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CHARACTERISTICS OF SALMON CAUGHT DURING THE FISHING SEASON ON THE ELORN AND AULNE RIVERS

by

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ABSTRACT

Study of fish captured by angling on the Aulne and Elorn rivers from 1971 to 1977 provides informations on the characteristics of Atlantic Salmon populations of these two rivers.
Smolt migration occurs mainly when the fish are one or two years old and very few stay three years in the river.
Most of the fish caught during the fishing season (February 15th to June 15th) are spring salmon (two or three sea winter fish).
Grilses and summer salmon are caught during the later part of the angling season but the exploitation rate of these populations is low.
Rapid decrease of captures during the last years indicates a depletion of the spring salmon population of which the exploitation may change the age composition of the stock and weaken dangerously the spawning potential of the species.

RESUME

L'étude descriptive des poissons capturés à la ligne sur l'Aulne et l'Elorn de 1971 à 1977 permet de définir les caractéristiques des populations de saumons de ces deux rivières.
Les smolts dévalent en majorité à l'âge de 1 et 2 ans et très peu séjournent 3 ans en eau douce.
La plupart des poissons capturés pendant la saison de pêche (15 Février au 15 Juin) sont des saumons de printemps.
Les grilses et les saumons d'été sont capturés en fin de saison de pêche, mais leur population est très peu exploitée.
La diminution rapide des captures durant les dernières années traduit un épuisement de la population de saumons de printemps dont l'exploitation risque de modifier la structure d'âge du stock et d'affaiblir le potentiel reproducteur de l'espèce.

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INTRODUCTION

The Aulne and Elorn rivers have their sources in the Montagne d'Arrée and flow to the Rade de Brest, forming a geographic entity favourable to a restocking program and to the development of coastal salmon farming.

The Aulne basin (1495 km2) is the third largest of Brittany while the Elorn one is much smaller (260 km2), and representative of the rivers of Northern Brittany.

These two rivers once supported large runs of salmon but the lack of appropriate management led to a disastrous diminishment of the catches as on all the rivers of Brittany. However, the Aulne and the Elorn rivers are among the 20 rivers of Brittany where a small number of salmon are caught during the fishing season.

Since 1974, CNEXO (1), in cooperation with APPSB (2), the Federation of Sport Fishing of Finistère and local associations has organized a managing and restocking program on these two rivers, including :

- cleaning of banks and spawning grounds,
- evaluation of the surviving stock and of the possible exploitation level,
- restocking by planting fry in nursery streams and evaluation of its efficacity.

The present study concerns the descriptive analysis of fish caught on these two rivers since 1971 (3).

1 - PHYSICAL AND HYDROLOGICAL CHARACTERISTICS OF THE CATCHING AREAS

AULNE

The source is situated at an altitude of 280 m and the river flows West then South on a schist substratum. After receiving its main tributary : Hyères, the river is channelled to the sea, interrupted by 28 lock dams. The slope fluctuates from 7.31 ‰ in the upper course, reaches 1.2 ‰ in the medium course and 0.8 ‰ in the channelled area. The vegetal cover is formed of bocage interrupted by moors and forest (oak, beech, chestnut-tree).

The precipitations are of the oceanic type, inducing violent floods in winter and low waters in summer and autumn (1970-1975 average : 2.46 m3/s - august ; 58 m3/s - february ; SRAE 1975) (4). Temperatures fluctuate between 5° C and 23° C. Water quality is excellent in the upper and medium course when the channelled course presents episodically high values of ammoniac and nitrites (SRAE 1975).

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(1) - Centre National pour l'Exploitation des Océans.
(2) - Association Pour la Protection du Saumon en Bretagne.
(3) - Data obtained from 1971 to 1973 on the Aulne river were communicated by J.L. BAGLINIERE and G. FONTENELLE (ENSAR).
(4) - Monthly 5 year average from Service Régional de l'Aménagement des Eaux en Bretagne.

ELORN

The drainage basin is mostly situated on schists. The river source is at an altitude of 300 m and flows West then North and West again until the estuary, after a 58 km course. There is a steep gradient in the upper course (16 ‰), then it decreases in the medium (3 ‰) and lower positions (2.5 ‰). Vegetal cover is typical of steep slopes (bush of oaks, beeches, chestnut trees and birches (SEPNB 1974) (1). The pluvial regime is similar to the Aulne one with high waters in winter (8.80 m3/s in February) and low waters in late summer (1.22 m3/s in August) (2). Water temperature varies between 5° C and 21° C. Water quality is excellent down to the lower course where a severe degradation of the environment has been accentuating for several years, due to the effluent of two important cities : Landivisiau and Landerneau (SRAE 1972, SEPNB 1974, CNEXO 1975).

