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Characteristics of Atlantic Salmon taken at  
St. Pierre et Miquelon in 1976

by

B. Paturel and J. L. LaBorde  
ISTPM St. Pierre et Miquelon

Introduction.

Following the 1975 fishing experiment, the Institut Scientifique et Technique des Pêches Maritimes (I.S.T.P.M.) undertook in 1976 new attempts on salmon fishing around the islands of St Pierre et Miquelon. The trials were made periodically from May 20 to July 25 with fishing time ranging from 2 to 8 fishing days. A sample of 244 specimens was collected from fishing stations from the East coast of Langlade and from the East and South coast of St Pierre. Informations on behaviour, morphological characters, ages, feeding and parasites were obtained from this sample.

Gear and Methods.

The fishing gear that has been used in 1975 and 1976, consisted in floating gill-nets having the following characteristics :

- mesh size : 5" (125 mm) and 6" (150 mm)
- twine : green monofilament polyamide, 0.6 mm in diameter
- headline : 25 fathoms polypropylene, 5 mm in diameter
- floats : 75 P.V.C. floats or one every two feet (0.6 m)
- leadline : 25 fathoms polyamide, 12 mm in diameter, weighing approximately  $\frac{1}{2}$  lb per fathom (130 g per meter)
- depth : 7 feet (2.10 m) or 17 meshes for the 6" nets and 20 meshes for the 5" nets.

The nets were hauled from a powered dory and the fleets of 3 to 4 nets were setted perpendicularly to the shore by means of anchors. At the outer end of the fleet a smaller net was added in order to entrap the fish. According to the size of the fish, the 6" nets were used before June 15, the 5" ones in July while at the end of June, both mesh sizes were used together.

#### Environment.

Data on environment consisted in the empirical observation of the weather and sea conditions. They confirmed that better catches were reported when the wind was coming from the sea (PATUREL, 1976) as 62 % of the catch was taken in 17 fishing days with Easterly winds and 38 % in 21 days with winds from the West.

Sea temperatures were taken at each fishing period and are shown in Table 1. Although no relation can be found between the abundance of salmon and a specific temperature, we can say that none were encountered with surface temperature under 4° C. Surface water reached this temperature as soon as May 15 which can explain that the first catches were made earlier than in 1975. Also in July and August, very few specimens were caught when sea temperature rose above the 10° C mark.

#### Behaviour.

Data on behaviour of salmon has been collected from the two main catching periods, i.e : May 21 to 31 and June 29 to July 8. It consisted mainly in the observation of the position of the fish in the net and its course when caught.

Observations on the time of catches show that in May 91 % of the catch occurred during day time, while in July we had 57 % in the night and 43 % during the day.

At the end of May, on 115 fishes 3 % were caught in the first net from the shore, 18 % in the second one, 21 % in the third, 37 % in the fourth and 20 % in the smaller trap net at the outer end of the fleet. In July, this distribution on 99 fishes was respectively 43 % in the first net, 23, 22, 11 and 0 % in the others. Also in May, 83 % of the catch was gilled in the upper part of the net, 13 % in the middle and 4 % in the low part, while during the second period we had 68, 21 and 10 % respectively.

From these observations and other data on feeding, we think that movements of salmon in the vicinity of the coast is in direct relation with those of capelin. As a matter of fact, while the season goes on, salmon gets closer to the coast as its prey goes on shore for spawning.

Informations on the course of each fish before it went into the net were collected from all fishing stations. They show that some 80 % of the total number of salmon followed the general direction North-South, which means that salmon, approaching the coasts from the East would pass round the islands by the South.

#### Biology.

Results concerning the morphometric characters have been separated in two periods : before and after June 15, period when grilse were found in the catches. Before mid-June, we had a modal fork length at 73 cm with a sex-ratio of 28 % of males and 72 % of female (fig. 1). Like in 1975, the large fish is followed in June by smaller specimens (modal fork length at 53 cm) with a more similar proportion of both sexes : 53 % of males, 47 for females (fig. 2). This difference in the size of salmon is also seen in the age-length key (table 2) as the bigger salmon is represented by previous spawners, and 2 and 3 sea year classes while the smaller fish is the 1 sea year class. Gonads being on maturation, we consider that all those fishes are on their way towards their spawning rivers. Nowadays, very few of them are previous spawners, then one can wonder what is happening to the males of the 2 sea year class. As a matter of fact, a small number is represented in our sample. This compares with datas from LEAR (1973) and LEAR, BURFITT and BATTEN (1974).

