



AN ROINN  
IASCAIGH AGUS FORAOISEACHTA

**THE CONTRIBUTION OF  
HATCHERY-REARED SMOLTS  
TO THE IRISH DRIFT NET FISHERY**

*by*

*Eileen Twomey*

The contribution of hatchery-reared smolts  
to the Irish drift net fishery  
by  
Eileen Twomey

Fisheries Research Centre, Abbotstown, Castleknock, Co Dublin  
Fishery Leaflet 118 August 1982  
Department of Fisheries and Forestry, Dublin 2

This Leaflet gives the results of the examination of 104,851 salmon caught by the drift nets between 1978 and 1981. The majority of salmon taken in the Irish commercial fishery are caught by drift nets. The drift net fishery takes place in coastal waters from May onwards and exploits, in the main, one sea-winter fish. In order to quantify the contribution of hatchery reared smolts to the fishery the commercial catch was sampled at various landing sites between 1978 and 1981. The results obtained showed that the reared fish were randomly distributed in the drift net catch around the coast from Malin Head to Ardmore Bay. The highest contribution (12.9%) was found in the fish captured along the Galway and South Mayo coasts. The next highest contribution was in West Cork where 6.3% of the fish sampled were recorded as reared. The analysis of each day's sample throughout the season indicated that the reared fish arrived concurrently with the wild salmon.

A calculation of the value of the salmon which were derived from hatchery-reared smolts was made, based on the percentage of reared fish observed in the catch samples. The conclusion was drawn that, although the contribution of reared smolts to the total catch is small, the principle of artificial rearing of smolts is justified in view of the contribution to the national catch and the spawning stock.

#### Introduction

From the census work carried out by the Salmon Research Trust of Ireland Inc., information is available on the contribution of hatchery reared smolts to the Burrishoole system from 1970 onwards. The reared fish component of the escapement into the system is given in the Trust's Annual Report for 1980. The Electricity Supply Board have estimated the contribution of hatchery reared smolts to their commercial catch at Thomond Weir on the River Shannon for a number of years prior to 1979. Thereafter commercial fishing ceased.

Hatchery reared smolts, tagged in the River Lee, were recaptured as adults at various locations in coastal waters, some quite distant from the river of origin. John Browne and Jacqueline Doyle recorded in 1978 the recapture of adult salmon, derived from reared smolts, at distances in excess of 500 kilometres from the river of origin. The River Bush project in Co. Derry has recorded recaptures of hatchery reared smolts from drift nets off the North Mayo coast. Preliminary results from the coded wire tag described by John Browne in Fishery Leaflet No. 114 gives information on the location of salmon along the coastline from the various smolt rearing stations.

The annual production of hatchery reared smolts is in the order of 360,000. The contribution from the River Bush in Northern Ireland is included in this figure. The rearing stations operated by the Electricity Supply Board on the River Shannon and River Lee are the major contributors producing annually some 300,000 smolts. Rearing stations on the Burrishoole system, the River Corrib, the River Boyne and the River Bush each produce between 10,000 and 15,000 annually.

The adipose fin is amputated from most of the hatchery reared smolts before release. Adults derived from hatchery reared smolts are thus easily identified on their return to coastal waters.

The presence of reared fish in the drift net catch was first recorded in 1975 when a sample of fish in the Cork drift net fishery was examined over a short period. In the years 1978 to 1981 inclusive with the co-operation of the Galway and Aran Fisheries Co-operative a large proportion of the landings from the Galway and South Mayo coast were examined during the peak of the fishing season. In 1980 and 1981 the work was extended to include the Donegal, North Mayo and Cork/Kerry drift net catch.

### Results

During the period of investigation reared fish were noted in all of the drift net caught fish from Donegal to Ardmore Bay situated to the east of the Cork Blackwater. The largest concentration of hatchery reared fish was found along the Galway and South Mayo coast sample and the lowest number was recorded along the Donegal coast. Table 1 gives information on the recorded drift net catch, the number of fish examined and the percentage of reared fish in each of the areas sampled. The recorded catch for each of the areas was extracted from the

official statistics. The proportion of the total catch examined varied from 1.46% in West Cork in 1980 to 81.5% along the Donegal coast in 1981. Despite the fact that there was only a small proportion of the fish taken in West Cork examined in 1980 statistical analysis of the results obtained indicated that there was no bias in the sampling method ( $P > 0.05$ ). The distribution of the reared fish was recorded on a daily basis. The analysis of each day's sample showed that the hatchery reared fish were fairly evenly distributed throughout the sampling period and this indicated their arrival at the coast was concurrent with the wild salmon. For example it can be seen in Table 2 from the sampling programme carried out in the Galway and South Mayo coast in 1980 over a period of 27 days that in the early part of the season the reared fish occurred in the same proportion as they did at the tail end of the season. In this year 70.1% of the recorded catch at the Galway and Aran Co-op premises was examined.

The data were examined using the  $X^2$  contingency test to determine if the reared fish were returning in clusters rather than randomly mixed with the wild fish. Table 3 gives the results obtained from the analysis of the 1981 data from the West Cork coast on a daily basis. The expected frequencies (given in brackets) calculated from the proportion of hatchery reared (0.043) and the proportion of wild fish (0.956) are in close approximation to the observed numbers when the entire sample is considered, although there is evidence of clustering on occasional days.

Table 4 gives data for the expected and observed numbers of reared fish for each of the locations sampled between 1978 and 1981 inclusive. It can be concluded that the reared fish were randomly mixed in the areas sampled, since the expected and observed frequencies are within the same range.