2 - EVOLUTION OF ATLANTIC SALMON CATCHES

According to ROULE (1920), during the 18th century, 4500 metric tons of salmon were caught off the Brittany rivers and estuaries during a good fishing year. At the same time, the catches on the lower course of the Aulne were estimated to 4000 salmon a year (Chateaulin). In 1940, total production of Brittany had falled down to 30 metric tons (5000 to 7000 salmon).

From 1972 to 1976 (3), the average catch did not exceed 7.5 tons per year.

	Number of salmon	Approximate weight
1972	2.900	13 tons
1973	1.000	6 tons
1974	1.070	5 tons
1975	2.140	10 tons
1976	740	3.3 tons.

Net fishing in the estuary by the commercial fishermen decreased progressively, due to the lack of fish, and do not represent more than 15 to 25 % of the total catch since 1970. Salmon populations of Aulne and Elorn followed this general rule and show a drastic diminishment since 1972. On the Elorn and Aulne estuaries, there is no more organized salmon fishery in the estuary, but only incidental catches (see fig. 1, page 4).

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(1) - Société pour l'Etude et la Protection de la Nature en Bretagne.
(2) - Monthly 5 year average from the Service Regional de l'Aménagement des Eaux en Bretagne.
(3) - Data obtained from Conseil Supérieur de la Pêche and Fédération de Pêche du Finistère.

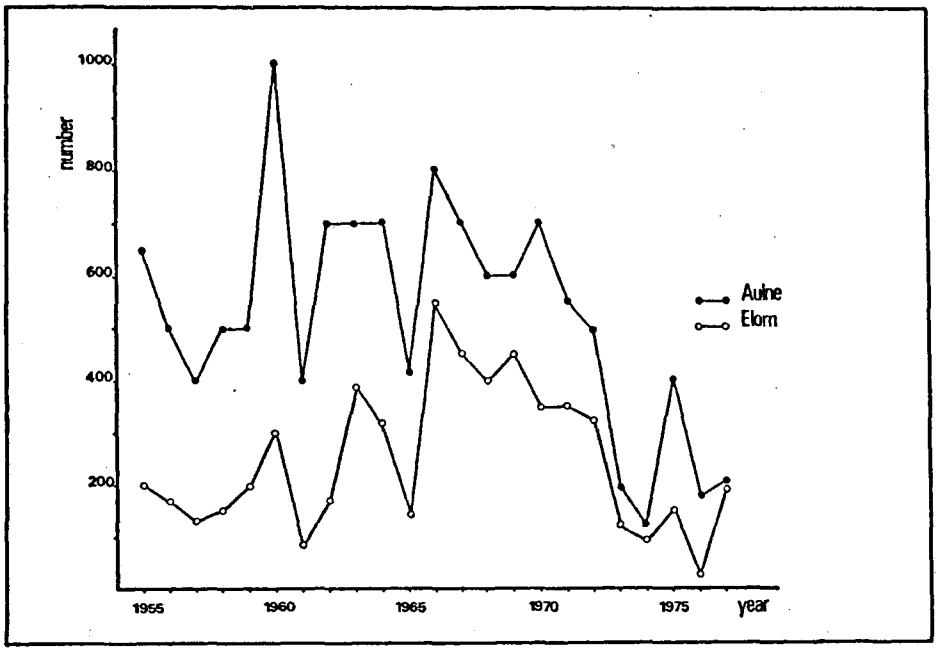

FIGURE 1 - Salmon caught during the fishing season from 1955 till 1977

Considering the absence of regulation instituting an obligatory declaration of catches, the numbers of fish caught constitute only a rough estimation, becoming reliable from 1966 when poaching control was effective. Catches are probably highly underestimated for the previous period characterized by a very important poaching. It is likely that considering this under estimation, stock diminishment has been constant since 1955.

3 - MATERIAL AND METHODS

In the absence of counting facilities on both rivers, no precise estimation of the salmon populations can be provided. The analysis was limited to the fish captured by angling during the fishing season (February 15th to June 15th).