In order not to take into account the weight of food in stomach which is variable, the gutted weight has been taken in reference. By this, we mean that only the gut and gills were removed, the head still remaining on the fish. The gutted weight distribution by sea-age is then summarized in Figure 3. The mean weight for the 1 sea year class was 1.52 kg while it was of 3.64 kg for the 2 sea year fish and 2.63 kg for the whole sample.

The river age distributions (fig. 4) show a preponderance of the 3 river years class for both sea ages. The average smolt age was 3.12 years for grilse, 3.02 for the two sea year fish, 3.22 for previous spawners and 3.07 years for the whole sample.

The results of the examination of 90 stomachs are shown in Table 3. We can see that capelin is the main food of salmon as it is found in 78 % of the stomachs collected.

The two sea year class is almost exclusively feeding on capelin as it represents 93 % of the weight of food for this group. While spawning of capelin happens around mid-June, the one sea year fish feeds partly on capelin (77 %) and on launce, Ammodytes sp. (22 %).

The average weight of food per kg of salmon examined (guttet weight) ranges from 21.7 g/kg for the 1 sea year group to 27.2 g/kg for the 2 sea year fish. These results compares with other datas presented by LEAR (1972) and LEAR, BURFITT and BATTEN (1974).

#### Conclusion.

In addition to the 1975 datas presented by PATUREL (1976), results obtained in 1976 have contributed to enlarge our knowledge on behaviour and biology of salmon in the vicinity of St Pierre and Miquelon islands.

Thus, we know already that salmon, on the migration route to their home rivers, approach the islands as soon as mid-May, when surface water is around 4° C. First comes the larger salmon having at least two years of marine life. Females are then found for 70 % of their number and they are almost exclusively feeding on capelin. By June comes the grilse (1 sea year), presenting a sex-ratio of about 1/1. As spawning of capelin occurs, sand launce becomes part of their diet. Transition between 2 sea year salmon and grilse can be progressive (1975) or sharp (1976). As surface water raise to 10° C at the end of July, fery few salmon are encountered.

The small individuals being poorly represented in our sample, especially those of fork length under 50 cm, we will be using in 1977 nets with smaller mesh size. Also attempts will be made at the beginning of the season to catch salmon off the coast by mean of longer fleets used either as set or drift nets. Together with this work will be persued the study of freshwater streams in which reproduction of atlantic salmon may be increased.

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Date	Place	Surface T°	Bottom T°	Depth (m)
May 24	East Coast Langlade island	4.6		
May 31	East Coast Langlade island	4.8	4.2	12
June 10	East Coast Langlade island	5.4	4.6	12
June 22	East Coast St Pierre island	6.7	5.5	30
July 1	South Coast St Pierre island	8.0	7.1	13
July 6	South Coast St Pierre island	7.9		
July 18	East Coast Langlade island	9.8		
July 25	East Coast Langlade island	9.2	7.6	12

Table 1. Surface and Bottom temperatures

Fork length (cm)	Age	1 SEA YEAR				Total	2 SEA YEARS				Total	3 SY			PREVIOUS SPAWNERS	Total	TOTAL
	River	2	3	4	5		2	3	4	5		2	3	5			
48	:		1	1		2										2	
49	:		1	1		2										2	
50	:	3	1	2	1	7										7	
51	:	4	5	2		11										11	
52	:	6	5	4	1	16										16	
53	:	2	6	9	2	19										19	
54	:	6	4	3		13										13	
55	:	1	3	3	1	8										8	
56	:	3	8	4	1	16										16	
57	:	3	4	2	1	10										10	
58	:	1	4			5										5	
59	:	2	2			4							1		1	5	
60	:		2			2										2	
61	:	1		1		2										2	
62	:							1			1					1	
63	:																
64	:								1		1					1	
65	:							1			1					1	
66	:							1			1					1	
67	:						1	1	1		3					3	
68	:							4			4					4	
69	:							5	1		6					6	
70	:						2	6	1		9					9	
71	:						1	3	2	1	7					7	
72	:						2	13	2		17					17	
73	:						1	13	2		16		2		2	18	
74	:							6	1		7		1		1	8	
75	:						2	12	2		16					16	
76	:						4	6	1		11					11	
77	:						1	2	1		4					4	
78	:						1	4			5					5	
79	:							3			3					3	
80	:							1			1		1		1	2	
81	:						1	1			2			1	1	3	
82	:																
83	:							1			1					1	
84	:								1		1					1	
91	:											1				1	
94	:												1		1	1	
97	:												1		1	1	
106	:												1		1	1	
Total	:	32	46	32	7	117	16	84	16	1	117	1	8	1	9	244	
Av. Fork length (cm)	:	54.0	54.5	53.4	53.7	54.0	74.1	73.2	72.7	71.0	73.2	91.0	82.0	81.0	81.9	64.4	