#### Discussion and Conclusions

It has been accepted for some time in Ireland that the rearing of smolts to enhance the stocks of salmon returning to freshwater is of limited value in view of the intensive exploitation by commercial operators. The results obtained at the installations on the Burrishoole system by the Salmon Research Trust have shown that the return to freshwater from hatchery reared smolts from 1970 to 1979 averaged 2.17% and varied from 0.61 to 6.6 per cent.

Their value to anglers is also dubious as there is evidence that the majority of reared fish enter the freshwater part of a river system later in the season than the wild fish. The present investigations have shown that the arrival of hatchery reared fish in coastal waters is concurrent with that of wild fish.

The present investigations provide information on the contribution of hatchery reared smolts to the commercial catch. It has been assumed, in the absence of an external tag, that all the hatchery reared fish are from Irish sources. This may not be entirely correct in view of the recapture of adult salmon derived both from reared and wild smolts from other European countries which have been caught around the Irish coast in the past.

The total numbers of reared smolts produced is minimal when compared to the wild smolt production. For example, the Corrib system alone is capable of producing 250,000 and this a small system in terms of stream area when compared to the Rivers Moy, Shannon, Cork Blackwater and the three sister rivers, Barrow, Nore and Suir.

The present production of 360,000 reared smolts is only a fraction of the wild production but the contribution to the commercial catch is of value. In 1980, 28,502 fish were examined at four centres and the total number of reared fish was 1,983 (6.9%). The recorded drift net catch for the country (excluding the east and south east coasts) was 186,419 fish. A simple calculation suggests that 12,862 fish (6.9%) were derived from reared smolts. Based on an average weight of 2.72kg (6lb) and an average price of £12 per fish the market value of the catch derived from reared smolts was £154,344 and there is no grazing fee at sea.

These costings refer only to the drift net catch and should be treated with caution since the survey showed that the proportion of fish derived from reared smolts varied from place to place and it was not possible to arrange for truly random samples.

In addition to the drift net catch, hatchery reared smolts provide salmon for the estuarine nets and the rod fishermen on the River Lee and River Shannon and there is a substantial contribution in terms of spawning fish. In the River Shannon and River Lee in 1980, 78.3% and 99.2% of the female brood stock fish, contributing 2 million eggs, were derived from hatchery reared smolts.

It is concluded that there is justification in expanding the present rearing facilities to increase the commercial catch as it has been shown in the present investigations that reared fish do provide a worthwhile addition to the commercial catch.

Acknowledgements

The assistance given by summer bursary students Ronan Morrissy, Liz Barnwall, Maria McCabe, Charles McGuinness, John Power and Carry Burns is acknowledged. I am indebted to John Browne for his advice on the preparation of this paper and to Christopher Moriarty for his work on editing.

Table 1. The recorded catch, the number of fish examined and the percentage of reared fish in the catch at various locations in the country.

		Recorded Catch	Number Examined	% of reared fish
Senegal Coast	1980	42,318	10,184	2.45
	1981	42,670	34,786	1.34
North Mayo	1980	30,585	6,430	2.68
	1981	19,666	10,422	2.40
Railway/South Mayo	1978	13,069	7,652	7.73
	1979	20,967	12,315	4.40
	1980	16,339	11,456	12.95
	1981	12,646	7,016	8.06
West Conk	1980	29,458	432	6.25
	1981	14,484	5,387	4.34

Table 2. Observed numbers of reared fish in the catch in the Galway/South Mayo coast in 1980.

<u>Date</u>	<u>No. of fish examined</u>	<u>% reared</u>
17.6.'80	200	2.00
18.6.'80	600	7.66
19.6.'80	200	7.00
20.6.'80	671	11.62
22.6.'80	492	6.50
23.6.'80	300	8.00
24.6.'80	1200	12.58
25.6.'80	829	12.66
26.6.'80	97	11.34
27.6.'80	644	10.40
28.6.'80	910	15.71
1.7.'80	1136	17.95
2.7.'80	251	15.53
3.7.'80	93	17.20
4.7.'80	337	14.20
5.7.'80	409	15.89
7.7.'80	109	9.17
8.7.'80	303	18.81
9.7.'80	957	10.55
10.7.'80	889	17.32
11.7.'80	411	14.35
15.7.'80	34	0
16.7.'80	193	9.80
17.7.'80	144	16.66
18.7.'80	25	4.00
22.7.'80	10	0
23.7.'80	12	16.66



Table 3. The observed and expected occurrence of hatchery reared and wild fish in the total sample from West Cork in 1981.

<u>Date</u>	<u>No. examined</u>	<u>Hatchery reared</u>	<u>Wild</u>
19.6.'81	340	11(15)	329(325)
23.6.'81	273	6(13)	267(260)
24.6.'81	349	19(16)	330(330)
25.6.'81	368	17(17)	351(351)
26.6.'81	154	11(7)	143(147)
30.6.'81	483	23(21)	460(461)
1.7.'81	486	46(21)	440(465)
2.7.'81	259	9(11)	250(248)
3.7.'81	361	11(16)	350(345)
7.7.'81	596	10(26)	586(569)
9.7.'81	166	8(7)	152(152)
10.7.'81	618	38(27)	580(590)
14.7.'81	520	11(22)	509(497)
17.7.'81	216	8(9)	208(206)
24.7.'81	204	6(9)	198(195)
Total	5387	224(237)	5153(5139)

Table 4. The number of fish examined together with comparative data of observed and expected frequencies.

		Number examined	Nos. of Hatchery Reared Fish	
			Observed	Expected
Donegal Coast	1980	10,184	249	224
	1981	34,786	468	452
North Mayo	1980	6,430	237	229
	1981	10,422	261	236
Galway/South Mayo	1978	7,657	592	527
	1979	11,315	541	498
	1980	11,456	1470	1466
	1981	7,016	615	608
West Cork	1980	432	27	26
	1981	5,153	234	237
Total	1978- 1981	104,851	4694	4503