AN ECONOMIC EVALUATION OF IRISH SALMON FISHING

GENERAL SUMMARY OF RESULTS

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GENERAL SUMMARY OF RESULTS*

This memorandum summarizes the results of a study sponsored by the Department of Agriculture and Fisheries and carried out by ESRI. The detailed results have been published in three ESRI papers:

Paper No. 68	(I)	The Visiting Anglers;
Paper No. ~~74~~ 75	(II)	The Irish Anglers;
Paper No. 78	(III)	The Commercial Fishermen.

The purpose of the study was to investigate the economics of salmon fishing in Ireland. Essentially, it set out to answer the question "how valuable was the Irish salmon industry to the economy in 1970?". In order to answer this question, the study tried to evaluate the economic impact of angling and commercial fishing on the various districts, determine the capacity of the industry for future development and provide information to assist in the more effective marketing of salmon and sea-trout angling. Although the survey was confined to 1970, its findings may be updated for subsequent years by means of the regularly published data on catches and numbers of licences, and by appropriate price indices.

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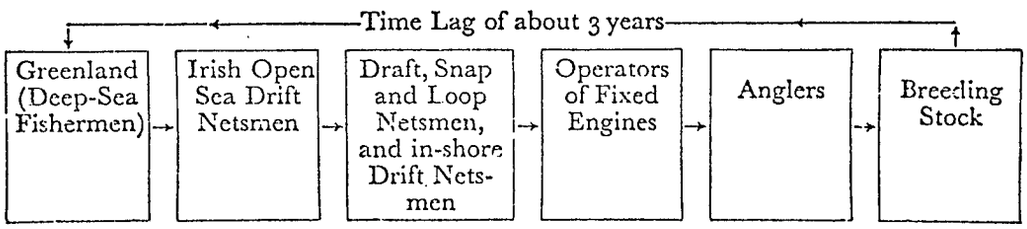
*This summary was prepared with the help of Mr. Seamus Breathnach.

The Life Cycle of the Salmon and the 'Exploitation Cycle'

Before discussing the results of the study, a few words about the salmon's life cycle and about current methods of capture are appropriate.

Having been spawned in an Irish river, salmon and sea trout remain there for about 1 - 3 years. They then undergo various physiological and behavioural changes and move downstream to the sea. The salmon travels long distances out in the Atlantic, where it feeds and grows very quickly, and, after a further 1 - 3 years, it returns to the river of its birth. The life cycle of the sea trout is basically similar except that it travels relatively short distances out to sea, feeding mainly round the coasts.

As recently spawned alevins or fry, and also during their downstream migration as smolts, salmon and sea-trout are subjected to many hazards such as pike, trout, herons, otters, pollution, dredging etc. During their life in the sea, other predators (seals, large sea fish etc.) take their toll. Man also exploits the adult salmon at several stages. The principal methods of exploitation which he uses are illustrated in the following diagram.



The "Exploitation Sequence": Arrows indicate the effects of each type of fisherman.

As can be seen from this diagram, the first stage at which adult salmon are captured is on their feeding grounds off Greenland.* This fishery has expanded dramatically in recent years with landings rising from 60 metric tons in 1960 to 2,139 metric tons in 1970.

Those salmon which escape the deep-sea netsmen around the coast of Greenland face further nets on their return to Irish waters. The first nets in the sequence are the open-sea drift nets, which operate mainly off the west and north-west coast, and usually fish by night. These enormous nets, which may be up to 3,000 yards long, are laid out across a path which the fish are known to follow. They are allowed to drift with the tide and the fish mesh themselves in the drifting nets. The salmon which succeed in evading the open-sea drift nets next encounter the in-shore drift nets. These nets function in a similar manner to open-sea drift nets, although they are shorter and are usually fished from smaller boats. Unlike the open-sea nets, they are frequently operated by day as well as by night. In 1970 about 800 drift net licences were issued (the licensing regulations do not distinguish between open-sea and in-shore drift nets).

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* It should be noted that the fish caught off Greenland are those which would have returned as Spring salmon. In contrast, Irish drift netting concentrates almost exclusively on Grilse and Summer salmon.

