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An Economic Evaluation of Irish Salmon Fishing

III: The Commercial Fishermen

B. J. WHELAN, R. O'CONNOR and A. McCASHIN

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An Economic Evaluation
of Irish Salmon Fishing

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*An Economic Evaluation of Irish
Salmon Fishing*

III: The Commercial Fishermen

B. J. WHELAN, R. O'CONNOR and A. McCASHIN

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An Economic Evaluation of Irish Salmon Fishing

INTRODUCTION

THIS is the third report of a study entitled *An Economic Evaluation of Irish Salmon and Sea-Trout Fishing* which was sponsored by the Department of Agriculture and Fisheries and conducted by The Economic and Social Research Institute. The first report was concerned with the visiting anglers (i.e. salmon anglers from outside the Republic) [1] while the second report dealt with the Irish anglers [2]. The terms of reference of the study together with some background information on the life history of the salmon and on methods of evaluation were given in the previous reports. This third study deals with commercial salmon fishermen, their methods of operation, the time spent fishing, their alternative occupations and particularly with the income arising from salmon fishing. The report also gives information relating to the owners of angling waters and the opinions of these and of the commercial fishermen on certain aspects of salmon fishing. In the final section of the paper an attempt is made to collate the results of the three studies so as to provide some basis on which policy issues can be considered.

In this study a commercial salmon fisherman is taken to be a fisherman who fishes for salmon (or sea trout*) by any legal means other than rod and line; and who sells the major portion of his catch. As mentioned in [2] a small number of anglers operate on a commercial basis, but these have been excluded from the present study.

Particulars of the 1970 commercial licences classified by district of issue are given in Table 1, while totals for all districts combined for the years 1955 to 1971 are given in Table A1 of the Appendix.

The types of tackle or "engine" currently used by commercial fishermen include various types of net and "fixed engines" such as boxes, cribs and head weirs. We describe these engines briefly below. For a more detailed discussion of the various salmon fishing engines, both legal and illegal, the reader is referred to the very interesting paper by Went [3].

*Few commercial fishermen fish specifically for sea trout. According to the official statistics, 57 per cent of all sea trout caught in 1970 were caught by rod and line, while only 4 per cent of all salmon were caught by anglers.

TABLE 1: *Commercial Licences issued in 1970, Classified by Licence Type and District of Issue*

<i>Fishery district</i>	<i>Licence Type</i>								<i>All types</i>
	<i>Nets</i>				<i>Fixed Engines</i>				
	<i>Draft</i>	<i>Drift</i>	<i>Snap</i>	<i>Loop</i>	<i>Bag net</i>	<i>Stake net</i>	<i>Head weir</i>	<i>Box or crib</i>	
Dublin	10	20							30
Wexford	63								63
Waterford	12	200	138			3	1	2	356
Lismore	9	75	15			2		1	102
Cork	57	30							87
Kerry	78	20			2			10	110
Limerick	116	77				4		5	202
Galway/Connemara/ Ballinakill	29	81						5	115
Bangor/Ballina	23	106			1			7	137
Sligo/Ballyshannon	90	40			1			2	133
Letterkenny	54	168		34				2	258
Dundalk/Drogheda	126							6	132
<i>All Districts</i>	667	817	153	34	4	9	1	40	1,725

The salmon catch for 1970 is more fully discussed below. However, in order to indicate the relative importance of the various engines, it may be worthwhile to mention here the proportion of the total catch taken by each type in 1970. According to the official statistics* drift nets caught the largest share of the total catch, about 49 per cent. Draft nets took about 36 per cent, while all the other commercial engines took about 11 per cent. The remaining 4 per cent was reported to have been taken by anglers, but the magnitude of the anglers' catch is in some doubt (see [2]). The commercial catch is a much more reliable figure since it is obtained from the statutory records kept by fish dealers.

DESCRIPTION OF COMMERCIAL FISHING ENGINES CURRENTLY IN USE

We have divided these into two groups: Fixed Engines† and Nets. The latter category comprises Draft, Drift, Snap and Loop Nets, while the former category comprises all other legal means of taking salmon. Each type of engine is described below.

*Sea and Inland Fisheries Report for 1970, Fisheries Division, Department of Agriculture and Fisheries, Dublin.

†The definition of Fixed Engines used here is not the same as that used in legal terminology, since the latter excludes riverine weirs.

Fixed Engines

(a) *Riverine Weirs*: These consist of obstructions wholly or partly across a river, in one or more parts of which there are trapping devices called boxes or cribs. A salmon moving upstream against the current finds its passage barred by the weir and swims until it enters the trap, from which it is impossible to escape. A single weir may have several boxes or cribs and a licence must be taken out in respect of each box or crib rather than in respect of the riverine weir as a whole.

Beginning in 1783, various Acts of Parliament were passed which required that a free gap or passage should be provided in all weirs so as to allow a certain number of salmon to go upstream for spawning.* These Acts contained difficulties of implementation and enforcement, and it was not until 1863 that effective legislation was enacted. At this time there were about 40 fishing weirs in existence, and by 1930 only 14 were in operation. Since then the Lax Weir on the Shannon and the weir on the Erne have been demolished. A new weir known as the Thomond Weir was erected on the Shannon in 1940. In 1970, there were 40 licensed "boxes or cribs" in operation.

(b) *Head Weirs*: These weirs are erected between tide marks in such a way as to trap fish on a falling tide. Since they are hazardous for navigation, all but two were declared illegal in 1863. Only one head weir licence was issued in 1970. This was in the Lismore district at the mouth of the Blackwater.

(c) *Stake Nets*: The head weir was a very inefficient engine and at the beginning of the last century it was superseded in many places by the more efficient stake net or stake weir introduced from Scotland. The stake net consists of two parts, a leader and a head or trap. The leader is a wall of netting running out from the shore and held in position by a series of stakes driven into the substratum. The passing fish are stopped by the leader and are guided into the head where they are trapped. The trap fishes automatically and at low tide it can be emptied by means of a small net. Licences were issued in respect of nine stake nets in 1970.

(d) *Bag Nets*: Both head weirs and stake nets can only operate in inlets and estuaries where there is an appreciable rise and fall of the tide. They are useless on the open coastline. For many years it was known that salmon cruised close inshore around many parts of the Irish coast and the bag net was designed to take the fish at these times. Like the stake net, the bag net consists of two parts—a leader or vertical wall of netting, and a head or trap, the whole being kept

*There are nowadays some statutory exceptions to this provision generally taking the form of substituting extra close time or a catch quota for the conventional free gap.

floating by means of corks or buoys. Bag nets are set at suitable places along the coast, being attached to the shore by means of an anchor or holdfast of some kind. Salmon moving inshore find their passage barred by the leader and then they move along the leader and eventually into the funnel of the trap from which they rarely escape. Four bag nets were licensed in 1970.

Nets (other than Fixed Engines)

(a) *Draft Nets*: The draft net is probably one of the most ancient methods of fishing for salmon and has been used down the years in almost every suitable river and in the open sea. The ordinary draft net is used in the following manner. A man stands on the bank of a suitable hauling ground holding in his hand a rope attached to one end of the net. One or more men row a boat containing the net out from the shore in a semi-circular direction and thus the net is paid out or "shot" in an arc. The boat is brought to the shore downstream from where the first man is standing and the men in it haul on a second rope attached to the other end of the net. In this way the net is hauled ashore bringing with it any fish which happened to be within the arc when the net was shot.

Up to 1948 draft nets could be used in both fresh and tidal waters but since 1948 their use in fresh water has been prohibited. They can, however, be operated in rivers up to the tidal water mark. For example, in the Slaney netting is allowed up to the bridge at Enniscorthy. The number of draft net licences issued in 1970 was 667.

(b) *Drift Nets*: A drift net is a floating net held at the surface by corks and kept vertical by means of relatively heavy "sinks" or leads. Salmon drift nets are of two types:

- (i) Estuarine or bay drift nets and
- (ii) Open sea drift nets.

Estuarine drift nets, which are usually less than 250 yards long, have been used in suitable harbours for some considerable time. It is not certain when this type of fishing started but in 1851 licences for the use of such nets were issued in Waterford Fishery District and a small number were issued in the same year for use in the Moy estuary. Drift nets depend for their success on meshing fish and therefore it is necessary to have a mesh suitable for the size of fish to be taken. In consequence the mesh used in the early part of the season when spring fish are running must be much larger than that used when the smaller summer fish or grilse start to run. Estuarine drift nets are normally fished from boats manned by up to four men. This type of net can be fished

both day and night as the fish cannot see it due to the disturbed and muddy water of the estuaries.

Open sea drift nets are used to catch salmon on the return from the feeding grounds to their home waters for spawning. The salmon return routes do not vary from year to year and are now well known to the fishermen. The mesh of net used by sea drift netters is usually from $2\frac{1}{2}$ to 3 inches (knot to knot) or 10 to 12 inches in the round. Each net is about 50 meshes deep and hangs 15 to 18 feet when mounted. When floating the foot rope is weighted with lead and the head rope is buoyed with corks, usually spaced about a yard apart so that the net fishes at the surface. The length of the net depends mainly on the capacity of the boat used and it may be up to 3,000 yards for the bigger boats. In order to fish, the net is laid out across a path which the salmon are known to follow. Boat and net drift with the tide, and the fish mesh themselves in the drifting net.

Most drift-netting is carried out at night. The most favourable weather conditions are a fair amount of wind and an overcast sky. On calm nights it is thought that the fish can see the net. Generally, salmon swim high in the water at night and they normally mesh in the upper three feet of the net. Drift netting is carried out by day in some districts, especially in Cork. The fish usually swim a good deal deeper during the day.