Table 2. Age-length key

Species	Age	1 SEA YEAR	2 SEA YEAR	PREVIOUS SPAWNERS
Capelin	occurrences	32	35	3
	weight (g)	1123.6	3329.5	531.7
	% by weight	77.4	93.0	83.7
Lance	occurrences	20	14	
	weight (g)	325.3	231.5	
	% by weight	22.4	6.5	
Herring	occurrences			1
	weight (g)			103.6
	% by weight			16.3
Fish remains	occurrences	1	4	
	weight (g)	3.3	19.2	
	% by weight	0.2	0.5	
Total weight of food in stomachs examined (g)		1452.1	3580.2	635.4
Total number of salmon examined		41	36	3
Average weight of food per salmon examined (g)		35.4	99.4	211.8
Total gutted weight (kg) of salmon examined		66.90	131.60	25.25
Average weight of food (g) per kg of salmon examined		21.7	27.2	25.2

Table 3 - Stomach contents by Sea Age Class.



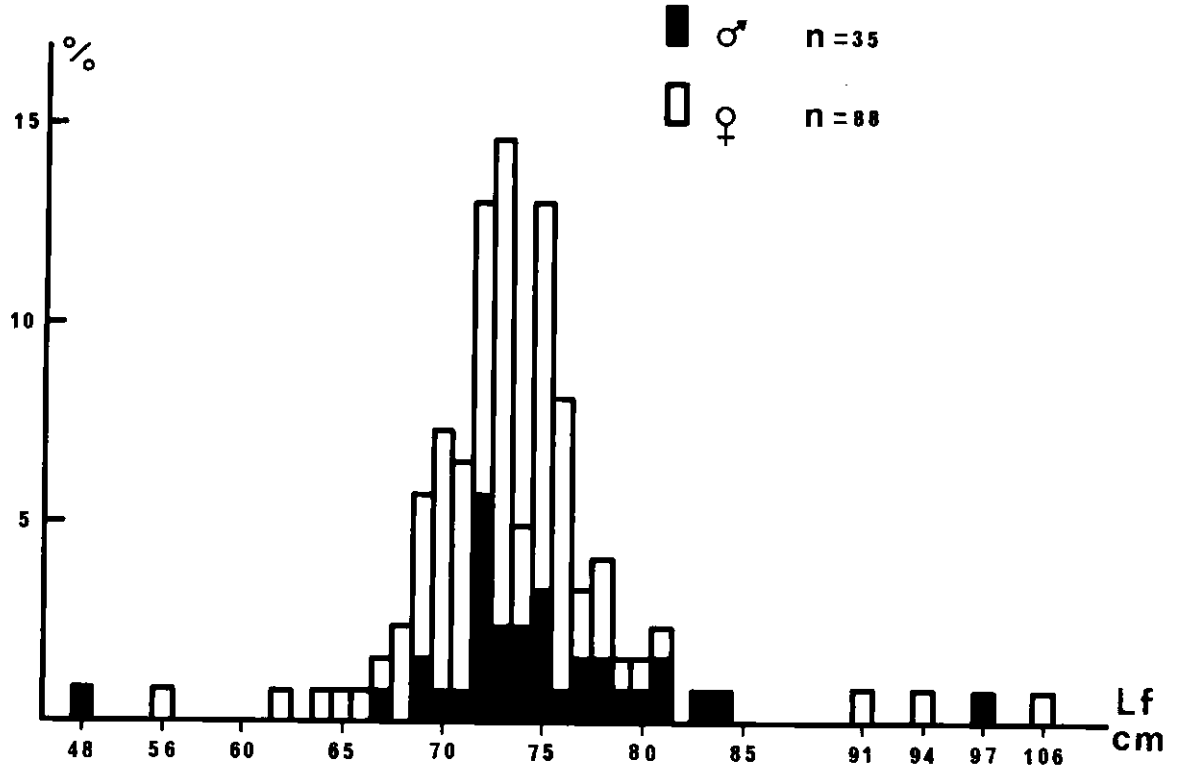


Fig. 1. Fork length distribution by sex from May 20 to June 15.

