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PREDICTION OF OYSTER SETS.

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Report for 1940

by

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In the summer of 1940 spat predictions were made for the following localities: Landing Stage (P.E.I. Biological Station), Station 2001, Trout river, Conway Narrows, Enmore river, Hills river, Foxley river, Grand river, Wait's creek, Inman bed, Barbara Weit river, Dunk river, Frederick cove, Brown's creek, Johnston's river, and Baltic river. Inspectors Carr and Murphy and Messrs. Harding and Hayes collected samples from these districts and brought them to the Biological Station for examination. The samples consisted of ten minute plankton tows taken with a No.18 net.

Figure 1 is a graph of the daily maximum surface and bottom temperatures for the landing stage as they were given in the P. E. I. Biological Station records. At other tow stations a temperature reading was taken with every plankton sample collected. By comparing those temperatures with the readings taken at the same time at the landing stage approximate average temperature differences were determined. For districts where regular temperature readings were not available, it was necessary in the prediction of sets to add or subtract, as the case may be, the local temperature differences from the average temperature calculated for the landing stage for the same period.

The district temperature differences are as follows:

Paugh's creek	0.5°C. higher
Trout river	0.5 lower
Conway Narrows	0.7 "
Hills river	1.0 higher
Foxley river	0.4 lower
Enmore river	1.0 higher
Grand river	same as stage
Waite's creek	0.5°C. lower
Barbara Weit river	same as stage
Dunk river	1.4°C. lower
Frederick cove	1.0 "
Bedeque bay	1.0 "
Brown's creek	0.4 higher

It may be observed from figure 1 that the spring temperature rise was very gradual. The gonads of the oysters in most districts were mature and the sperms active nearly two weeks before the temperature reached 20°C. This temperature rise during the week following July 1 instigated a general spawning burst. Although the temperature dropped below the spawning threshold on July 2 and 4 no breaks in the spawning burst were definitely marked in the size frequency curves. It was also found difficult to distinguish any peak of spawning or to predict any peak of settlement.# Announcement of probable settlement dates was thus made on the basis of the beginning of a brood settlement and its duration.

See section headed "On the spawning date for Bideford river oysters in 1940" in J.C. Medcof's annual M. S. report for 1940.

The size-frequency measurements made from the tow samples are given in Table 1 while the summary of the brood histories and the prediction of sets are given in Table 2. The average height of the larvae is cited in all cases. The prediction dates thus indicate the central points of the sets. It may be noted that with very few exceptions (Frederick cove and Hills river) the centre of the spawning burst occurred on July 5 and settlement, varying with conditions of development, between July 24 and August 1.

At the landing stage and Station 2001, plankton samples were collected and examined on alternate days. Besides the major spawning burst which centred around July 5, a second mass spawning was indicated to have taken place on August 4th at Station 2001 and on August 5 at the landing stage, for large quantities of straight-hinge oyster larvae appeared in the tow samples shortly after these dates. Their numbers decreased somewhat in succeeding tows and only a small settlement was recorded around August 24-26 when they should have finished their free-swimming period.

Size-frequency polygons for the landing stage and station 2001 are given in figure 2. Because of the widespread distribution of the larval population the growth curves probably are not significant. There may, however, be observed slight tendencies toward separation of group spawnings as the population nears settlement on July 24-25 and again later when the major portion of the brood has settled. A further differentiation may be noted by comparison with experimental spat collector data in a second and smaller peak of set on August 4 and 5.

The brood histories at station 2001 were slightly in advance of those at the landing stage, due probably to a slightly higher average seasonal temperature.

Predictions for Trout river, Conway Narrows, Hills river, Foxley river, Frederick cove, Waite's creek, Inman bed, Barbara Weit river, Dunk river and Brown's creek, were made from large frequency curves which supplied a fairly definite picture of the larval population. The predictions made for these districts may be found in table 2.

The tows for Enmore river, Grand river, Johnston's river and Baltic river, contained so few umbo larvae that only an approximation of the probable settlement dates could be given.

Enmore river. Shortly after the date for general spawning in the other localities numerous straight-hinge larvae were present in the tows. From temperature indications, which averaged about 1.0°C. higher than the stage, this brood should have had a peak set on July 25 but subsequent tows did not yield enough larvae to follow its progress. The gonads of the adult oysters on July 12 showed only one-quarter to one-half spawned which would indicate that the first was not the major brood.

Grand river. One tow was taken at Grand river on July 12, but no predictions could be made on the basis of the number of oyster

larvae present. The gonads of the adult oysters showed considerable spawning and since the temperature was the same as that at the landing stage similar conditions were considered probable.