Drift netting used to be mainly confined to the north-west of the country. Nowadays, however, it is practised along the south coast from Waterford to Castletownbere, in Galway Bay, off Connemara and in Clew Bay, as well as in the traditional regions of Donegal and north-west Mayo. The bulk of drift netting is carried out during the months of June and July, but some areas have a somewhat longer season.

In 1970, there were 817 drift net licences issued.

(c) *Snap Nets*: These require two boats to operate them. The net is suspended between two light flat-bottomed boats called cots, and is kept perpendicular in the water by means of weights and floats. The moment a fish touches the net the fishermen feel it and immediately jerk up the lower cords of the net, throwing the weights over the cords and doubling the net around the fish. The boats then close and the fish is removed from the net. This type of net is used only in the Waterford and Lismore districts, and 153 licences were issued in respect of snap nets in 1970.

(d) *Loop Nets*: These nets are only used in the estuary of the river Swilly which has a soft deep muddy substratum and cannot be fished satisfactorily by draft nets. The loop net consists of a wooden frame, about 15 feet long, whose width varies from about 3 feet at one end to about 6 feet at the other. Netting is attached to one side of the frame so as to form a low pyramid. To

use the net, the fisherman wades into the river and holds the frame almost vertically in the water, at a tangent to the bank. When he feels a fish enter the net, he lets the frame float, so trapping the fish. In 1970, licences were taken out for 34 loop nets in the Letterkenny district.

Illegal Methods

The above are the principal legal methods of catching salmon which are currently in use. There is also a wide variety of other methods which are used illegally. These include: spears, strokehauls, stake nets, crude bag nets and pole nets. Sometimes poachers also resort to the use of poisons and explosives to take fish.

THE SURVEY

The Pilot Study

A small pilot survey of commercial licence holders was carried out in Spring 1970 to pre-test a questionnaire, investigate the likely response rate and discover any problems likely to arise in the full study. The pilot sample was selected from the 1969 licence counterfoils provided by the Department of Agriculture and Fisheries. In all 40 licence holders were selected and completed returns were obtained from 35 of these. On the whole the pilot questions were reasonably well answered and as a result only minor modifications had to be made to the questionnaire.

The Samples

The main survey of commercial fishermen, which was carried out in 1971 and related to the 1970 fishing season, involved two samples. The first was a sample of 328 licence holders from the Department's list of licence holders for draft, drift, snap and loop nets. This sample covered fishermen who fished alone or in association with others in estuarine waters and in the open sea. It also covered owners and operators of private commercial fisheries who had taken out licences for draft nets, but it did not cover the small number of owner/operators who had taken out licences for "fixed engines" alone. The latter were covered by the second sample which was drawn from the General Valuation Office records. In this sample there were 11 large-scale fisheries, which accounted for 42 fixed engine licences out of a total of 54 such licences issued in 1970.

As information was required from different areas of the country, the sample of licences was selected so as to include a minimum number of each licence type in each district, regardless of the number of licences taken out in that district. Also, all the large commercial fishery owners were included in the sample drawn from the GVO records. This ensured that a very high proportion of commercial salmon fishing was covered by the survey. The results from the two samples were grossed separately and the grossed figures subsequently combined.

The small numbers of fishermen selected from each district posed a problem in that a high non-response rate could result in there being very few respondents with a certain type of licence in a certain district. Such small numbers would make the estimates derived from the survey very unreliable. It was therefore decided when choosing the sample to select randomly some substitute names in

addition to those which constituted the original sample. These substitutes were used by the interviewers when it proved impossible to contact a name on the original list.

Table 2 gives a breakdown of the sample and of all commercial licences by fishery district, together with information on the number of substitutes which it was necessary to use in each district. Out of the total 1,725 commercial licences issued, it was desired to sample 328. Even when the substitutes were used, the number of respondents in certain districts fell a little below the desired number and the achieved sample amounted to 313 respondents. However, the discrepancy between the desired and achieved sample was small and was not thought to be very important. The final column of Table 2 shows that the number of substitutes used was high, amounting to about one quarter of the achieved sample. The high rate of substitutes was probably due to the impossibility of contacting many licence holders some of whom are migratory workers and were not in the district at the time of the survey.

The high level of non-contact may introduce certain biases into our data if the fishermen whom we failed to contact differ significantly from the respondents. Biases of this sort seem most likely to occur in data relating to fishermen who work away from home when not salmon fishing. Our estimates of certain items are therefore liable to be affected by the non-contact rate, and it is, in

TABLE 2: *Distribution of All Commercial Licences and Numbers in the Desired and Achieved Sample, Classified by Fishery District*

<i>Fishery district</i>	<i>Total Commercial Licences</i>	<i>Desired sample</i>		<i>Achieved sample</i>		<i>Substitutes</i>	
		<i>Number</i>	<i>As % of (a)</i>	<i>Number</i>	<i>As % of (a)</i>	<i>Number</i>	<i>As % of (c)</i>
	(a)	(b)	(c)	(d)	(e)	(f)	
Dublin	30	13	13	43.3	—	—	
Wexford	63	18	18	28.6	10	55.6	
Waterford	356	44	42	11.8	2	4.8	
Lismore	102	29	29	28.4	5	17.2	
Cork	87	27	27	31.0	3	11.1	
Kerry	110	24	23	20.9	9	39.1	
Limerick	202	29	27	13.4	7	25.9	
Galway/Connemara/ Ballinakill	115	27	24	20.9	8	33.3	
Bangor/Ballina	137	30	28	20.4	6	21.4	
Sligo/Ballyshannon	133	28	28	21.1	9	32.1	
Letterkenny	258	38	33	12.8	12	36.4	
Drogheda/Dundalk	132	21	21	15.9	9	42.9	
<i>All Districts</i>	1,725	328	313	18.1	80	25.6	

general, impossible to know the extent to which this has occurred. However, in certain instances (such as the catch data) it was possible to compare survey estimates with estimates from other sources. The results of these comparisons suggest that the survey estimates are reasonably realistic, and we hope that the same applies to the survey data which could not be checked by reference to other sources.

RESULTS OF THE SURVEY

The main results of the survey are presented below. Ninety-five per cent confidence intervals are given for most of the more important tables. These represent the range within which the true value is likely to lie. The more precise the estimate is, the narrower this interval will be. It should be noted, however, that these confidence intervals reflect only the variability due to sampling and do not make any allowance for biases of the kind described above.

As in [2], variable sampling fractions were used in the various districts and for the various licence types. This means that all figures from the survey must be weighted to take account of these variable fractions. All the averages, percentages and totals given below have therefore been appropriately weighted.

Numbers Employed

For the purpose of this paper two main classes of commercial fisherman are defined namely, (i) employers and employees, (ii) share members and relatives assisting.

Employers are the owners of commercial fisheries or fishing boats who take all of the catch and pay a cash wage to their helpers whom we define as *employees*. Directors and managers of the large commercial fisheries who take part in the fishing operation in any capacity are included as employees. Employers may or may not take part in the actual fishing operation.

Commercial netting is usually undertaken on a co-operative basis with the catch being shared out among the members of the enterprise who are referred to as *share members*. The owner of the boat usually fishes himself and generally receives a larger share of the catch than do the other crew members. Sometimes, however, the owner of the boat and nets does not fish but receives a share of the catch in return for the use of these items. These boat owners are referred to as *non-fishing share members*. If a fisherman is assisted by members of his own household who receive no cash payments he is classed as a share member and the other household members as *relatives assisting*. Persons who fish alone are also classed as share members.

Table 3 shows the estimated number of persons engaged in commercial salmon fishing, classified by fishery district and licence type. The total number

of persons engaged was estimated at 5,265. The prevalence of share fishing is evident from the fact that 4,612 or 88 per cent of these were share members. About 1 per cent of those engaged were classified as employers, about 5 per cent were employees and another 3 per cent were non-fishing share members. The remaining 3 per cent were classified as relatives assisting. The classification by licence type shows that non-fishing share members are proportionately more numerous in drift netting enterprises than elsewhere, possibly because of the high capital investment required for this type of fishing. On the other hand, employees occur a good deal more frequently in fixed engine enterprises than in other enterprises.

TABLE 3: *Estimated Number of All Persons Engaged in Commercial Salmon Fishing in the Different Fishery Districts in 1970*

<i>Fishery district</i>	<i>Share members (a)</i>	<i>Employers</i>	<i>Employees (b)</i>	<i>Relatives assisting</i>	<i>Non-fishing share members</i>	<i>Total</i>
Dublin	58	2	—	18	3	81
Wexford	141	4	11		7	163
Waterford	833	12	26		55	926
Lismore	268	2	6		15	291
Cork	245	—		11	4	260
Kerry	368	8	43		3	422
Limerick	525		26	86	15	652
Galway/ Connemara/ Ballinakill	254	3	15	13	—	285
Bangor/Ballina	436	7	43	8	4	498
Sligo/Ballyshannon	409	10	49	10	9	487
Letterkenny	767	1	29	14	31	842
Drogheda/ Dundalk	309	8	29	6	6	358
<i>Licence Type</i>						
Draft	1,971	29	139	95	57	2,291
Drift	2,200	13	30	71	96	2,410
Snap	407					407
Loop	34					34
Fixed Engines		15	108			123
<i>Total</i>	4,612 ±(258)	57 ±(26)	277 ±(73)	166 ±(67)	153 ±(62)	5,265 ±(225)
<i>Percentage</i>	87.6	1.1	5.3	3.2	2.9	100.0

Note: The figures in brackets at the bottom of the table are the confidence intervals at the 95 per cent level of significance.

(a) Including those who fish alone.

