIII and IX and Section X scallops. Why this should be is not clear, but it is possible that the explanation bears on the depth of the water in the vicinity, and the effect of that depth of water on temperatures and food supply. Both Section I and Section X scallops are situated on the edge of the 50 to 75 fathom depth contour whereas all of the other samples are from shallower water. Stevenson (1935) found that "shallow water scallops grow considerably faster in their determinative years of growth than the deep water ones".

Measurements of the accumulated growth from year to year show more directly the variation in growth rates for the different areas.

Table II. Averages of total lengths of shells tabulated in table I, measured from umbo to opposite edge of shell. Measurements in mm.

Section	2 yr. olds	3 yr. olds	4 yr. olds	5 yr. olds	6 yr. olds	7 yr. olds	8 yr. olds	9 yr. olds	10 yr. olds
Sect. I	4.92	7.36	9.04	10.0	10.9	11.5	11.0	--	--
Sect.II	5.59	8.38	10.2	11.3	12.0	12.5	12.8		
Sect.III	5.66	8.40	10.3	11.5	12.3	12.9	13.2	13.5	13.7
Sect.IV	5.9	8.4	9.9	--	--	--	--	--	--
Sect. V	6.2	8.4	10.3	11.2	12.2	13.1	13.5	--	--
Sect.VI	5.51	8.28	10,2	11.2	--	--	--	--	--
Sect.VII	5.10	7.77	9.7	10.8	11.5	12.0	12.4	12.7	13.0
Sect.VIII	5.13	7.73	9.59	10.7	11.5	12.0	12.4	12.7	12.9
Sect.IX	5.32	8.02	9.66	10.6	--	--	--	--	--
Sect. X	4.52	6.84	8.53	9.65	10.4	11.0	11.3	11.6	11.8

From the above table one can see at a glance that Section II, III, V and VI scallops attain legal size, (4 inches or 10.2 cm. approx.) at the end of their fourth year of life;

Section IV, VII, VIII and IX scallops reach that size during the fifth summer; Section I scallops early in their sixth summer and Section X scallops near the end of their sixth summer.

A more exact check of the differences in growth rates of scallops from different localities for the same year and of the same locality for different years is to be had from a comparison of the following tables.

Table III. Average yearly growth of 3, 4 and 5 year old scallops from Section I. Measurements in mm.

Age	1st. ring	2nd. ring	3rd. ring	4th. ring	5th. ring	No. shells examined
3 years	19.4	30.3	23.4			218
4 years	16.5	29.5	26.1	16.4		50
5 years	17.8	31.6	28.7	18.1	8.9	16

Table IV. Average yearly growth of 2,3,4 and 5 year old scallops from Section II. Measurements in mm.

Age	1st ring	2nd. ring	3rd. ring	4th. ring	5th. ring	No. shells examined
2 years	25.8	33.9				41
3 years	21.7	35.3	27.2			325
4 years	18.8	32.6	29.9	19.0		80
5 years	17.8	36.5	31.5	17.8	8.9	16

Table V. Average yearly growth of 2,3,4 and 5 year olds from Section III. Measurements in mm.

Age	1st ring	2nd. ring	3rd. ring	4th. ring	5th. ring	No. shells examined
2 years	26.5	32.8				29
3 years	21.5	35.3	27.2			325
4 years	18.2	32.6	29.8	19.3		42
5 years	20.6	36.0	28.6	18.0	8.8	19

Table VI. Average yearly growth of 3 and 4 year scallops from Section VI. Measurements in mm.

Age	1st ring	2nd. ring	3rd. ring	4th. ring	5th. ring	No. shells examined
3 years	22.1	34.8	26.0			46
4 years	18.9	34.1	29.5	18.9		14

Table VII. Average yearly growth of 3, 4 and 5 year old scallops from Section VII. Measurements in mm.

Age	1st. ring	2nd. ring	3rd. ring	4th. ring	5th. ring	No. shells examined
3 years	19.9	32.6	28.0			25
4 years	17.2	33.4	28.1	17.8		10
5 years	17.7	33.5	28.3	18.0	10.5	15

Table VIII. Average yearly growth of 3, 4 and 5 year old scallops from Section VIII. Measurements in mm.

Age	1st. ring	2nd. ring	3rd. ring	4th. ring	5th. ring	No. shells examined
3 years	21.1	31.6	25.4			28
4 years	20.0	28.4	27.6	16.6		12
5 years	21.5	35.1	25.3	18.7	9.0	6

Table IX. Average yearly growth of 3, 4 and 5 year old scallops from Section IX. Measurements in mm.

Age	1st. ring	2nd. ring	3rd. ring	4th. ring	5th. ring	No. shells examined
3 years	21.7	31.5	26.7			30
4 years	20.3	29.2	29.2	16.2		6
5 years	21.5	35.3	26.3	16.6	8.0	6

Table X. Average yearly growth of 3 and 4 year old scallops from Section X. Measurements in mm.