CNEXO and APPSB organized an information campaign in 1971, encouraging the anglers to take the scales of the salmon caught. From 1971, 321 scale samples were observed from Aulne fish (15 % of the fish caught) and 234 scales from Elorn fish were read (17.9 % of the total catch).
Collaboration with anglers became excellent from 1974 and since this date, 26 % (Aulne) and 46.3 % (Elorn) of the catches have been examined at the Centre Océanologique de Bretagne and reexamined at ENSAR (1).
All the data concerning catches in Brittany have been gathered on a central card index managed by computer.

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(1) - Ecole Nationale Supérieure d'Agronomie de Rennes.

4 - DATE, LOCATION AND CATCH METHOD

During the fishing season, most of the fish - 80 % (Elorn) and 85.2 % (Aulne) - are caught between February 15th and April 15th (Table 1). On the Elorn river, this pattern corresponds to the Spring salmon migration peak, as showed by the counting trap first year of operation.

TABLE 1 - Repartition of migration and catches during the fishing season. In %.

	15/02 - 15/03	16/03 - 15/04	16/04 - 15/05	16/05 - 15/06
AULNE 1974-77 Rod fishing (1)	44,0 (98)	41,2 (92)	9,4 (21)	5,4 (12)
ELORN 1971-77 Rod fishing	35,3 (78)	45,7 (101)	11,3 (25)	7,7 (17)
ELORN 1976 Counting trap (2)	19,6 (19)	59,8 (58)	18,6 (18)	2,1 (2)

- Numbers in brackets indicate the numbers of fish.

(1) - Aulne : fishing pressure is very important at the beginning of the season due to a salmon fishing contest.

(2) - The counting trap was operated in 1976, during the worst fishing year of the 1971-1977 period.

Captures occured in majority in the lower part of the rivers (fig. 2 and 3, page 6). 85 % of the catches on the Elorn river are done within the 15 km above the estuary.
On the Aulne river, the central fishing area is situated around the town of Chateaulin (3 km above the estuary) and all the fish captured are in the first 40 km.

Bait used varies on the two rivers, as shown in Table 2.

TABLE 2 - Various baits used (in %).

	Spoon	Minnow or stone loach	Worm	Shrimp
AULNE	42	27	-	31
ELORN	34	25	41	-

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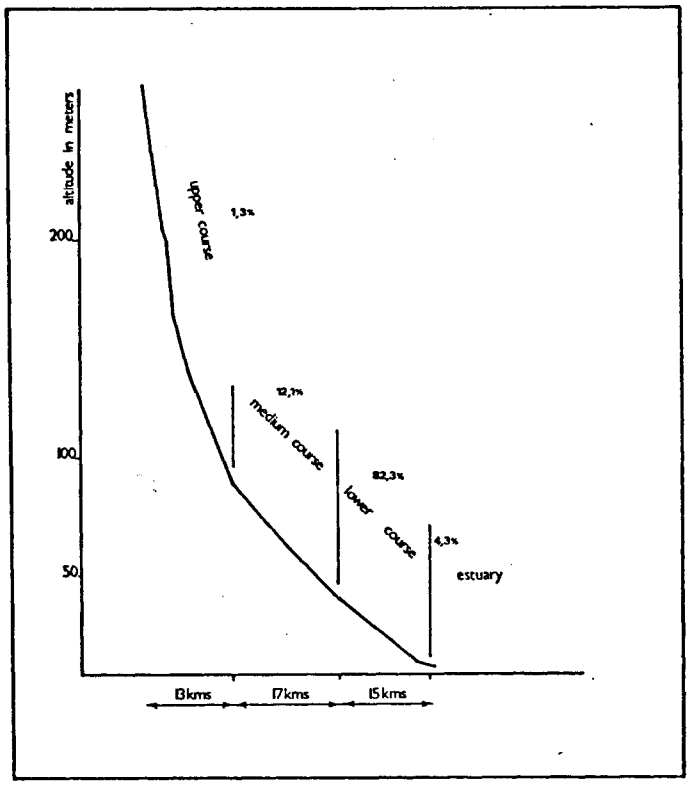

FIGURE 2 - Distribution of salmon catches on the Elorn river from 1971 till 1977.