Draft nets come next in the exploitation sequence. These are one of the oldest and most wide-spread methods of catching salmon. To operate a draft net, one man stands on the bank of a suitable hauling ground holding a rope attached to one end of the net. Two or three other fishermen row out from the shore in a row boat releasing the net as they go. They row ashore downstream from where they set out, so that the net is cast or 'shot' in an arc. It is then hauled ashore, bringing with it any fish which happen to be within the arc when the net is shot. Draft nets are used in estuaries and other suitable places throughout the country. About 670 draft net licences were issued in 1970.

Two other types of net are used in certain estuaries: the snap net, which is confined to the Waterford fishery district, and the loop net, which is found only in the Letterkenny district. Two boats are required to operate snap nets. The net is suspended between two light flat-bottomed boats called cots. When a fish touches the net the fishermen feel it and immediately jerk up the lower cords of the net, thereby doubling the net about the fish. Licences for 153 snap nets were issued in 1970.

Loop nets consist of a wooden frame about 15 feet long whose width varies from 3 feet at one end to 6 feet at the other. Netting is spread loosely across the frame and attached all round. To use the net, the fisherman wades into the river and holds the frame almost vertically in the water, at an angle to the bank. When he feels a fish enter the net, he lets the frame float in such a way as to trap the fish. In 1970 licences were taken out for 34 loop nets.

The returning salmon must face the hazards not only of nets but those of fixed engines as well. These latter devices are of

several types. Riverine weirs are obstructions placed wholly or partly across a river in which are set trapping devices called boxes or cribs. A licence must be taken out in respect of each box. Forty such licences were issued in 1970.

Head weirs, only one of which was licenced in 1970, are operated in estuaries and the fish are trapped in them on a falling tide. Stake nets, of which nine were licensed in 1970, operate in a somewhat similar way. Unlike head weirs and stake nets, which can only function in estuaries and inlets where there is an appreciable fall of the tide, bag nets can be used on the open coast. These nets are floated by means of corks or buoys and attached to the shore by means of an anchor or holdfast. Four bag net licences were issued in 1970.

Anglers, who numbered about 11,000 in 1970, are the next hazard which salmon and sea trout must face as they ascend the rivers. Disease and poachers also take their toll of the fish at this stage. Finally, in November and December the remaining fish mate and spawn, after which a high proportion die. Those which survive spawning drop back to the sea. Some of these return to spawn in subsequent years.

THE STUDY

The study is divided into three parts. Part I deals with the foreign or visiting anglers and is based on a random sample of 430 anglers who completed a postal questionnaire. Part II, which deals with the native anglers, is based on personal interviews with a random sample of 586 anglers. Part III deals with commercial fishermen and is based on 328 personal interviews. Part III also contains an overview of the findings and considers their implications for policy.

I: "THE VISITING ANGLERS"

This Paper attempts to describe the foreign anglers. Where, for example, did they come from? How many anglers came in 1970? Why did they come? How much did they spend? On what items did they spend their money?

The domiciles of the foreign anglers who fished for salmon in the Republic in 1970 are set out below.

Numbers of Foreign Salmon Anglers in 1970

	Number	Percentage
Great Britain	1,960	52%
Northern Ireland	860	23%
The Rest of Europe	~~650~~ 647	17%
The Rest of the World	~~28~~ 284	8%
TOTAL	~~3,498~~ 3,751	100%

The reasons why they came to Ireland are as follows:

Salmon Fishing Specifically	72%
Salmon Fishing + Family Holiday	13%
Family Holiday Only	5%
Other Purposes	9%

Of crucial relevance to an economic evaluation is the question of expenditure. How much, therefore, did the anglers spend? The following table gives average expenditure per angler and total expenditure by the different nationalities:

	Average per Angler	Total
Northern Ireland	£86	£73, 000
Great Britain	£196	£373, 000
The Rest of Europe	£234	£149, 000
The Rest of the World	£363	£101, 000
TOTAL		£696, 000

On what was this money spent?