(b) Including Directors and Managers.

Readers should note that the confidence intervals attached to the smaller categories are relatively large, indicating the fairly imprecise nature of the estimates for these categories. Too much reliance should not therefore be placed on the exact level of these items. However, the figures given do give an indication of the orders of magnitude involved.

Time Spent Fishing

Salmon fishing is a seasonal occupation, so it is necessary to consider the length of time spent fishing during the year as well as the numbers engaged. Table 4 shows the average number of weeks during which some salmon fishing was done by holders of commercial licences other than fixed engines. Fixed net licence holders were excluded from the averages since these licensees are frequently owners who do not work the fishery themselves and the "number of weeks" they spent "salmon fishing" is difficult to define. The total time spent by their employees, etc. is, however, included in the total man-weeks column of the table.

Readers will note that the table heading refers to the number of weeks during which some salmon fishing was done rather than to the number of weeks spent salmon fishing. The former is the phrasing used in the questionnaire (see Appendix B) and we deliberately framed the question in this way because of the fact that salmon fishing is often combined with farm work and other occupations. However, when we estimated the average number of hours per week which respondents said they spent salmon fishing, we found that they claimed to have spent an average of 38.2 hours per week. It therefore seems reasonable to interpret the "weeks during which some salmon fishing was done" as being roughly equivalent to "weeks spent salmon fishing", since these amount to very nearly forty-hour weeks on average.

The table shows that the average number of weeks fished by commercial licence holders (other than fixed engines) was about 12. The average number of weeks varied more as between different fishery districts than between licence types. The eastern and southern fisheries tended to have a longer season than did the western districts. For instance, Waterford fishermen reported the greatest average number of weeks fishing (about 19) and Letterkenny fishermen the smallest (about 7). This pattern presumably reflects the runs of fish. Most of the spring fish occur in the eastern and southern fisheries whereas the western fisheries rely almost entirely on grilse and summer salmon. Loop net fishing seems to be more of a part-time activity than other forms of netting: the number of weeks spent at it was small (about 7); the average number of hours fished per week was low (about 15); and most loop net fishermen had alternative full-time occupations (see below, Table 5).

Grossed up figures for the time spent salmon fishing by all those engaged

are given in the final column of Table 4. As mentioned above the total time devoted to salmon fishing by those employed in fixed engine operations is incorporated in this column. The latter figures were directly available from the questionnaire but in the case of the net fishermen the only employment data available related to the respondent. An estimate of weeks fished by crew members had therefore to be made by assuming that the latter fished for the same number of weeks as did the respondent.

As can be seen from this column, Waterford was the district with the highest number of man-weeks (about 16,000), and Limerick had the next highest number (about 10,000). Roughly 27,000 man-weeks were spent fishing with draft nets and about 25,000 with drift nets. The total number of man-weeks engaged amounted to about 63,000.

As is clear from Table 4, salmon fishing is a seasonal occupation, at which only about twelve weeks are spent by the average fisherman. It is therefore of considerable importance when assessing the contribution of salmon fishing to employment in Ireland to ascertain what other occupations the fishermen were

TABLE 4: *Average Number of Weeks during which some Salmon Fishing was done by holders of Commercial Licences (other than Fixed Engines) in 1970, together with Total Man-Weeks Employment in Salmon Fishing, Classified by Fishery District and by Licence Type*

Fishery district	Nets					Total man-weeks employment (including fixed engine operations)*
	Draft	Drift	Snap	Loop	All types	
	<i>Average number of weeks fished</i>					
Dublin	12.0	21.8			16.9	1,220
Wexford	15.2	—			15.2	2,256
Waterford	29.3	21.2	12.9		18.7	15,610
Lismore	14.0	19.7	15.7		17.9	5,003
Cork	18.1	4.2			12.3	3,786
Kerry	7.7	5.2			7.0	3,532
Limerick	15.0	12.1			13.9	9,561
Galway/Connemara/ Ballinakill	8.7	5.8			7.1	2,114
Bangor/Ballina	14.8	6.8			10.6	4,471
Sligo/Ballyshannon	7.4	7.4			7.4	3,701
Letterkenny	6.7	6.3		6.8	6.6	5,574
Drogheda/Dundalk	15.4	—			15.4	5,870
<i>All Districts</i>	12.7	12.0	13.8	6.8	12.4	62,698
	±(1.1)	±(1.1)	±(3.3)	±(1.8)	±(0.7)	±(3,714)

*Based on responses to the question: "During how many weeks did you do some salmon fishing in 1970?"

Note: The figures in brackets at the bottom of the table are the confidence intervals at the 95 per cent level of significance.

engaged in and, particularly, to what extent salmon fishing was an alternative to unemployment.

Table 5 shows the average number of weeks during which commercial licence holders were engaged in certain occupations in 1970. The total number of weeks may add to more than 52, since a respondent may engage in more than one activity in any week. As can be seen from the table, an average of about 5 weeks is spent fishing for species other than salmon. Drift netmen spend an average of about 7 weeks at this activity and fishermen in Sligo/Ballyshannon an average of about 11 weeks. Loop netmen and fishermen from Limerick do not seem to engage in any other fishing. The number of weeks during which some farmwork was done by respondents varied from 28 in Bangor/Ballina to

TABLE 5: *Average Number of Weeks during which certain Occupations were engaged in by holders of Commercial Licences (other than Fixed Engines) in 1970, Classified by Fishery District and by Licence Type(a)*

Fishery district	Type of Employment					
	Salmon fishing	Other fishing	Farmwork	Other occupation	Wholly unemployed	All types
Dublin	17	6	—	25	13	61
Wexford	15	2	12	24	6	60
Waterford	19	5	15	15	8	62
Lismore	18	2	8	18	10	56
Cork	12	4	7	26	8	57
Kerry	7	7	23	17	7	60
Limerick	14	—	14	17	9	54
Galway/Connemara/ Ballinakill	7	6	14	13	12	52
Bangor/Ballina	11	5	28	14	7	65
Sligo/Ballyshannon	7	11	13	13	8	53
Letterkenny	7	8	16	14	11	56
Drogheda/Dundalk	15	2	5	26	11	60
<i>Licence Type</i>						
Draft	13	3	15	17	10	58
Drift	12	7	13	16	9	57
Snap	14	1	22	12	11	60
Loop	7	—	—	43	9	59
Overall Average	12	5	14	16	9	58
	±(0.7)	±(1.2)	±(2.4)	±(2.6)	±(2.0)	±(1.1)

Note: The numbers in brackets at the bottom of the table are the confidence intervals at the 95 per cent level of significance.

(a) Based on total number of licence holders.

none in Dublin. On the whole, fishermen in the western districts seemed to spend more time at farmwork than fishermen from other areas. In contrast, the fishermen from the eastern and southern regions spent longer at other (i.e. non-farm) occupations. For instance fishermen from Drogheda/Dundalk and from Cork spent an average of about 26 weeks in other employment, while fishermen from Galway/Connemara/Ballinakill and Sligo/Ballyshannon spent only 13 weeks on average in other occupations. As was mentioned above, the large average number of weeks spent by loop netmen in other employment suggests that very little time is devoted to this form of fishing; it is, perhaps, mainly a recreational activity. On average respondents spent about 9 weeks wholly unemployed. Unemployment seems to have been most severe in Dublin and in Galway/Connemara/Ballinakill, and least severe in Wexford, Kerry and Bangor/Ballina. It is, however, very difficult to assess the extent of underemployment in rural areas. For instance, much of the 28 weeks during which farmwork was reported to have been done by respondents in Bangor/Ballina may well have been spent underemployed. This region is well known for the high levels of unemployment and underemployment which prevail there.

Further details of unemployment experienced by holders of commercial licences are given in Table 6. As can be seen from this table, about one-third of all respondents experienced at least one week's whole-time unemployment. This proportion fell to about 16 per cent in Bangor/Ballina and rose to about 47 per cent in Lismore. The average duration of unemployment (among those who are unemployed for at least a week) is considerable, amounting to about 27 weeks for the country as a whole. The longest duration of unemployment was in Galway/Connemara/Ballinakill where respondents reported an average of 44 weeks unemployment. Fishermen in Letterkenny spent an average of 41 weeks unemployed. Although Lismore fishermen have the highest percentage who experienced unemployment, the average duration of this unemployment (19 weeks) was the lowest of all the districts. The average weekly amount of unemployment payments received by unemployed licence holders amounted to about £7 for the country as a whole. The total amount paid out in unemployment payments to licence holders amounted to about £109,000.

It should be borne in mind that this table refers only to licence holders and not to all salmon fishermen. Since the licence holder is frequently the best off member of the crew, it seems likely that unemployment among other crew members may be even more severe. We saw above (Table 3) that a total of about 5,300 persons were estimated to be engaged in salmon fishing in 1970, giving an average of about three persons engaged per licence. Assuming that the unemployment experience of licence holders is identical with that of other crew members, we estimate that the total amount of unemployment payments made to salmon fishermen in 1970 was something in excess of £300,000.