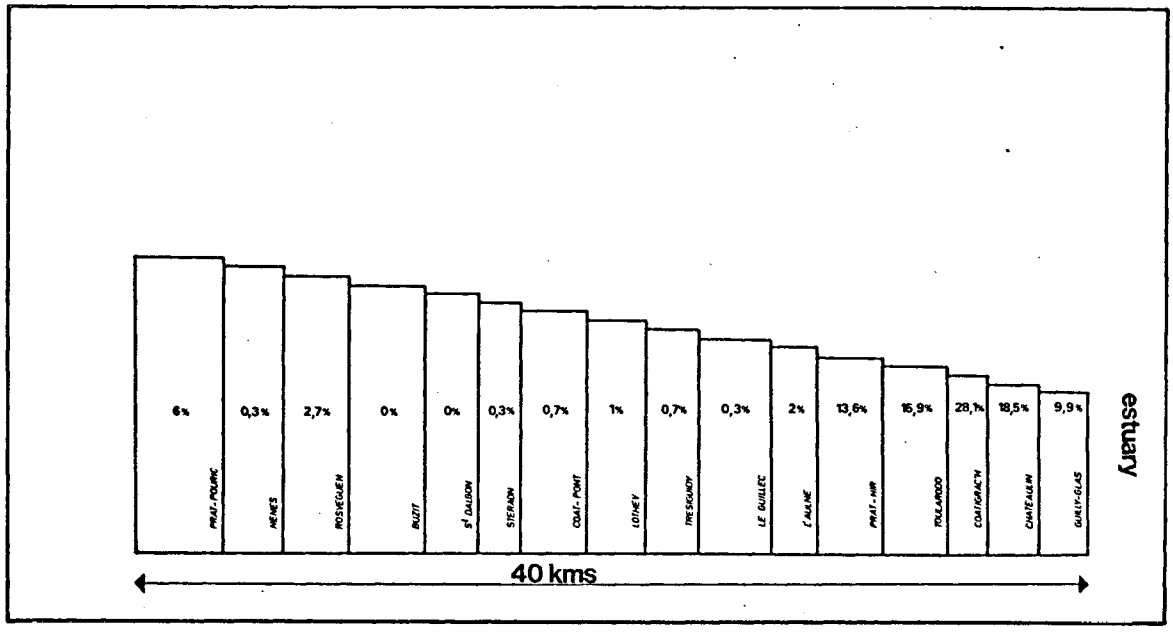

FIGURE 3 - Distribution of salmon catches on the Aulne river from 1974 till 1977.

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5 - CHARACTERISTICS OF SALMON CAPTURED

Fork length of fish captured varies from 50 to 95 cm (Aulne) and from 55 to 95 cm (Elorn). 88 % of the total catch of both rivers are in the range 65-85 cm.
Weight fluctuates between 1000 g and 7500 g and the major part (81.6 %) is situating between 3000 and 5000 g (Fig. 4).

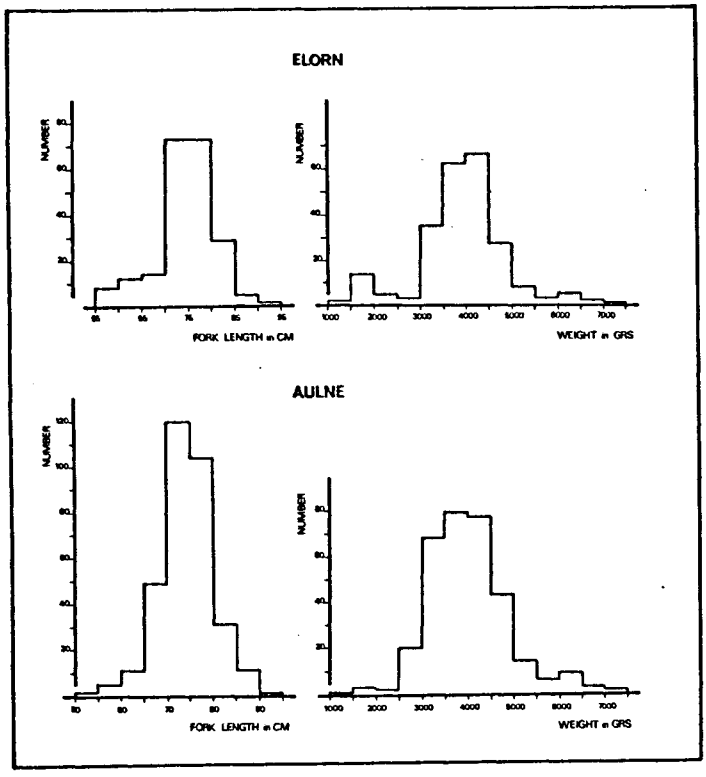

FIGURE 4 - Weight and length distributions of salmon catches.