Accommodation and meals	£269, 000
Tackle, Boat Hire, Licence fees etc.	84, 000
Gifts	30, 000
Other Expenses	53, 000
	£436, 000

Plus:

Travelling Expenses to and from Ireland	163, 000
Travelling in Ireland	97, 000
	696, 000

The following fishery districts were those where the highest total expenditure was incurred: Kerry (£134, 000), Galway/Connemara/Ballinakill (£117, 000) and Bangor/Ballina (£72, 000).

Lower amounts were spent in other areas such as Dublin (£20,000), Wexford and Limerick (£14,000) and Drogheda/Dundalk (£10,000).

While the figure of £696,000 represents the total expenditure of the visiting anglers, it does not represent the net benefits accruing to the Irish economy from these anglers' visits. To assess these benefits, adjustment must first of all be made for the expenditure of those anglers the main purpose of whose trip to Ireland was not salmon fishing. Allowance must also be made for payments to foreign travel firms. When these adjustments are made, it is estimated that £518,000 was paid to Irish residents by foreign salmon anglers.

However, this is only a first round figure, and does not allow for the "multiplier effects". This is the name given to the process whereby an initial injection of expenditure in an area generates subsequent rounds of expenditure and income. These subsequent rounds of expenditure must therefore be included if the overall effect of the initial expenditure is to be assessed*. A multiplier of 1.6 was calculated, the application of which gave an estimate of £829,000 for all the economic activity, both direct and indirect, generated by foreign salmon anglers in 1970. "It is also estimated, though very crudely, that about one quarter of this amount went to the Kerry district, one-fifth to Galway/Connemara/Ballinakill, and one-eighth to Bangor/Ballina. The remainder was distributed over the other regions in an unknown way with Dublin receiving in addition to its own share of direct expenditure a high spin-off from all the other regions".

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* Certain conditions (notably the existence of unemployed resources and absence of other means of stimulating demand for them) must be fulfilled before the multiplier can be validly applied. In the present case, it was judged that these conditions were fulfilled.

Conclusions

Though the total figure for 1970 is apparently small, the financial benefits are distributed to areas where employment is lowest; and in areas like south-west Kerry, Connemara, west Mayo and west Donegal, the income derived is probably greater than that derived from most agricultural enterprises. Moreover, numbers of foreign salmon anglers are likely to increase in the future for several reasons. Firstly, the Republic is one of the few European countries with any salmon left, and demand for salmon angling is buoyant. For instance, a recent British study showed that of the half million game fishermen estimated to be in Britain, only 3% caught salmon on their last outing, whereas 46% have a preference for catching salmon. Secondly, as Ireland is now a member of the EEC, it is likely that traffic to Ireland from Europe will increase.

"We should try, therefore, to exploit these developments in every way possible (particularly by the prevention of pollution and the elimination of other hazards to the angling stocks) keeping in mind that value estimated for 1970 is probably only a fraction of the potential of this amenity".

II: "THE IRISH ANGLERS"

In this report attention is focussed on the native angler: data concerning his characteristics are assembled; information is given on the frequency and location of his fishing, on the numbers and disposal of fish caught, and on his opinions about angling and the management of angling waters; his expenditure-pattern is traced, and forecasts of the number of anglers and their expenditure are made for 1975.

An important theoretical issue arises in connection with the evaluation of the angling activities of Irish residents. Do

we measure the benefits of this angling by the total expenditure of the anglers on fishing which is known as 'the total expenditure method', or do we measure them by the amount of 'satisfaction' which this angling affords to the anglers? Measuring satisfaction - otherwise known as the 'amenity value' method - is beset by many theoretical and practical difficulties.

Several ingenious solutions* to these problems have been suggested in the literature, but unfortunately none of these was appropriate for the present data. It was therefore necessary to use the cruder total expenditure method to assess the benefits of salmon angling by Irish residents. It is felt, however, that the amenity or recreational value of salmon angling would be considerably in excess of the total expenditure, since many Irish anglers spend little on their sport and would probably pay considerably more for it if they had to.

Let us now turn to the results of the study. First of all, what sort of people are Irish salmon and sea-trout anglers?

Roughly speaking 10% had agricultural occupations; 25% had professional or managerial occupations; and almost 50% were employed manually. As might be expected, the native anglers had lower incomes than the visitors. For example, 40% of the visiting anglers enjoyed incomes of over £4,000 per annum, whereas only a tiny fraction of Irish anglers earned over £5,000 per annum and almost 50% of them had incomes of less than £1,000 per annum in 1970.