TABLE 6: *Estimated Number and Percentage of all Commercial Licence Holders (other than holders of Fixed Engines Licences) who were unemployed (a) during 1970; Duration of Unemployment; Average Unemployment Payments (b) received and Total Amount Distributed in Benefits*

<i>Fishery District</i>	<i>Total Number of licence holders</i>	<i>Number unemployed</i>	<i>Percentage unemployed</i>	<i>Average Number of weeks spent unemployed (d)</i>	<i>Average amount of unemployment payments per man per week</i>	<i>Total amount distributed in unemployment benefits</i>
	<i>Number</i>	<i>Number</i>	<i>Per cent</i>	<i>Weeks</i>	<i>£</i>	<i>£,000</i>
Dublin	30	11	36.7	31	6.8	2.3
Wexford	63	18	28.6	22	6.6	2.6
Waterford	350	127	36.3	22	6.1	17.0
Lismore	99	46	46.5	19	9.6	8.4
Cork	87	32	36.8	21	11.0	7.3
Kerry	98	32	32.7	22	6.7	4.8
Limerick	191	71	37.2	23	6.3	9.8
Galway/Connemara/ Ballinakill	110	32	29.1	44	6.8	9.6
Bangor/Ballina	129	20	15.5	37	6.3	4.6
Sligo/Ballyshannon	130	39	30.0	28	6.7	7.3
Letterkenny	256	97	37.9	41	6.3	24.2
Dundalk/ Drogheda	126	50	39.7	28	8.0	10.8
<i>Licence Type</i>						
Draft	667	212	31.8	29	6.7	41.6
Drift	817	307	37.6	25	7.7	58.4
Snap	153	50	32.7	23	6.7	7.8
Loop	34	6	17.6	(c)	(c)	0.9
<i>Total</i>	1,671	575	34.4	27	7.0	108.7

(a) We define as unemployed any person who experienced whole-time unemployment for one or more weeks during 1970.

(b) Including Unemployment Benefits and Unemployment Assistance.

(c) There were too few respondents in these cells to permit the calculation of valid averages.

(d) Based on number who experienced some unemployment.

Capital Investment in Salmon Fishing

In this paper capital equipment is taken to be such items as buildings, boats, nets, weirs, smoking plants, refrigerators, cars, vans, etc., used for the production and distribution of salmon. We do not regard as capital such items as fuel

and oil, repairs etc., whose costs are not fixed, but vary roughly in proportion to time spent fishing. The latter are included under "current costs". Of course, the distinction between capital and current is one of degree rather than of kind and the dividing line between them is somewhat arbitrary. The basic distinction is, however, between long- and short-lived items of equipment.

Apart from the estimated value of buildings and equipment, we did not include in our estimate of capital employed the estimated market value of the fishery itself or the money invested to acquire the exclusive right to fish in that area. This problem does not arise with the majority of draft and drift net operations, which are carried out under public netting right. It does, however, arise with some of the (more lucrative) draft net fisheries, and with the fixed engine fisheries, where the operator has purchased the exclusive right to fish in that area. We excluded this investment because we felt that the values placed by owners or operators on their fisheries would be both biased and arbitrary.

Capital equipment was valued at replacement cost (i.e. at the cost in 1970 prices of replacing the item in its present condition). This was done by asking the respondent the age and amount paid for each item (historic cost). By means of index numbers* the historic cost was adjusted to obtain the present value of the item if new, and this was discounted on a straight line basis to obtain the present value at replacement cost. Respondents were also asked to say what proportion of the item's value was attributable to salmon fishing and what proportion to other purposes. Only that proportion which respondents reckoned was attributable to salmon is included in the following tables.

Table 7 shows the estimated total capital investment in salmon fishing in 1970. About 60 per cent of this was investment in boats and a further 13 per cent represented investment in nets. The item "Dams, Weirs, etc." refers to the structures used by fixed engine licensees and the very large entry of £160,000 for Limerick represents that proportion of the capital value of the Thomond Weir which is attributable to salmon fishing.

The district with the highest capital investment in salmon fishing was Letterkenny with capital to the value of £246,000. Other districts with high investment were Limerick (although this represents almost entirely the capital value of the Thomond Weir), Bangor/Ballina and Waterford.

Table 8 shows the average value (per licence) of all capital investment in commercial salmon fishing. As was seen in Table 7, boats constituted the single most important item of investment, average investment per licence in boats varying from £38 in Wexford to £843 in Bangor/Ballina. These differences reflect primarily the different proportions of drift nets in the various districts,

*Various wholesale price indices obtained from Irish Statistical Bulletin.

TABLE 7: Estimated Total Value* of All Capital Investment in Commercial Salmon Fishing in the Different Fishery Districts in 1970, Classified by Item of Investment.†

Fishery District	Item of Investment						Total
	Boats and engines	Dams, weirs, structures, etc.	Nets	Cars, vans	Boat-houses, offices, sheds	Other	
				£			
Dublin	2,660		1,230		110	290	4,290 ± (1,468)
Wexford	2,400		1,470	5,030			8,900 ± (4,092)
Waterford	85,400	130	19,600	23,450	630	880	130,090 ± (84,109)
Lismore	14,490	220	11,510	300	50		26,570 ± (5,658)
Cork	12,120		10,860	90	710	350	24,140 ± (8,102)
Kerry	9,350	500	5,890	8,270	190	3,460	27,660 ± (11,348)
Limerick	11,730	160,860	3,770	5,000	920	610	182,450 ± (3,397)
Galway/Connemara/ Ballinakill	21,410	2,000	2,420	3,430	5,500	310	35,510 ± (17,256)
Bangor/Ballina	115,500	1,000	15,910	10,520	3,830	2,850	149,610 ± (64,501)
Sligo/Ballyshannon	58,080	1,190	15,640	8,430	2,500	110	85,950 ± (59,497)
Letterkenny	216,750	80	25,530	1,870	710	770	245,710 ± (147,068)
Drogheda/Dundalk	5,250	280	4,580				10,100 ± (5,568)
<i>All Districts</i>	555,140 ±(313,268)	166,260 —	118,410 ±(41,439)	66,390 ±(40,461)	15,150 ±(2,887)	9,630 ±(11,783)	930,980 ±(327,586)

*All capital items valued at replacement cost (for method of valuation see text).

†Due to rounding errors the figures in each cell do not necessarily add to the row and column totals shown.

Note: The figures in brackets along the margins of the table are the confidence limits at the 95 per cent level of significance. The column headed "Dams, Weirs, Structures, etc." refers entirely to the "fixed engine" fisheries for which standard errors were not calculated.

TABLE 8: *Average Value* per Licence of All Capital Investment in Commercial Salmon Fishing in the Different Fishery Districts in 1970, Classified by Item of Investment†*

Fishery District	Item of Investment						Total
	Boats and engines	Dams, weirs, structures, etc.	Nets	Cars, vans	Boat-houses, offices, sheds	Other	
				£			
Dublin	89	—	41			10	143 ± (49)
Wexford	38	—	23	80	—	—	141 ± (65)
Waterford	244	—	56	67	2	2	371 ± (180)
Lismore	142	2	113	3	1	—	260 ± (57)
Cork	139	—	125	1	8	4	277 ± (93)
Kerry	85	5	54	75	2	31	252 ± (116)
Limerick	58	796	19	25	5	3	903 ± (18)
Galway/Connemara/ Ballinakill	186	17	21	30	48	7	309 ± (150)
Bangor/Ballina	843	7	116	77	28	21	1,002 ± (464)
Sligo/Ballyshannon	436	9	118	63	19	1	646 ± (447)
Letterkenny	840	—	99	7	3	3	952 ± (574)
Drogheda/Dundalk	40	2	35	—	—	—	77 ± (42)
<i>All Districts</i>	332 ±(187)	96 —	69 ±(25)	38 ±(24)	9 ±(2)	5 ±(7)	540 ±(162)

*All capital items valued at replacement cost (for method of valuation see text).

†Due to rounding errors the figures in each cell do not necessarily add to the row and column totals shown.

Note: The figures in brackets along the margins of the table are confidence limits at the 95 per cent level of significance. The column headed "Dams' Weirs, Structures, etc." refers entirely to the "fixed engine" fisheries for which standard errors were not calculated.

since drift nets are usually used in conjunction with larger boats. Investment in nets also seems to reflect the proportion of drift nets in each district. The other items (cars, refrigeration, boat-houses, etc.) seem to be of relatively minor significance in most districts, being confined, it seems, to the larger fishery operations. Total investment per licence tends to be greatest in the north-western districts of Bangor/Ballina, Sligo/Ballyshannon and Letterkenny, and lowest in Wexford and Dublin.

Costs

These were the running expenses incurred by fishermen in operating their fishing enterprise. The main items of cost, classified by fishery district, are shown in Table 9. The largest single item of current costs is repairs to boats and buildings on which an estimated £57,000 was spent. About one third of this was spent in Waterford, about 25 per cent in Letterkenny and about 22 per cent in Bangor/Ballina. Costs of fuel and oil amounted to a total of about £52,000, the highest expenditures on these items being in Waterford. Licence fees, fishery rates and rent paid for waters amounted to about £32,000.

Depreciation was calculated on a straight-line basis from the replacement cost of the item and the respondent's estimate of its life. When the column headed "Estimated Total Depreciation" in Table 9 is compared with the column headed "Total Capital Investment" in Table 7 above, we find that the rate of depreciation varied considerably between districts. While the overall rate of depreciation was about 17 per cent ($=156,550/930,980$), Dublin had a depreciation rate of 44 per cent ($=1,880/4,300$) while that of Limerick was about 6 per cent ($=11,540/182,450$). These widely varying rates of depreciation reflect differences in the (expected) durability of the capital stock in the various districts, i.e. in the proportion of long-lasting items such as weirs and buildings, relative to the proportion of short-lived items such as nets.

For the country as a whole, total costs, including depreciation, were estimated at about £389,000. About one quarter of this was incurred in Waterford, about 18 per cent in Bangor/Ballina and about 16 per cent in Letterkenny.

Table 10 shows the average costs per licence in the various districts. The proportions of total costs in the various categories seem broadly similar in the different districts, but the level of total costs is perceptibly higher where a high proportion of the licences is for drift nets.