Age.	1st. ring	2nd. ring	3rd. ring	4th. ring	5th. ring	No. shells examined
3 years	20.1	30.5	25.5			10
4 years	16.8	27.3	23.8	16.0		5

Age groups 2, 3, 4 and 5 have been tabulated wherever a sufficient number of samples of these groups were to be had. As these are the years of fastest growth, measurements for these years show variations in growth rate more readily than do subsequent years. In a few instances, notably the four year group of Sections IX and X and the five year group of Sections VIII and IX, very few shells were available for measurement, so the significance of such measurements might well be questioned. But with the larger number of shells the averages of the growth measurements appear to be very significant. For example; 1479 shells made up Section II sample and of these 960 were three year old scallops. Two

series of measurements were made of these three year olds, one group of shells consisting of 149 and the other 176, no shell being measured twice. The results of these measurements are recorded in Table XI.

Table XI. Average yearly growth of two series of shells from Section II sample. All measurements made on three year old scallops.

Series	1st. ring	2nd. ring	3rd. ring	No. shells examined
A	21.9 mm.	35.8 mm.	27.6 mm.	149
B	21.5 mm.	35.4 mm.	27.1 mm.	176

The value of the above averages, in connection with the question of the significance of the preceeding tables, can be seen at a glance.

DISCUSSION

That there is a distinct variation in the growth rate if the Bay of Fundy scallop now appears to be beyond doubt. The factors which chiefly influence this growth rate have not, as yet, been investigated in detail but are assumed to be temperature and food supply with possibly several others of lesser importance. Stevenson (1935) found that Annapolis Basin scallops grew far more rapidly than any others examined, and he attributed this first, to the warmer temperature of the Basin water, and second, to a greater supply of food which was carried back and forth over the bed by the fast currents of water in Digby Gut. This Annapolis Basin bed of scallops was formerly very productive but now seems to have disappeared completely and so it is impossible to check for growth rate in this area.

AGE GROUP DISTRIBUTION

Table XII lists numerically, according to age groups, all of the scallops secured by the operations of the Station boat "Zoarces" in April, 1940. From this table we are able to get some idea of the relative abundance of the various age groups of scallops in the Digby area, and to make a rough estimate of the effect of the new legal size group on the productiveness of the fishery for the coming season.

Table XII. Age group tabulation of all of the scallop shells secured in the Digby area in April of this year, together with the Section from which they were taken.

Age	Sect. I	Sect. II	Sect. III	Sect. IV	Sect. V	Sect. VI	Sect. VII	Sect. VIII	Sect. IX	Sect. X
1 yr.	-	-	-	-	-	1	-	-	-	-
2 yr.	-	41	30	1	1	2	-	2	-	-
3 yr.	221	969	565	11	29	46	23	25	30	9
4 yr.	51	154	56	2	3	14	10	12	7	3
5 yr.	19	49	38	-	1	3	15	7	8	3
6 yr.	-	16	7	-	1	-	3	1	10	2
7 yr.	14	38	13	-	1	1	8	2	6	4
8 yr.	22	83	26	-	1	5	7	9	10	16
9 yr.	40	43	24	-	-	9	27	21	12	23
10 yr.	48	18	21	-	-	3	55	31	17	12
11 yr.	15	14	29	-	-	3	39	16	7	18
12 yr.	7	6	25	-	-	2	12	6	-	13
Older	a	b	c	d	e	f	g	h	i	j
# shells	437	1431	834	14	37	89	199	132	107	103

a - 42 shells, age undetermined. Average diameter 14. cm.
b - 48 " " " " " 15.2 "
c - 46 " " " " " 14.7 "
d - 5 " " " " " 15.2 "
e - 8 " " " " " 15.4 "
f - 26 " " " " " 14.8 "
g -105 " " " " " 13.9 "
h - 24 " " " " " 14.2 "
i - 48 " " " " " 14.3 "
j - 4 " " " " " 13 "

Examination of Table XII shows instantly the great predominance of three year old scallops in Section I, II, and III samples. Sections IV, V and VI, and also IX show age group three predominating, but not to any great extent.

From the point of view of their effect upon the immediate future of the fishery this large three year group of Sections I, II and III is very important, since this group in most areas will have attained legal size before the fall season begins and will appear in larger and larger numbers in the fishermen's catches. Section I three year olds, on the other hand, will not attain their legal size until early in the summer of 1942, but undoubtedly large numbers of them will be taken during the 1941-42 scallop fishing season.

It is quite possible that these slower growing Section I scallop may have an important part to play in the restocking of other areas further up the Bay. As they have