On average, each Irish angler caught 40lb. of salmon and spent £50 on his angling activities. Some anglers sold all or part

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* For a full discussion of the considerations involved see Appendix B of the Report under review.

of their catch, but in general amounts received were small. Indeed, about two-thirds of anglers had catch-sales worth less than one-tenth of their total costs. Overall, Irish anglers caught an estimated 261,000 lb. of salmon valued at £103,000, and 104,000 lb. of sea trout valued at £25,000.

Total expenditure on angling in the different districts was as follows:

Dublin	£96,300
Wexford	6,600
Waterford	31,000
Lismore	12,600
Cork	27,600
Kerry	9,700
Limerick	49,400
Galway/Connemara/Ballina-kill	16,300
Bangor/Ballina	17,000
Sligo/Ballyshannon	14,100
Dundalk/Drogheda	17,500
Letterkenny	27,100
	£326,000

Anglers spent £195,700 of this amount in their home districts and £130,300 elsewhere in the Republic.

If we now recall the expenditure of foreign anglers (from Part I), we can get the total GNP generated by all salmon angling activity. It must first of all be pointed out, however, that the multiplier cannot be applied to the native anglers' expenditure since this expenditure does not meet the necessary requirements. The total figure thus amounts to £1.16m. and is derived as follows:

(Part I) Income from visiting anglers (£518,000 x 1.6)

= £829,000

(Part II) Income from Irish anglers = £326,000

But what of the future? A tentative projection for total unmultiplied expenditure by salmon anglers in 1975 suggests a figure of £1.26m., (at 1970 prices). This compares favourably with the 1970 figure of £860,000.*

III: "THE COMMERCIAL FISHERMEN"

The following table, abstracted from Part III, gives us an impression of the magnitudes involved in commercial fishing for salmon in the Republic in 1970. In addition to the figures in this table, it may be pointed out that total capital investment, valued on a replacement cost

District	Lic.'s Issued	No. of Persons Engaged	Total Man-weeks employed	Total Catch	
				Quantity	Value
				000lb.	£000
Dublin	30	81	1,220	5.6	1.9
Wexford	63	163	2,256	26.1	9.1
Waterford	356	926	15,610	593.2	207.6
Lismore	102	291	5,003	336.2	117.6
Cork	87	260	3,786	144.4	50.5
Kerry	110	422	3,532	326.2	114.1
Limerick	202	652	9,561	374.0	130.9
Galway/Connemara/Ballinakill	115	285	2,114	88.8	31.0
Bangor/Ballina	137	498	4,471	472.5	165.4
Sligo/Ballyshannon	133	487	3,701	332.2	116.2
Letterkenny	258	842	5,574	583.5	204.2
Dundalk/Drogheda	132	358	5,870	108.1	37.8
Total	1,725	5,265	62,698	3,391.3	1,186.9

*The 1970 figure is derived as follows: total expenditure by foreign anglers, including internal travel, i.e. £533,000 (£97,000 + £486,000, see. p. 7 above) plus total expenditure by Irish anglers i.e. £326,000 (see p. 10 above) = £860,000.

basis, amounted to £913, 000 for the year, whereas current 'operating' costs inclusive of depreciation, amounted to £389, 000.

Of all licences issued for 1970 (shown in Column I of the table) about 670 were for draft nets and 820 were for drift nets, and the remaining 240 were for other types of catching device. The numbers of various types of licence issued become important when the question of the equity of catch-distribution amongst the various licence holders is raised, and more particularly, when overall annual catches have to be limited in the interests of good fishery management.

Column 2 shows the distribution by region of the 5, 300 persons engaged in commercial salmon fishing. Considering columns 2 and 3 together shows that on average fishermen work for a period of about 12 weeks each. Columns 4 and 5 give the quantity and value of salmon caught commercially in 1970.

To assess the income arising from commercial salmon fishing, total costs (£389, 000 inclusive of depreciation) are deducted from the total value of the catch (£1,199, 000 inclusive of sea trout sales). The income thus amounts to approximately £810, 000.