Johnston's river. Only one tow, taken on July 31, was brought in from Johnston's river. A spat settlement previous to July 31 possibly could have taken place and succeeding sets were indicated on August 2, 6 and 16.

Baltic river. A tow taken from Baltic river indicated that a set might be expected immediately. No other information was given by the sample.

Settlement of Larvae

Time of Settlement. The counts made of the settlement of oyster spat on experimental collectors put out at the landing stage and station 2001 are given in tables 3 and 4. The experimental collectors consisted of horizontal squares of cardboard protected by vertical uprights and cut from commercial collectors. They were attached by clothespins to an upright rod at intervals of eighteen inches. The second collector from the top rested at the surface of the water at the average half-tide mark. From the tables it may be noted that peak sets occurred between July 28 and 29 and smaller sets on August 3 and to 6 and August 24 to 27.

Intensity of Settlement on Commercial Collectors.

Estimates of the sets occurring on commercial collectors are given below. The results are calculated from average numbers of spat on several horizontal and vertical surfaces from representative positions on the collector.

Location	Date	No. of spat per collector
Landing stage	Aug. 2	87,272
Williams' creek)Bideford	"	69,552
Forbes' cove) "river	"	124,488
Station 2001	"	53,828
Conway Narrows	"	336
Frederick cove	"	168
Trout river	Aug. 10	61,320
Station 2001	Aug. 10	60,168
Bentinck cove	"	4,368

Size of Larvae at Settlement. Height measurements were made of the oyster spat found on experimental collectors at the landing stage and station 2001. They are given in table 5. A table of some additional data on settlement sizes obtained from collectors used in a fouling experiment in 1938 is also added. Care was taken to distinguish between spat with rims of dissoconch so that the measurements given represent prodissoconch shell only. It may be noted that at the landing stage on July 26 and July 29, 1940, days which yielded the largest sets, there appears to be two modes for settlement size, one at 336 microns and the other at 350 microns or slightly larger.

(with corresponding micrometer units)

Location	Date	Time	Tide	°C. Temp.	98 7	112 8	126 9	140 10	154 11	168 12	182 13	196 14
Landing Stage	July 16	4:30	½R			#	32 33	25 12	5			
	" 20					#		12 14	11 23	27 30	23 15	17
	" 22					#			7 19	13 12	10 8	12
	" 25										4 3	4
	" 30									4	3 4	3
	Aug. 1					#			10	2 4	2 6	1
	" 3	11:43	½F							1 1		2
	" 6				#	6 7	2 4	3 2	3	7		
	" 7					#				10	10 9	16
	" 12					#	6	12 5	2 6	8 4	1 2	2
Station 2001	July 15				33	28	30 18	8 2	2 3	6	1 2	1
	" 18						8 18	23 30	31 30	13 9	1	
	" 22	11A	HF					3 3	6 10	10 19	11 10	13
	" 24									1	3	3
	" 26	3:30	½F								1 1	2
	" 29									3 2	1 4	1
	" 31										1 1	
	Aug. 3	9:30	HF								2	
	" 6	3:30	L		#							
	" 8					#				2	1 1	1
	" 10						#			7 3	8 4	10
Trout river	July 16	10:	LF	21.0	#	20	19 29	28 18	7 4			
	" 19	9:25	¾R	21.4				15 18	25 25	25 18	17 4	5
	" 24	2:55		23.0							1 5	7
	" 28								10	9 4	7 9	4
	Aug. 11	5:30	½F	24.2		#						
Conway Narrows	Jly. 17	12A	¾F	20.0	#	15 16	15 21	19 18	7 5	2		
Foxley river	" 17	10A	½F	20.8	6 13	14 10	13 9	9 9	4 8	2 2	1 3	
	" 25	1:30	¼F	23.2							6 6	7
Hills river	" 15	1:30	HF	22.8	4 16	9 7	5 11	13 11	13 17	18 19	11 10	13 5 2
	" 19	3:45	L	22.6			3		5 3	5 5	1	1 1
	" 31	2:30	H	24.4			15 12	13 14	9 7	2 2	3 1	4 1 4
Inman bed	" 16	11A	LF	20.0	9 6	4 10	30 26	28 18	8 5	3 2	2 4	
	" 23	8A	H	21.8	#					12 6	5 9	13
Waitee's creek	" 18	5A	H	19.0			3 10	13 21	28 19	14 5	3	1 1
Barbara Weit	" 18	6A	HF	20.0			3 7	19 16	25 27	23 20	13 8	3 1 7
	" 23	6A	¼F	21.0							9 6	10 7 15
Brown's creek	" 23	9A	HF	22.2						9 8	7 11	6 13 13
Dunk river	" 16	9A	HE	20.0		10 13	25 24	25 14	9 4	1	1	-
	" 22	9A	H	20.0							16 7	10 16 23
Frederick cove	" 17	11A	¼L	21.2		15 18	13 9	8 3	4	2	1	
	Aug. 2	1P	L	21.2		12 8	27 18	10 12	4	1	2	
Baltic river	" 4											