Thus, Bangor/Ballina, Letterkenny and Sligo/Ballyshannon are the districts with the highest current costs per licence. The costs figure for Bangor/Ballina seems unusually high, and may represent a sampling anomaly. Depreciation follows the same pattern as current costs—high in drift netting areas and low in others.

TABLE 9: *Estimated Total Current Costs, Classified by Item of Expenditure, and Estimated Total Depreciation* on Capital, incurred in the Different Fishery Districts in 1970†*

Fishery District	Item of Expenditure							Total current costs (a)	Estimated total depreciation (b)	Estimated total costs (a+b)
	Fuel and oil	Repairs to buildings and boats	All other repairs	Licences, rates, rental	Purchase of small items	Refrigeration packaging, transport	Miscellaneous costs			
	£									
Dublin	740	100	190	100	120	70	30	1,350	1,880	3,230 ± (1,349)
Wexford	300	210	1,140	650	610	120	50	3,080	2,860	5,940 ± (2,255)
Waterford	16,840	18,400	4,760	1,800	5,710	2,880	470	50,870	48,630	99,490 ± (32,138)
Lismore	2,570	900	330	3,540	850		170	8,360	12,580	20,930 ± (5,195)
Cork	960	1,260	2,250	380	890	140		5,880	5,650	11,540 ± (2,272)
Kerry	1,510	820	750	2,980	890	820	170	7,930	5,070	13,000 ± (1,928)
Limerick	9,145	1,250	5,560	4,950	3,710	4,000	1,380	29,990	11,560	41,560 ± (2,333)
Galway/Connemara/ Ballinakill	1,420	1,190	2,190	4,660	490	310	30	10,290	5,390	15,680 ± (6,017)
Bangor/Ballina	6,200	12,820	3,820	7,330	2,400	1,750	5,420	44,740	25,750	70,490 ± (15,015)
Sligo/Ballyshannon	5,260	5,340	7,380	1,190	1,700	550	1,000	22,420	15,450	37,860 ± (10,889)
Letterkenny	6,040	14,380	6,880	3,350	1,010	7,090	5,430	44,180	19,450	63,630 ± (22,689)
Drogheda/Dundalk	840	310	160	1,090	830		30	3,260	2,280	5,530 ± (4,105)
<i>All Districts</i>	51,820 ± (10,342)	56,980 ± (21,321)	40,410 ± (9,609)	31,020 ± (1,216)	19,210 ± (3,320)	17,730 ± (4,587)	14,180 ± (1,023)	232,340 ± (30,018)	156,550 ± (23,764)	388,890 ± (44,642)

*Depreciation: for method of calculation see text.

†Due to rounding errors the figures in each cell do not necessarily add to the row and column totals shown.

Note: The figures in brackets along the margin of the table are the confidence intervals at the 95 per cent level of significance.

TABLE 10: Average Current Costs per Licence Classified by Item of Expenditure and Average Depreciation* per Licence, Classified by Fishery District†

Fishery District	Item of Expenditure							Total current costs (a)	Estimated total depreciation (b)	Estimated total costs (a+b)
	Fuel and oil	Repairs to buildings and boats	All other repairs	Licences, rates, rental	Purchase of small items	Refrigeration, packaging, transport	Miscellaneous costs			
Dublin	25	3	6	3	4	2	1	45	63	108
Wexford	5	3	18	10	10	2	1	49	45	94
Waterford	48	52	13	5	16	8	1	143	137	280
Lismore	25	9	3	35	8	—	2	82	123	205
Cork	11	14	26	4	10	2	—	68	65	133
Kerry	14	7	7	27	8	7	2	72	46	118
Limerick	45	6	28	25	18	20	7	148	57	206
Galway/Connemara/ Ballinakill	12	10	19	41	4	3	—	87	47	136
Bangor/Ballina	45	94	64	54	18	13	40	327	188	515
Sligo/Ballyshannon	40	40	55	9	13	4	8	168	116	285
Letterkenny	23	56	27	13	4	27	21	171	75	246
Drogheda/Dundalk	6	2	1	8	6	—	—	25	17	42
All Districts	30	33	23	18	11	10	8	135	91	226

*Depreciation: for method of calculation see text.

†Due to rounding errors the figures in each cell do not necessarily add to the row and column totals shown.

Catch

Details of catch in 1970 obtained from the respondents in the sample were cross checked against fish dealers' registers and where discrepancies arose the dealers' figures were accepted. The catch data so derived gave estimates of total salmon catch which were found to correspond quite closely with the official catch figures, as published in the Sea and Inland Fisheries Reports of the Department of Agriculture and Fisheries. These latter figures are based on a complete enumeration of all commercial fishermen and we therefore decided to accept the official figures in preference to our sample estimates, except in the case of Kerry drift nets where the official statistics were regarded as unrealistic.

Table 11 shows the total quantity and value of all commercial catches in 1970 classified by district and licence type. Total catch was about 3.4m. lb, valued at £1.2 m. About 17 per cent of this was taken in Waterford and roughly the same percentage in Letterkenny. Bangor/Ballina was the next most productive district, followed by Limerick, Sligo/Ballyshannon and Kerry.

As was seen above, draft nets accounted for about 37 per cent of all salmon caught, while drift nets accounted for about 52 per cent. Snap and loop nets took about 6 per cent of all commercially caught salmon and fixed engines caught a similar percentage.

Average commercial catch per licence is shown in Table 12. The overall average catch per licence was about 1,966 lb, valued at £688. There was, however, considerable variation around this average as between different districts and types of licence. There were high catches per licence in Bangor/Ballina, Lismore, Kerry, Sligo/Ballyshannon and Letterkenny. Catch per licence was low in Dublin, Wexford, Galway/Connemara/Ballinakill and Drogheda/Dundalk.

Although for the country as a whole catch per draft net, at 1,891 lb, was slightly less than average catch per drift net (2,140 lb), in Lismore and Bangor/Ballina the average catch per licence for draft nets was nearly 7,000 lb. Catch per drift net was high in Lismore, Letterkenny, Bangor/Ballina and Sligo/Ballyshannon. Snap nets caught an average of about 1,000 lb each, and loop nets about 180 lb.

It seems clear from Table 12 that the fixed engines are very effective as methods of capture. These engines caught an average of about 3,600 lb per licence,* about twice as much as the average catch per draft net licence. Fixed engines in Sligo/Ballyshannon caught an average of about 9,000 lb of salmon, and those in Letterkenny and Galway/Connemara/Ballynakill an average of about 6,000 each.

*It should be noted that for licensing purposes each box or crib in a weir is considered to be a separate engine. Since several of the weirs in the country have more than one crib the average catch per weir is in excess of 3,600.

TABLE 11: Total Quantity and Value of all Commercial Salmon Catch in 1970 in the Different Fishery Districts, Classified by Type of Engine†

Fishery District	Type of Engine									
	Nets						Fixed Engines‡		Total	
	Draft		Drift*		Snap and Loop		Quantity	Value		
	Quantity	Value	Quantity	Value	Quantity	Value			Quantity	Value
	lb.	£	lb.	£	lb.	£	lb.	£	lb.	£
Dublin	1,790	630	3,840	1,350					5,640	1,970
Wexford	26,160	9,160							26,160	9,160
Waterford	24,210	8,470	367,530	128,640	169,730	59,410	31,820	11,140	593,290	207,650
Lismore	61,520	21,530	246,610	86,310	14,130	4,950	13,980	4,890	336,230	117,680
Cork	129,840	45,440	14,580	5,100					144,420	50,550
Kerry	305,890	107,060	17,440*	6,100*			2,930	1,030	326,270*	114,190*
Limerick	151,050	52,870	172,880	60,510			50,130	17,550	374,070	130,920
Galway/Connemara/Ballinakill	30,780	10,770	29,280	10,250			28,760	10,070	88,820	31,080
Bangor/Ballina	159,310	55,760	292,600	102,410			20,680	7,240	472,590	165,410
Sligo/Ballyshannon	205,200	71,820	100,000	35,000			27,010	9,450	332,210	116,270
Letterkenny	61,410	21,490	503,600	176,260	6,140	2,150	12,400	4,340	583,550	204,240
Drogheda/Dundalk	103,820	36,340					4,290	1,500	108,110	37,840
All Districts	1,260,990	441,350	1,748,360*	611,920*	190,000	66,500	192,000	67,200	3,391,350	1,186,970

*The figures for total catch in Kerry and for drift nets differ from the figures given in the official statistics. This is due to the fact that no official catch returns for drift net licences were made in 1970 from the Kerry district, but we interviewed the holders of the six licences issued for drift nets in Kerry and have added in the catch figures reported by them.

†The figures in each cell do not necessarily add to the row and column totals shown due to rounding errors.

‡Fixed engines include weirs, traps, boxes, cribs, and bag and stake nets.

Sources: Appendix No. 12, page 51, Sea and Inland Fisheries Report for 1970. Government Publications Office. Detailed breakdowns were obtained from the Statistics Section, Inland Fisheries Branch, Department of Agriculture and Fisheries.