- Freshwater stage

Climatic conditions occuring in Brittany allow a fast growth of parrs, producing a high rate of 1 year smolts. Considering the somewhat small numbers of fish of each age group, no significant difference exists (confidence interval 5 %) between the rate of 1 year and 2 years smolts.
The rate of 3 years smolts is almost nil.
A variation of the rate of 1 year and 2 years smolts appears but is not significant (confidence interval 5 %).

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TABLE 3 - Freshwater age of salmon captured (in %).

	1 year smolts	2 years smolts	3 years smolts
ELORN	43,8	55,8	0,4
AULNE	46,7	53,0	0,3

- Sea water life

The majority of the fish examined are Spring salmon, most of them being 2 sea winter fish. Grilse and small summer salmon contribute to a feable part of the catches as their run starts respectively in late May and mid-June.

TABLE 4 - Sea water age (in %) of salmon captured.

	1 SEA WINTER	2 SEA WINTER		3 SEA WINTER	Previous spawner
	Grilse	Small spring salmon	Small summer salmon	Large spring salmon	
ELORN	10,4	74,6	0,8	11,7	2,5
AULNE	2,2	83,7	0,6	11,8	1,6

TABLE 5 - Distribution of freshwater and sea water life of salmon captured (%).

	FRESHWATER LIFE					
	1 YEAR		2 YEARS		3 YEARS	
	ELORN	AULNE	ELORN	AULNE	ELORN	AULNE
1 sea winter salmon (grilse)	44 (11)	14 (1)	56 (14)	86 (6)		
2 sea winter -small spring salmon ..... -small summer salmon	43 (77) 100 (2)	47,7 (125)	57 (102)	51,9 (136) 100 (2)		0,4 (1)
3 sea winter salmon -large spring salmon	46 (13)	46 (17)	54 (15)	54 (20)		
Previous spawner	33 (2)	60 (3)	50 (3)	40 (2)	17 (1)	

Numbers in brackets indicate the numbers of fish. ./.

TABLE 6 - Length and weight characteristics of the various sea water age groups.

	FORK LENGTH (cm)		WEIGHT (g)	
	ELORN	AULNE	ELORN	AULNE
1 sea winter salmon (grilse)	59 ± 1,03	56,8 ± 4,3	1814 ± 122,2	1825 ± 399
2 sea winter salmon (small spring salmon) (small summer salmon)	74 ± 0,53 75	73,8 ± 0,61 77	3845 ± 78,2 3470	3753,8 ± 73,7
3 sea winter salmon (large spring salmon)	81,8 ± 1,43	80,9 ± 1,94	5144 ± 317,1	5220 ± 311
Previous spawner	86,7 ± 6,5	78,8 ± 7,6	6563 ± 1793	4798,8 ± 1183

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DISCUSSION

Atlantic salmon migrating in the rivers of Brittany are characterized by a short period of life in freshwater, linked with a fast growth of the parrs under favourable climatic conditions. Considering the rapid degradation of the environment, this factor probably favoured the subsistance of small runs of salmon in these rivers, in spite of lack of management. However, actually, this characteristic makes a small population very susceptible to a bad spawning year.

The drastic decreases of the catches on the rivers of Brittany indicate very likely an important depletion of the stocks, but there is no precise data available about the level of the surviving population and it is thus impossible to evaluate the effect of the sport fishery. It is possible to note, however, that the predation is done almost exclusively on the spring salmon population and that the grilse stock is almost totally spared. This last population represents a lower reproduction potential due to the lesser rate of females and the small size of the fish.

An inventory done on the Scorff river in 1976, following an accidental fish kill, shows that the grilse of this river were mostly males when spring salmon examined were mostly females (1). The major part of the spawning is created by late run fish ascending the river in late summer and autumn. The migration of these fish might be affected during low water periods by the increasing pollution of the rivers low course and estuary.

Several authors note an evolution of the stocks in the main countries producing Atlantic salmon (SHEARER 1971 - WENT 1971 - RUGGLES & TURNER 1972 - ELSON 1974). This evolution shows an increase in the rate of grilses compared to the two or more sea winter fish. In some cases, selective exploitation of a part of the population, associated to a degradation of the river environment, may cause a variation of the age structure and consequently an alteration of the spawning potential, as signaled on the Miramichi river by RUGGLES & TURNER (1972). In this example, ELSON (1974) signales that a restriction of the marine commercial fishery from 1972 allowed a significant increase of 2 or 3 sea winter fish escapement.

Considering the actual state of degradation of local Atlantic salmon stocks, a limitation of the fishing pressure on the spring salmon population would be highly benefical.

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