15	16	17	18	19	20	21	22	23	24	25	26	Average of brood in microns Brood 1	2	Remarks
7 4 4												133		
11 11 18	9 8	8 4	6 2	3								170		
8 7 3	12 15	12 6	12 17	17 16	12 27	15 33	34 15	19 18	8 9			212	172	
4 7 4	7 7	5 4	5 8	10 8	10 7	15 17	19 7	13 10	15 8	6 2		288	228	
4 10 6	4 10	6 18	10 10	12 10	14 12	13 14	14 18	8 9	9 4	2 4			270	
		1		2 2	2	2 1	4 2	1					300	Mod.W. Cldy.
10 17 6	11 5	16 7	6 5	4 3	4 2	10 3	3 2	4						
4 1 3	3 3	3 2	1	2 1	2							110		
												154		
12 23 14	18 24	13 9	9 6	3 1								222	175	
5 3 4	6 11	6 13	15 13	13 9	12 11	12 8	10 9	2 1				264		Strong SW.
	1	2 4		1 1		4 4	4 3	3 9	1 4					
4 4 2	4 10	3 4	8 10	8 6	10 14	14 16	20 28	10 11	10 12	10 2	2 2			
3	3 1	2 4	3 3	7 6	6 9	13 12	13 15	13 7	7 2	4	2			
2	1 1	1 3	1 2	7	8 11	7 7	16 12	8 4	6 1					Fresh SW.
1 1	2 1	1	2	1 1	1	2 2	2	1	1		1	Very thin tow, count of 3 samples		
5 7 5	4 12	5 5	2 6	1 5	2 2	3 2		1 2	1					
												126		
1												168		
6 6 11	7 13	9 8	5 7	9 9	17 10	9 7	7 8	12 6	2 2					
6 12 10	8 10	17 12	10 11	13 8	13 9	14 18	17 27	23 24	20 12	7	4 2 1			Thin tow
												126		
												119		" "
9 4 9	13 17	14 9	11 8	10 8	7 6	12 5	9 2	3 1	2			236		
5 3	1	1										143		
		2										few bivalves & fewer oysters		
												112		interesting
												115		collection
9 13 16	15 12	11 12	5 1	5 2	2	1	1					215		bivalves -
5 2	1											140		oysters
13 15 10	21 15	13 10	11 5	6 5	2 5	4 2	4 2	2				154		mostly st.
19 23 10	18 13	19 11	12 8	7 10	2 3	3 1	2 1	1				220		hinge
												220		
												119		
14 8 12	16 8	11 8	13 4	2								200		
												104		
												112		
				2 10	2 3	5 10	12 18	11 7	1 3	1 2		305		

Table 2.

Set Predictions and Brood Histories

Locality	Date of exam.	Temp. Date	Indications Temp. max. surf.in °C.	Aver. height in microns	Brood number	Av.Temp. from probable sp. date Max.surf.°C.	Prediction.	Length of free swimming period accord. to prediction
Landing stage	July 20	July 5	20.6	170	1	21.4	July 29	24 days
	Aug. 12	Aug. 5	23.3	112	2	23.3	Aug. 26	21 "
Station 2001	July 18	July 5	21.0	154	1	22.0	July 28	23 "
	Aug. 10	Aug. 4	22.0	119	2	22.5	Aug. 24	20 "
Trout river	July 16	July 5	20.1	126	1	21.7	July 29	24 "
	" 19	" 5	20.1	168	1	21.7	" 29	24 "
Conway Narrows	July 17	July 5	19.9	126	1	21.5	July 30	25 "
Foxley river	July 17	July 5	19.6	119	1	21.3	Aug. 1	27 "
	" 25	July 5	19.6	236	1	21.5	July 31	26 "
Hills river	July 15	July 3	21.6	143	1	22.2	July 26	23 "
Inman bed	July 16	July 5	20.1	115	1	21.7	July 30	25 "
Waite's creek	July 18	July 5	20.6	140	1	21.5	July 29	24 "
Barbara Weit	July 18	July 5	20.6	154	1	22.0	July 28	23 "
Brown's creek	July 23	July 5	20.5	220	1	22.6	July 26	23 "
Dunk river	July 16	July 5	19.0	119	1	20.9	Aug. 2	28 "
Frederick cove	Jul.17	July 10	25.7	104	1	21.6	Aug. 3	24 "
	Aug. 2	" 26	23.5	112	2	23.1	" 15	21 "
Baltic river	Aug. 4			305			Aug. 5	

Table 3.