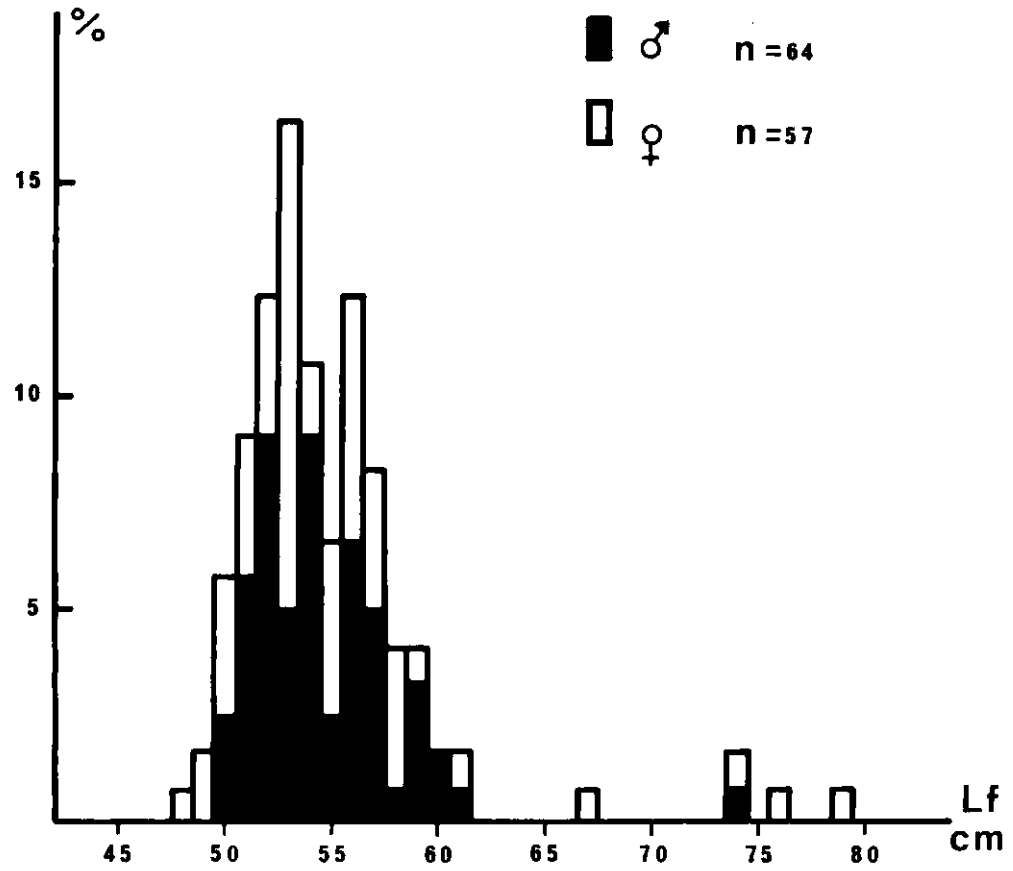


Fig. 2. Fork length distribution by sex from June 15 to July 25.

