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**SURVIVAL OF SMOLTS FROM THE RIVER BUSH**

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**SUMMARY**

Preliminary results show wild smolt survival in the River Bush to be 8.6% but tagged wild smolts yield 2.2%. Wild compare with reared smolts survive in the proportion of 3.7:1. Branded smolts give three times the return rate of tagged fish. There is evidence that survival in wild smolts is higher in the mid sector of the length range and frequency. Indications are that in both wild and reared smolts the survival of 1 year olds is less than for 2 year old independent of length.

Les resultats préliminaires indiquent une survivance de smolts sauvages au taux de 8.6% dans la fleuve de la Bush, mais de 2.2% de smolts sauvages étiquetés. En comparaison avec les smolts élevés, les sauvages survivent dans le rapport de 3.7 à 1. Les smolts marqués donnent un rendement trois fois plus grand que celui des poissons étiquetés. Il est évident que la survivance des smolts sauvages est plus haut dans le secteur moyen dans la gamme de longueurs et de fréquences. Selon les indications, la survivance et des smolts sauvages et des élevés est plus basse dans les poissons d'un an que de deux ans, n'importe la longueur.

**INTRODUCTION**

An ascending/descending fish trap was completed on the River Bush, Co Antrim in 1972 in association with smolt rearing facilities sufficient to shortly produce some 100,000 smolts each year. The River Bush has no estuary and discharges directly into the sea; the trapping and rearing establishments are built about one mile upstream from the river mouth. "Canadian" type smolt tags and liquid nitrogen cold branding are used.

Complete records of ascending adult grilse and salmon and descending wild smolts are available from 1974; reared smolt records are available from 1973. From the limited data it is possible to form some preliminary conclusions.

**SMOLT SURVIVAL**

The survival of wild smolts to subsequent adult trap return has been:

Year	Smolts	Grilse	%	2SW	%	Total %
1974	43,819	2,840	6.5	608	1.4	7.9
1975	33,437	2,680	8.0	*459	1.4	9.4
Totals	77,256	5,520	7.2	1,067	1.4	8.6

\* Estimate based on average of 4 years.

Comparative survivals between tagged, wild and reared plus adipose fin clipped and branded reared smolts to the Bush trap have been:

	No Released	Trap Recaptures	% Return to Trap
Tagged Wild Smolts	3,930	88	2.2
Tagged Reared Smolts	3,377	19	0.6
Branded Reared Smolts	3,747	72	1.9

From this preliminary data it is evident that the ratio of wild to reared smolt survival is 3.7:1 and the proportion of reared branded smolt survival to reared tagged smolts is 3.2:1. In the case of the tagged wild smolts it is evident that a 74.4% mortality arises from this operation. Saunders and Allen (1967) showed that tagged wild smolt survival was 2.0% which is very similar to the Bush. Piggins demonstrates survivals of wild smolts to trap return as grilse and salmon for the relevant brood years of 1974 as being 9.2% and 1975 as 5.4% (does not include 2SW fish).

#### FACTORS ASSOCIATED WITH SURVIVAL

The 1974 smolt length at release and subsequent recaptures is worth scrutiny. As shown in Table 1 there is evidence of survival being linked to smolt length and frequency with the highest survival in the middle of the range. This is in conformity with most other observations although in some cases survival was directly linked to increasing length. In the case of the reared smolts as shown in Table 2 a similar comment applies to the 2 year olds but not to the 1 year olds and survival of the latter is also less. Lower survival of 1 year old smolts is the general rule but on the present results is not length linked.

TABLE 1  
WILD SMOLTS

Length cm below	No Tagged	No Recaptured	% Recaptured
11	69	1	1.5
12	176	9	5.1
13	553	15	3.2
14	507	16	3.2
15	294	25	8.5
16	185	10	5.4
17	166	6	3.6
18	59	1	1.7
19	26	2	7.7
20	11		
21	2		
22	3		
Totals	2,051	85	4.1
Mean Lengths	146	149	

TABLE 2

REARED SMOLTS

Length cm below	<u>1 Year Old</u>			<u>2 Year Old</u>			<u>Total</u>		
	No Tagged	Recaptured	% Recaptured	No Tagged	Recaptured	% Recaptured	Tagged	Recaptured Total	%
11	5	4	80.0				5	4	80.0
12	44	2	4.6	1	-	-	45	2	4.4
13	214	1	0.5	2	-	-	216	1	0.5
14	497	-	0	4	3	75	501	3	0.6
15	394	-	0	22	4	18.2	416	4	1.0
16	97	-	0	45	8	17.8	142	8	5.6
17	9	-	0	197	2	1.0	206	2	1.0
18				123	4	3.3	123	4	3.3
19				128	-		128	-	0
20				1			1	-	0
Totals	1,260	7	0.6	743	21	2.8	2,003	28	1.4

The relationship between time of descent and survival of the wild smolts is shown in Table 3.

TABLE 3  
WILD SMOLT RUN AND TAGGING

Week No Week 1 = 1-8 April	Smolt Number		% of 1 & 2 Year Olds		Tagged	Recaptured	% Recaptured
			1	2			
1	21	(11)			2		
2	268	(270)			33 (100)	2	6.1
3	2,340	(1,922)	6.0 (-)	94.0 (-)	194 (100)	11 (2)	5.7 (2.0)
4	5,413	(7,775)	16.1 (7.4)	83.9 (92.6)	532 (240)	19 (6)	3.6 (2.5)
5	10,330	(10,174)	31.6 (11.5)	68.4 (88.5)	450 (60)	22 (1)	4.9 (1.7)
6	11,260	(6,847)	60.9 (17.6)	39.1 (82.4)	105 (898)	12 (32)	11.4 (3.6)
7	10,716	(4,866)	94.7 (33.3)	5.3 (56.7)	701 (-)	18 (-)	2.6 (-)
8	2,792	(975)	96.2 (-)	3.8 (-)	244 (200)	2 (9)	0.8 (4.5)
9	337	(253)	98.4 (-)	1.6 (-)	31 (-)	0 (-)	0 (-)
10	152	(179)	91.7 (29.4)	8.3 (70.6)	13 (-)	0 (-)	0 (-)
11	112	(132)			23 (-)	0 (-)	0 (-)
12	21	(32)			2 (-)	0 (-)	0 (-)
13	4						
14-17 inc	8						
<b>Total</b>	<b>43,818</b>	<b>(33,437)</b>			<b>2,330 (1,598)</b>	<b>86 (50)</b>	<b>3.7 (3.1)</b>

No clear cut pattern emerges from these results although there is a trend for the later running smolts to show a smaller survival rate. In 1974 these were almost all 1 year old smolts.

References

Saunders R L and Allen K Radway 1967

Effects of tagging and of fin-clipping on the survival and growth of Atlantic Salmon between smolt and adult stages - J. Fish Res. Bn Canada 24(12), 2595-2611.

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