TABLE 12: Average Quantity and Value of Commercial Salmon Catch per Licence in the Different Fishery Districts in 1970, Classified by Type of Engine†

Fishery District	Average per Licence											
	Nets						Fixed Engines†				All Engines	
	Draft		Drift*		Snap and Loop				Per Licence		Per Person Engaged	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	lb.	£	lb.	£	lb.	£	lb.	£	lb.	£	lb.	£
Dublin	180	63	192	68					188	66	70	24
Wexford	415	145							415	145	160	56
Waterford	2,022	706	1,837	643	1,230	430	5,300	1,856	1,666	583	630	220
Lismore	6,836	2,392	3,288	1,151	942	330	4,660	1,630	3,296	1,154	1,121	393
Cork	2,278	787		486		170			1,660	581	555	194
Kerry	3,922	1,372	872	305			244	86	2,066	1,038	652	228
Limerick	1,302	456	2,245	786			5,572	1,950	1,852	648	548	192
Galway/Connemara/												
Ballinakill	1,061	371	361	127			5,752	2,014	772	270	298	104
Bangor/Ballina	6,926	2,424	2,760	966			2,585	905	3,450	1,207	894	313
Sligo/Ballyshannon	2,280	798	2,500	875			9,003	3,150	2,498	874	667	233
Letterkenny	1,137	398	2,997	1,049	181	63	6,200	2,170	2,262	792	688	241
Dundalk/Drogheda	824	288					715	250	819	287	288	101
All Districts	1,891	540	2,140	760	1,016	356	3,556	1,244	1,966	688	624	218

*The figures for total catch in Kerry and for drift nets differ from the figures given in the official statistics. This is due to the fact that no official catch returns for drift net licences were made in 1970 from the Kerry district, but we interviewed the holders of the six licences issued for drift nets in Kerry and have added in the catch figures reported by them.

†The figures in each cell do not necessarily add to the row and column totals shown due to rounding errors.

‡Fixed engines include weirs, traps, boxes, cribs, and bag and stake nets.

Sources: Appendix No. 12, page 51, Sea and Inland Fisheries Report for 1970. Government Publications Office, Detailed breakdowns were obtained from the Statistics Section, Inland Fisheries Branch, Department of Agriculture and Fisheries.

Of course, as was stated above, the length of the salmon fishing season varies, depending on the runs of fish. It is longest in the waters of the East and South-East which have substantial† spring runs, and shortest in the West and North-West which rely predominantly on grilse and summer fish. In order to control for length of season, the catch per day fished for the various engines is given in Table 13. As might be expected from the seasonal pattern of fish runs described above, the districts with the highest catch per day were Kerry, Bangor/Ballina, Sligo/Ballyshannon and Letterkenny. Lismore, despite having the highest catch per licence of all the districts, had a relatively low catch per day fished, due to the long fishing season there. The catch per day fished was over 100 lb for draft nets in Lismore and Bangor/Ballina, and the catch per drift net per day in Letterkenny was roughly 100 lb. The figures for fixed engines are rather difficult to interpret, since the number of days fished was not recorded for these respondents. A rough estimate had therefore to be made based on knowledge about the fishery and the length of its season. However, it does appear that fixed engines are far more efficient methods of catching salmon than are other methods; average catch per day fished by fixed engines amounted to about 216 lb.

As well as length of season, another factor which seemed likely to influence the catch figures was the average number of men engaged in the different fishing enterprises. Other things being equal, the larger the number of men engaged the higher one would expect the catch to be. An attempt is made to allow for the influence of this factor in the lower half of Table 13, which shows the average catch per man engaged per day fished.

In the main, these figures reveal a similar pattern to that of the figures in the upper half of the table. The highest catches per man per day were recorded in Letterkenny, Bangor/Ballina, Sligo/Ballyshannon and Kerry, while low catches were reported in Dublin, Wexford and Drogheda/Dundalk. It is clear from the table that the average number of men engaged per fixed engine licence is a good deal higher than the average for other types of licence, since the contrast between the daily fixed engine catch per man and that for other types of licence is not as pronounced as was the contrast between the average catches per licence.

Income Arising in Salmon Fishing

The total income arising in salmon fishing is calculated by deducting the estimated total costs, including depreciation, from the value of the catch. In general, it seems reasonable to assume that, unlike anglers, commercial fishermen are in business to earn a livelihood, so that it is not necessary to value the

†Numbers of spring fish have been steadily declining in recent years in all Irish rivers. See below, and Went and Twomey [4].

TABLE 13: Average Daily Catch of Salmon (per Licence and per Man), Classified by Fishery District and Type of Licence

Fishery District	Average Catch per Licence per Day Fished									
	Draft		Drift		Snap and Loop		Fixed Engines		All Engines	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	lb.	£	lb.	£	lb.	£	lb.	£	lb.	£
Dublin	4.1	1.4	1.6	0.6	—	—	—	—	2.0	0.7
Wexford	4.8	1.7	—	—	—	—	—	—	4.8	1.7
Waterford	24.7	8.6	16.1	5.6	22.5	7.9	289.3	101.2	18.9	6.6
Lismore	119.0	41.6	36.2	12.7	12.4	4.4	69.9	24.4	38.9	13.6
Cork	54.8	19.1	24.8	8.7	—	—	—	—	48.8	17.0
Kerry	82.9	29.0	33.7	11.8	—	—	58.6	20.6	76.6	26.8
Limerick	18.5	6.5	46.9	16.3	—	—	716.1	250.7	31.4	11.0
Galway/Connemara/Ballinakill	21.0	7.3	16.4	5.8	—	—	479.3	167.8	26.9	9.4
Bangor/Ballina	110.5	38.7	58.0	20.3	—	—	344.7	120.7	72.2	25.2
Sligo/Ballyshannon	59.1	20.7	79.7	27.9	—	—	450.2	157.5	69.4	24.3
Letterkenny	40.4	14.1	99.9	35.0	3.3	1.2	15.5	54.2	68.6	24.0
Drogheda/Dundalk	10.0	3.5	—	—	—	—	21.5	7.5	10.2	3.4
<i>All Districts</i>	31.6	11.1	43.9	15.4	18.1	6.3	215.7	75.5	33.5	11.7
Average Catch per Man Engaged per Day Fished										
Dublin	1.2	0.4	0.9	0.3	—	—	—	—	0.7	0.3
Wexford	2.0	0.7	—	—	—	—	—	—	2.0	0.7
Waterford	7.4	2.6	6.9	2.4	8.9	3.1	96.4	33.7	7.6	2.7
Lismore	39.7	13.9	15.0	5.3	3.2	1.1	23.3	8.1	13.6	4.8
Cork	16.0	5.6	13.0	4.6	—	—	—	—	17.5	6.1
Kerry	21.0	7.4	8.4	3.0	—	—	29.3	10.3	19.4	6.8
Limerick	5.3	1.9	20.4	7.1	—	—	35.8	12.5	10.5	3.7
Galway/Connemara/Ballinakill	7.0	2.4	7.0	2.5	—	—	95.9	33.6	10.2	3.6
Bangor/Ballina	28.2	9.9	17.3	6.0	—	—	31.3	10.9	19.9	6.9
Sligo/Ballyshannon	16.3	5.7	22.5	7.9	—	—	225.1	78.8	19.4	6.8
Letterkenny	10.7	3.7	30.7	10.8	3.3	1.2	34.4	12.0	22.6	7.9
Drogheda/Dundalk	3.6	1.3	—	—	—	—	21.5	7.5	3.7	1.2
<i>All Districts</i>	9.5	3.3	16.4	5.7	6.1	2.1	38.1	13.3	11.2	3.9

“satisfactions” of the commercial fisherman. However, income derived from salmon fishing would seem to have multiplier effects similar to those of tourist expenditure. In the final section of this report we therefore discuss the application of multiplier analysis to income arising from commercial salmon fishing in order to derive an estimate of the ultimate or multiplied effects of this income.

First of all, however, we must derive the income figures themselves and these are shown in Table 14. As may be seen from this table, income arising from salmon fishing for Ireland as a whole amounted to about £810,000. Letterkenny was the district with the highest income arising of about £140,000. The figures for Waterford and Kerry were also over £100,000. The figure for the Dublin district is negative, indicating that costs exceeded income in this district.* About 15 per cent of the total income arising was paid out in wages and salaries, and the remaining 85 per cent (equivalent to about £687,000) accrued to self-employed persons. The proportion of wages and salaries in net income varied from zero in Cork to about 50 per cent in Limerick. This proportion seems to

TABLE 14: *Details of Output and Income from Commercial Salmon Fishing Activity in the Different Fishery Districts in 1970*

<i>Fishery District</i>	<i>Total Output (Value of catch)†</i>	<i>Total Costs (including depreciation)</i>	<i>Income Arising</i>	<i>Wages Paid</i>	<i>Income from Self-Employment</i>
Dublin	2,630	3,230	£ -600	—	-620
Wexford	10,340	5,940	4,400	1,270	3,130
Waterford	208,350	99,490	108,860	14,600	94,260
Lismore	118,780	20,930	97,850	2,120	95,730
Cork	51,450	11,540	39,910	—	39,910
Kerry	114,360	13,000	101,360	10,790	90,570
Limerick	132,670	41,560	91,110	45,500	45,610
Galway/Connemara/ Ballinakill	31,750	15,680	16,070	5,540	10,530
Bangor/Ballina	166,110	70,490	95,610	20,730	74,890
Sligo/Ballyshannon	118,180	37,860	80,320	12,390	67,930
Letterkenny	204,940	63,630	141,310	5,330	135,980
Drogheda/Dundalk	38,980	5,530	33,450	4,570	28,880
<i>All Districts</i>	1,198,540	388,390	809,650	122,840	686,810

†Includes sales of sea trout.

‡Due to rounding errors the figures in each cell do not necessarily add to the row and column totals shown.

*From the answers we received, it seems that salmon fishing is in very considerable decline in Dublin and is not likely to be practised there for very much longer.

be considerably influenced by the presence and size of fixed engine operations in the various districts.

Table 15 shows output, costs and income arising per licence, per man engaged and per man per day. Income arising per licence is highest in Lismore, Kerry, Bangor/Ballina and Sligo/Ballyshannon, and lowest in Dublin, Wexford and Galway/Connemara/Ballinakill. Controlling for numbers engaged by considering the average income per man engaged does not substantially alter this pattern.