Oyster sets on Experimental Collectors (horizontal surfaces) at Landing Stage

Top	Depth (½ tide)	July 24	25	26	27	28 29	30	31	August 1	2	3	4 5	6 8	9	13	14	15	16	17	19	20 23	24 26
	18"	0	0	0	0	0	0	0	5	Br	0	0	0	0	0	0	Br	0	0	0	0	0
	0	1,1R	1R	2	0	59	3	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0
	18" under	1R	0	4	2	23	2	1	0	Br	0	0	0	0	0	0	0	0	0	0	0	0
	32"	0	0	3	8	93	2	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	68"	1R	1,1R	4	10	35	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3
Bottom	Depth (½ tide)																					
	18" out	0	0	0	0	0	0	0	0	Br	0	1	0	0	0	0	Br	0	0	0	0	0
	0	0	0	2	0	135	2	4	0	0	3	2	0	0	0	0	0	0	0	3	0	0
	18" under	1R	0	14	1	236	15	3	0	Br	0	5	0	0	1	0	0	0	0	0	0	0
	32"	0	0	20	20	144	34	13	0	0	3	20	0	0	0	0	0	0	0	0	0	0
	68"	1R	1	54	24	121	85	78	0	0	1	8	0	1	0	0	2	0	3	1	0	5
Total		1	2	103	64	846	144	110	6	0	8	36	0	2	1	0	0	0	3	4	0	8
Mode				B 68"	B 68"	B 18" under	B 68"	B 68"	T 18" out			B 32"										

R = larvae resting (not attached

Br = broken collector

Table 4.

Oyster sets on experimental collectors (horizontal surfaces) at Station 2001.

		July				August									
	Depth		25	27	30	1	3	7	9	11		16		20	24
Top	(½ tide)	24	26	29	31	2	6	8	10	14	15	18	19	23	27
	18" out	1R	0	0	0	Br	0	0	0	0	Br	0	0	0	0
	0"	0	1	67	4	Br	0	0	0	0	1	0	0	0	0
	18" under	3R	6	9	2	0	1	0	1	0	0	0	0	0	0
	32"	1R	24	644	2	6	B	0	0	0	0	0	0	0	0
	68"	0	Br	255	3	1	1	1	1	0	0	0	0	0	4
Bottom	Depth (½ tide)														
	18" out	0	0	1	0	Br	1	0	0	0	Br	0	0	0	0
	0"	0	0	74	8	Br	7	0	0	0	0	0	3	0	0
	18" under	2R	4	70	2	0	7	0	0	0	0	0	0	0	0
	32"	0	87	658	73	17	175	0	0	0	0	0	0	0	0
	68"	0	Br	698	228	41	23	0	0	0	2	0	2	0	1
Total		0	122	2476	322	65	233	1	2	0	3	0	5	0	5
Mode			B 32"	B 68"	B 68"	B 68"	B 32"				B 68"		B 0		T 68"

R = larvae resting (not attached)

Br = broken collector

Table 5.

Prodissoconch Height of Settled Oyster Spat

(in mocrons with corresponding micrometer units)

		308	315	322	329	336	345	350	357	364	371	378	385	392
Stage		22		23		24		25		26		27		28
1940														
July	24						1		1					
	25					1	1							
	26	2	4	5	8 6	21 4	18	10 10 2	5	2		1		
	27			2	2 1	2 1	5	1 6 2	4	2				
	29		1		1 10 1	12 9	22	8 14 5	28	5 14	4	3	1	2
	30			6	4	6	10	5	8					
	31			4	2	5	5	9	5	5	1			
Aug.	3				1		1							
	5			2	5	7	7	3				1		
	17				1			1		1				
	19						1		1					
	26					1	3		2					
2001														
1940														
July	26			3	3 17 5	25 4	11	5 12	6	3 2		1		
	29			1	2	4	14	13	3	9	4			
	31	1		4	4	11	6	7	8	3		2		
Aug.	2	3			3	8	5	4	4	3		1		
	6	1	2	3	6	8	8	6	2	1				
	15					1	1		1					
	19				1	1		1						
	27		1		1	1		1	1					

Forbes' cove (from control for fouling experiments)

1938														
July	24			1	3	9	19	21	5	5	3			