Although it is not necessary to value the 'satisfaction' experienced by commercial fishermen it is appropriate to apply the multiplier to assess the total income which they generate. Applying the multiplier of 1.6 to the total value of catch gives a figure of £1.91m.

AN OVERVIEW

We are now in a better position to make an overall evaluation of Irish salmon fishing. To our initial question "How valuable was the Irish salmon industry to the economy in 1970", we are able to give several answers. We can quote the income, employment, exports, gross output

(= total expenditure) and net output (= value added) the industry generated. No single one of these is the ideal criterion of 'value', but each has a certain validity. Some of these criteria are shown in tabular form below. Gross Output, which is the sum of expenditure by foreign and Irish anglers plus the total value of commercial catch, amounted to £2.1 m. in 1970. When this figure is adjusted for its estimated import content we obtain the Net Output or "value added" by the industry. This amounted to £1.7m. When a multiplier is applied to take account of the secondary effects of the expenditure of the foreign anglers and the total value of commercial catch, we obtain an estimate of the total effect of salmon fishing on G. N. P. This effect was estimated at £3.1m. The final criterion of value which is shown in the table is export earnings, i.e. expenditure by foreign anglers and the value of salmon exported. These earnings totalled about £1.6m.

	Gross Output	Net Output	Total G. N. P. Effects	Export Earnings
	£000			
Foreign Anglers	533	402	829	530
Irish Anglers	326	239	326	-
Commercial Fishermen	1, 199	1, 035	1, 910	1, 100
Total	2, 058	1, 676	3, 065	1, 630

"Over and above the present value of the industry, account should also be taken of the potential value. Given the dearth of salmon elsewhere, together with increasing income and leisure, a growing demand for both commercially caught salmon and for salmon angling can be envisaged in the years ahead. Hence, if our salmon stocks can be maintained or expanded, the value of the Irish salmon fishing industry should increase considerably in the future".

Policy Implications

What are the implications of the study for the management of Ireland's salmon resources? We have seen that salmon fishing is a valuable industry and one which is likely to become even more lucrative in the years ahead. It is therefore vital that every effort be made to increase, or at least maintain, salmon stocks.

Both the anglers and the netsmen interviewed were agreed that control of pollution, prevention of poaching and adequate care of the spawning fish were of the utmost importance. There was less unanimity on the question of over-exploitation and this important issue must therefore be considered in more detail.

The first fishermen in the exploitation sequence are those who catch the salmon off Greenland. Many of the fishermen in our sample felt that the Greenland catches should be limited and that the recent international agreement on this subject should be stringently enforced.

Drift-netting comes next in the exploitation sequence. This form of netting has become a thorny problem in Ireland in recent years due to a dramatic increase in the numbers of drift nets and their catches. From a mere 319 in 1961 drift net numbers have shot up to 1,156 in 1972, while drift net catch has risen from 0.2 m.lb. in 1961 to 2.3 m.lb. in 1972. Regression analysis of the catch data for the years 1952-72 suggests that this expansion in drift net catch has caused a reduction in catch by other methods. This reduction is particularly marked in the case of angling. In the interests of equity and of conservation, some limitation on the numbers of drift nets is therefore appropriate.

The extent of such limitation, and indeed many other important issues of fishery management, depend on proper assessment of the spawning capacity of Irish rivers and adequate monitoring of the runs of fish.

The collection of such data is an important priority.

The study also throws light on the question: which is the best use of our salmon - angling or commercial fishing. It is estimated that the value of allowing upstream an extra fish (i.e. one which would otherwise have been caught by netsmen) was £2.81 in 1970 The commercial value of such a fish to the netsman was £2.45. It must be emphasized that this calculation is based on several assumptions, particularly the assumption that spawning escapement is adequate. Moreover, in a time of mounting pressure on stocks of salmon the balance is tipped increasingly in favour of angling, which is a less 'salmon-intensive' source of income than netting.

Rational management of Ireland's salmon will consequently involve difficult value judgements, but the overriding consideration should be the survival of the salmon. The issue of net licences, particularly drift nets, will therefore need to be carefully controlled.