However, when we control for length of season by considering the income per man per day fished, the high levels of income per day fished in the drift netting regions such as Sligo/Ballyshannon and Letterkenny are apparent. For example, the income per man per day fished in Sligo/Ballyshannon was £8.9 and £5.1 in Letterkenny. The Kerry district, which also has a fairly short season, has a high figure for income per man per day. In the eastern and south-eastern regions, however, the relatively long seasons and low catches gave low figures for income per man per day. For instance, this figure was *negative* in Dublin, and amounted to only about £0.40 in Wexford, £1.2 in Drogheda/Dundalk and £1.3 in Waterford.

Sales Outlets

Table 16 shows the sales outlets used by the fishermen, other than holders of fixed engine licences. The most remarkable feature of the table is probably the predominance of sale to private dealers, who bought about 76 per cent of the catch. About 18 per cent of fish was sold to co-operatives, or at auctions organised by co-operatives; 2 per cent of the catch was directly exported and a further 3.5 per cent was sold to hotels, guesthouses and private consumers. The remainder was disposed of in other ways.

In the districts where co-operatives exist, they generally account for a fairly high percentage of the catch—about 47 per cent in Kerry, 33 per cent in Galway/Connemara/Ballinakill and about 62 per cent in Letterkenny. Kerry seems to be the district with the most diversified sales outlets, since only 44 per cent of its catch is sold to private dealers, 47 per cent goes to co-operatives and 10 per cent to hotels, etc. The percentage of catch sold by draft netmen to private dealers (76 per cent) was about the same as the percentage sold by drift netmen (73 per cent). About 2 per cent of total catch was exported directly, mainly from the districts of Sligo/Ballyshannon and Letterkenny. Most of these fish presumably went to Northern Ireland. No drift netmen seem to sell to hotels or private consumers, but about 6 per cent of draft net catch was disposed of in this way.

We should point out that Table 16 may not accurately represent the disposal of the total salmon catch, since it excludes catch by fixed engines. These are

TABLE 15: *Details of Output, Costs and Income from Commercial Salmon Fishing in 1970, Classified by Fishery District (Averages per Licence, per Man and per Man per Day Fished)*

Fishery District	Total Output* (= Value of Catch)			Total Costs (including Depreciation)			Income		
	Per Licence	Per Man Engaged	Per Man Per Day	Per Licence	Per Man Engaged	Per Man Per Day	Per Licence	Per Man Engaged	Per Man Per Day
					£				
Dublin	88	33	0.4	108	40	0.5	-21	-8	-0.1
Wexford	164	64	0.8	94	36	0.4	70	28	0.4
Waterford	585	225	2.5	280	107	1.3	305	117	1.3
Lismore	1,165	409	4.8	205	72	0.8	959	336	4.0
Cork	591	198	5.8	133	44	1.3	459	154	4.5
Kerry	1,040	271	7.0	118	31	0.8	921	240	6.2
Limerick	657	203	3.4	206	64	1.1	451	140	2.4
Galway/Connemara/ Ballinakill	276	111	3.9	136	55	1.9	140	56	1.9
Bangor/Ballina	1,212	334	6.8	515	142	2.9	697	193	3.9
Sligo/Ballyshannon	889	243	13.1	285	78	4.2	604	165	8.9
Letterkenny	794	244	7.4	246	75	2.2	548	168	5.1
Drogheda/Dundalk	295	109	1.4	42	16	0.2	253	93	1.2
<i>All Districts</i>	695	228	3.9	226	75	1.3	468	153	2.6

*Includes sea trout.

usually fairly large operations and may therefore differ significantly from ordinary netmen in their sales outlets. However, the total catch by fixed engines is, as we saw, only about 6 per cent of the catch by all methods. This means that Table 16 would not be dramatically affected by its inclusion.

TABLE 16: *Percentage of Catch of Commercial Salmon Fishermen (other than Fixed Engine Licensees) sold to various Types of Outlet, Classified by Fishery District*

<i>Fishery district</i>	<i>Private sale to dealer</i>	<i>Co-Op*</i>	<i>Direct exportation</i>	<i>Hotel, etc.†</i>	<i>Other</i>	<i>Total</i>
Dublin	100.0					100.0
Wexford	100.0					100.0
Waterford	100.0					100.0
Lismore	100.0					100.0
Cork	91.8			7.4	0.8	100.0
Kerry	43.6	46.7		9.7		100.0
Limerick	92.0			7.9		100.0
Galway/Connemara/ Ballinakill	55.0	33.2	1.7	9.6	0.5	100.0
Bangor/Ballina	88.7	2.1	1.6	3.3	4.3	100.0
Sligo/Ballyshannon	74.5	7.8	15.3		2.1	100.0
Letterkenny‡	27.6	67.5	4.6	0.3		100.0
Drogheda/Dundalk	99.6			0.4		100.0
<i>Licence Type</i>						
Draft	75.9	13.9	3.0	6.2	0.9	100.0
Drift	75.2	23.8	2.2		0.9	100.0
Snap	100.0					100.0
Loop	97.0			3.0		100.0
<i>Total</i>	75.8	16.4	2.4	2.5	0.9	100.0

*Including sale at Auctions organised by Co-operatives.

†Including sale to hotels, guesthouses, private consumers, etc.

‡The figure for sales to co-operatives in Letterkenny is based on data kindly supplied by Fisheries Division.

Division of Catch

It was pointed out above that most salmon fishing is share-fishing, that is, the value of the catch is divided among the crew members on some agreed basis. It is of interest to see how this division is usually carried out, and Table 17 presents the relevant figures. As may be seen from this table, for the state as a whole about 46 per cent of the catch accrues to the licence holders, who constitute about one-third of all share fishermen. About 51 per cent accrues to the other crew members, who form about two-thirds of all share fishermen.

The remaining 2 per cent accrues to the small number of "non-fishing share members", i.e. people who supply some of the equipment such as boats or nets but do not participate in the actual fishing. These figures may reflect the fairly common practice of allocating a "share for the boat, and a share for each fisherman", since the licence holder is usually the owner of the boat and nets.

The variations between districts are not very large. The highest percentages accruing to licence holders were in Dublin (66 per cent) and Cork (54 per cent). The highest percentages accruing to other crew members were in Kerry (66 per cent) and Bangor/Ballina (65 per cent). These percentages are no doubt influenced by the average number of persons engaged per licence, which is relatively low in Dublin and Cork but relatively high in Kerry and Bangor/Ballina. We saw above that non-fishing share members occur more frequently in drift-net operations than elsewhere, probably as a result of the higher capital costs of drift netting equipment. This factor also helps to explain the pattern exhibited by the percentage of the catch accruing to non-fishing share members which is highest in the districts where drift netting is most frequently practised, namely, Lismore, Bangor/Ballina, Letterkenny and Waterford.

TABLE 17: *Average Percentage Share of Catch Received by the Various Types of Crew-Member, Classified by Fishery District*

<i>Fishery District</i>	<i>Percentage received by Licence Holder</i>	<i>Percentage received by all Crew</i>	<i>Percentage received by non-fishing share members</i>	<i>Total</i>
Dublin	65.8	34.2	0.0	100.0
Wexford	47.4	51.3	1.3	100.0
Waterford	52.7	44.9	2.4	100.0
Lismore	40.5	51.8	7.7	100.0
Cork	53.7	45.5	0.8	100.0
Kerry	32.8	66.2	0.9	100.0
Limerick	40.1	58.3	1.6	100.0
Galway/Connemara/ Ballinakill	50.7	49.3	0.0	100.0
Bangor/Ballina	29.7	65.1	5.2	100.0
Sligo/Ballyshannon	52.4	46.3	1.3	100.0
Letterkenny	49.3	47.9	2.8	100.0
Drogheda/Dundalk	45.4	53.1	1.5	100.0
<i>All Districts</i>	46.2 ±(2.6)	51.4 ±(2.6)	2.4 ±(0.9)	100.0

Note: The figures in brackets along the bottom of the table are the confidence intervals at the 95 per cent level of significance.

The Opinions of the Net Fishermen

As may be seen from the questionnaire, which is shown in Appendix B, the opinions of the licence holders (other than holders of fixed engine licences) were sought on several matters. Among these were: (i) how good was salmon fishing in 1970 and the reasons why, (ii) whether or not they favoured certain management policies which have been suggested to improve salmon fishing, (iii) what the current marketing arrangements for salmon were and whether or not they were satisfied with these arrangements. The responses to these questions are summarised below. The opinions of the fixed engine licensees are dealt with in the next section.

(i) *Quality of Salmon Fishing in 1970.* Table 18 gives the percentages of fishermen who expressed various views about the quality of commercial salmon fishing.* Overall, about 48 per cent of fishermen felt that the 1970 season had been "average" or better, while the remainder believed that it had been worse than average. Their moderate pessimism contrasts quite sharply with the views of the Irish anglers [2], nearly eighty per cent of whom felt that a decline had occurred in salmon angling. The fact that 1970 was a relatively dry year may go some way towards explaining this contrast. As we point out below, dry weather tends to prevent fish from entering the rivers, thus favouring the commercial fishing and causing a deterioration in angling.

As Table 18 shows, there was considerable variation between the views of fishermen in the different regions. The Dublin fishermen were practically unanimous in their view that 1970 had been a very bad year, while 43 per cent of the Drogheda/Dundalk fishermen believed that it had been a better than average year. Over 77 per cent of fishermen from Bangor/Ballina thought that the 1970 season had been worse than average. It is striking, however, that 12 per cent of fishermen in the same district thought it had been a "very good" season. There seemed to be little variation between the views of draft and drift netmen, but the snap and loop fishermen both seemed to feel that 1970 was very much below average.