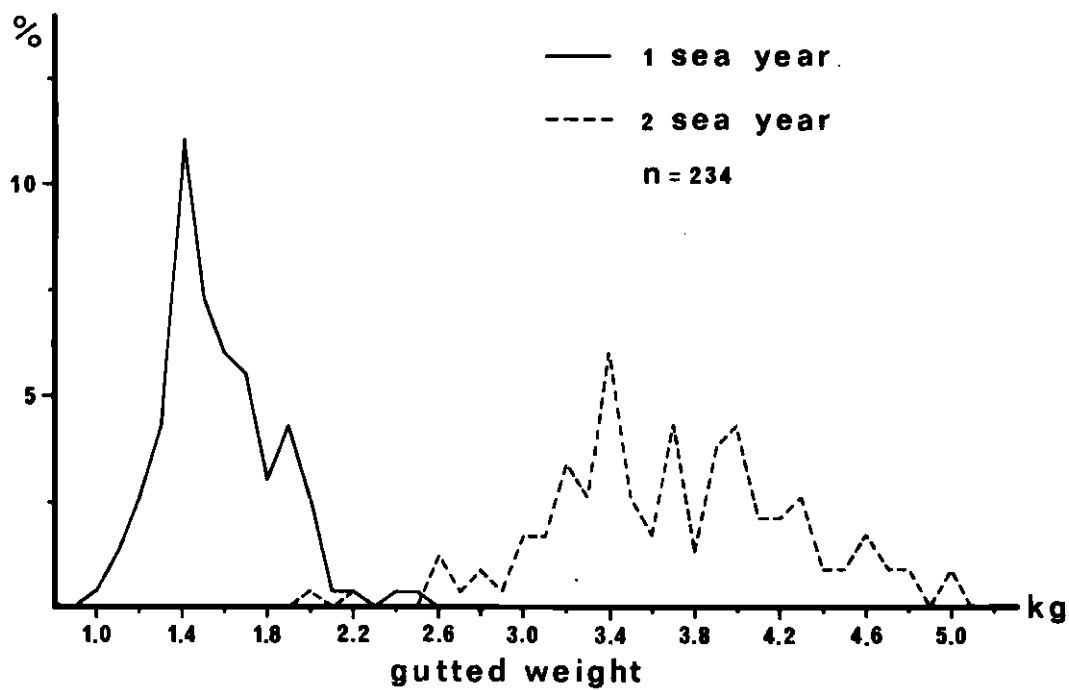


Fig. 3. Gutted weight distribution by sea age class.

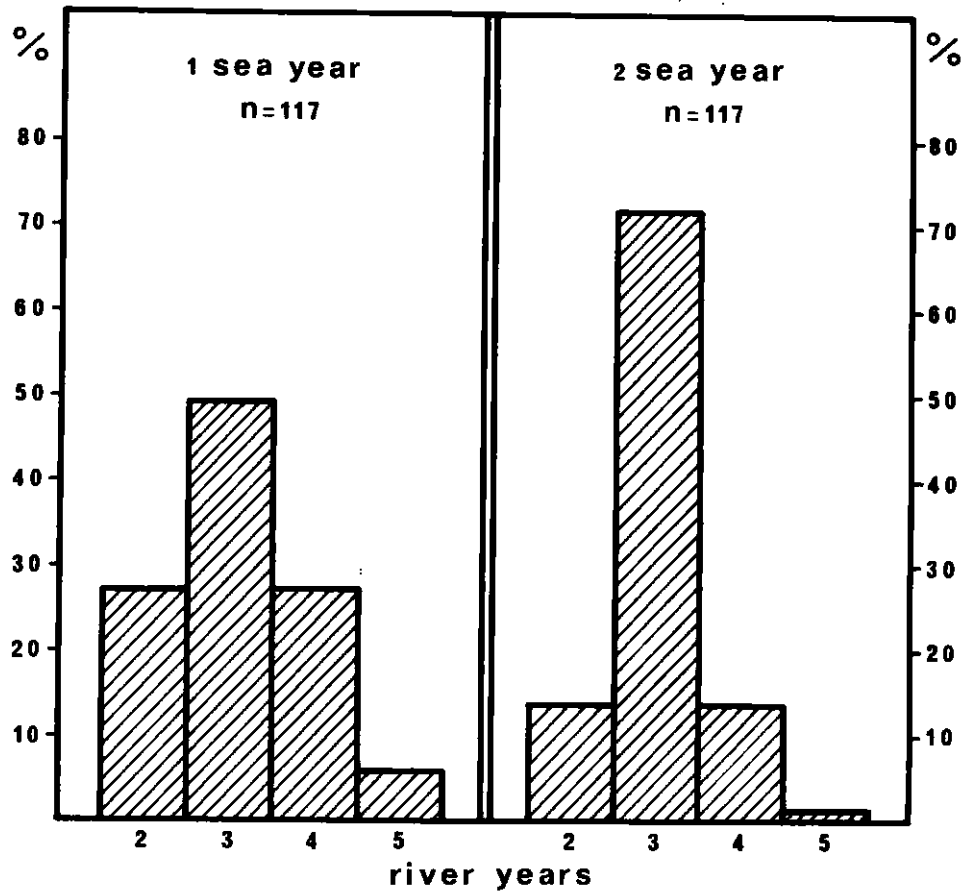


Fig. 4. Percentage distribution of river ages at each sea age.