The fishermen who said that the fishing had been either above or below average were asked why they believed this had been so. There were too few who said that fishing had been above average to warrant tabulating these responses, but Table 19 shows the reasons given by those who believed the fishing had been worse than average. The most frequently cited reason for poor returns in 1970 was Greenland netting. Excessive netting in Irish waters was also seen as a major factor, as were pollution and salmon disease.

*When answering this question (Q11, Appendix B) the fishermen were presumably thinking of their own individual catches, and not of the total catch by all fishermen, which was greater in 1970 than at any time in the past.

TABLE 18: *Percentage Distribution of Commercial Fishermen's Opinions about the Quality of Salmon Fishing in 1970, Classified by Fishery District and Type of Licence*

<i>Fishery Districts</i>	<i>Very Good</i>	<i>Better than Average</i>	<i>Average</i>	<i>Worse than Average</i>	<i>Very Poor</i>	<i>No answer</i>	<i>Total</i>	<i>No.</i>
				<i>Per Cent</i>				
Dublin	0.0	0.0	0.0	10.3	86.2	3.4	100.0	13
Wexford	4.8	0.0	33.9	11.3	45.2	4.8	100.0	18
Waterford	10.4	13.0	41.5	23.6	11.5	0.0	100.0	40
Lismore	4.2	8.3	29.2	17.7	40.6	0.0	100.0	28
Cork	0.0	12.9	32.9	17.6	36.5	0.0	100.0	27
Kerry	9.5	14.7	36.8	16.8	22.1	0.0	100.0	22
Limerick	0.0	3.7	34.7	7.4	54.2	0.0	100.0	26
Galway/Connemara/ Ballinakill	4.7	4.7	63.6	8.4	16.8	1.9	100.0	23
Bangor/Ballina	11.9	0.8	9.5	15.9	61.9	0.0	100.0	27
Sligo/Ballyshannon	7.1	11.0	37.8	34.6	7.1	2.4	100.0	27
Letterkenny	9.7	4.8	14.5	35.5	35.5	0.0	100.0	31
Drogheda/Dundalk	6.3	36.2	34.6	22.8	0.0	0.0	100.0	20
Licence Type								
Draft	6.2	11.2	29.0	21.1	31.5	1.0	100.0	151
Drift	6.8	7.0	38.8	18.8	27.2	0.4	100.0	123
Snap and Loop	0.0	0.0	27.3	37.1	36.6	0.0	100.0	28
<i>All</i>	5.8	7.8	34.1	21.7	30.0	0.6	100.0	302

TABLE 19: *Reasons given for poor catches by respondents who said that 1970 had been a "worse than average" or "very poor" year*

<i>Reason</i>	<i>Percentage of times each reason was mentioned</i>
	<i>Per Cent</i>
Greenland Netting	17.1
Excessive Draft or Drift Netting	15.3
Pollution	13.6
Salmon Disease	13.4
Adverse Weather	11.0
Lack of Re-stocking	8.0
Poaching	5.7
Drainage	4.7
No Fish Present	3.6
Cyclic Factors	2.3
Other	5.0
<i>Total</i>	100.0

(ii) *Views on Policies.* It seems likely that salmon fishing will, in the future, be increasingly regulated. We therefore thought it of interest to obtain the fishermen's views on how best commercial salmon fishing might be improved. First of all we asked respondents whether or not they favoured each of eleven policies, then asked them if there were any other policies not listed which they favoured and finally asked them to say which one of all the policies (including any unlisted policies they themselves had mentioned) they deemed most important. In this way, we hoped to ascertain their views on a range of policy issues and to discover their priorities.

Table 20 summarises the views expressed, and Tables A2 and A3 of Appendix A show the breakdown by district and licence type. Far and away the most popular policy was "more restocking and improvement of spawning beds" which was favoured by 96 per cent of the respondents and thought to be the most important policy of all by 37 per cent. Table A2 shows that support for this policy was practically unanimous in all districts. Table A3 shows that the percentage thinking this the best suggestion of all varied from 69 per cent in Cork to 7 per cent in Dublin.

"Lengthening the fishing season" was thought to be the best policy by about 15 per cent of respondents, but was opposed by a sizable minority (about 36 per cent). Table A2 shows that support for this policy varied from 81 per cent in Drogheda/Dundalk to 28 per cent in Letterkenny. About 70 per cent of draft netmen favoured this policy, whereas only 40 per cent of drift netmen did so. Forty-five per cent of drift netmen were opposed to lengthening the

TABLE 20: *Percentages of Commercial Licence Holders (other than Fixed Engine Licensees) who favoured and opposed Certain Policies, and Percentage believing each Policy to be the best one*

<i>Policy</i>	<i>Favour</i>	<i>Oppose</i>	<i>No ans./ not Applicable</i>	<i>Per cent thinking this the best policy of all</i>
More restocking and improvement of spawning beds	96.2	0.6	3.2	37.4
Lengthening of fishing season	51.7	35.9	12.4	14.5
Tougher laws on river pollution	91.0	1.9	7.1	10.5
Restrict drift netmen	49.5	34.9	17.6	10.4
More or better piers, mooring places, etc.	71.0	2.0	23.0	7.4
More restriction on size of nets	37.2	31.2	31.6	3.7
Restrict draft netmen	30.5	40.4	29.1	3.2
Restrict other commercial fisher- men	36.0	37.5	26.5	2.3
Shorten weekly close time	20.5	67.9	11.6	2.0
Restrict anglers	13.0	65.5	21.5	1.7
Restrict drainage operations	67.0	9.6	23.4	0.5
Other suggestions	—	—	—	6.4

season. It should be noted that these responses refer to the 1970 season, so that the Ministerial Order of 1972 which shortened the permitted fishing time in several districts was not in effect. Fishermen's opinions on the subject of the appropriate length of season may have changed as a result of this order.

Predictably, as many as 91 per cent of respondents favoured "Tougher laws on river pollution" and about 11 per cent of respondents thought this the most important policy of all. Table A2 shows that support for this policy was over 88 per cent in all districts except Galway/Connemara/Ballinakill, where only 54 per cent were in favour. Table A3 shows that the pollution problem seemed more serious to fishermen in the East and South-East than to those in other areas; 67 per cent of Dublin fishermen thought pollution control the most important problem of all, as did 18 per cent of those in Waterford, 16 per cent in Wexford and 15 per cent in Drogheda/Dundalk. Bangor/Ballina was different from the other western districts in that pollution control was seen as the most important priority by as many as 18 per cent of fishermen there.

"Restrict Drift Netmen" was supported by about 50 per cent of all fishermen and opposed by about 35 per cent. Table A2 shows, quite surprisingly, that support for restriction on drift nets was considerable among drift netmen themselves; 47 per cent of them favoured restrictions whereas 44 per cent were opposed. Table A3 shows that 10 per cent of drift netmen thought restrictions

on drift nets to be the most important policy of all. Since the survey was carried out such restrictions have become a hotly contested issue as a result of the Ministerial Orders of 1972 and 1973 which imposed certain restrictions on the number of drift licences issued. In view of the outcry which these regulations provoked it is remarkable that in 1970 so many drift netsmen seemed to favour some restrictions on their own fishing. Of course, our question did not inquire about the sort of restrictions which fishermen wanted to see introduced, and it is possible that those who favoured restrictions were thinking of some form of regulation other than that actually implemented.

The other policies listed in Table 20 did not attract a great deal of support. It is interesting to note that few fishermen thought it important to restrict draft netmen or anglers, and, although they favoured restricting drainage operations, they did not seem to think this policy was important.

When asked for additional suggestions, about 70 per cent of the respondents said they did not have any. Of the thirty per cent who did make suggestions, about one fifth mentioned better protection and about one seventh favoured restricting non-professional fishermen. The others made a wide variety of suggestions, in the main applicable only to their local area.

The broad conclusions which one can draw from these tables seem to be as follows (a) the fishermen are very concerned about the welfare of those fish which reach the rivers, as shown by the frequent mentions of improvement of spawning beds, restocking, protection and control of pollution; and (b) a sizable number see a need for some regulation of drift netting.

Marketing Arrangements. Most of the questions which we asked on the subject of marketing arrangements were not well answered. The proportion of no answers and no opinions was high, and fishermen did not make many suggestions as to how the marketing arrangements could be improved. We therefore refrain from giving detailed tabulations of the answers, and confine ourselves to stating a few overall results.

Table 21 shows the percentages who favoured and opposed certain suggestions, and the order of priority in which the respondents ranked these suggestions. "Setting up a Co-op" was reckoned to be the best suggestion by about one third of the respondents, although about 14 per cent were opposed to this idea. About 67 per cent favoured an increase in the number of buyers, and about 66 per cent wanted more control of dealers who buy illegally caught fish. Eighteen per cent of the fishermen made "other suggestions". About 43 per cent of these suggestions referred to a better or more stable price, about 24 per cent to setting up a cold store, and about 3 per cent each to more careful handling of fish and better collection arrangements. Mention was also made of setting up smoking plants, better market information and a change in the weight which classifies a fish as a grilse rather than a salmon.

TABLE 21: *Percentages of Commercial Fishermen who favoured and opposed certain suggestions about how their marketing arrangements might be improved*

<i>Suggestion</i>	<i>Favour</i>	<i>Oppose</i>	<i>No Answer/ No Opinion</i>	<i>Percentage thinking this the best suggestion</i>
Setting up a co-operative	55.2	14.4	23.1	32.3
Increase in the numbers of buyers	67.3	15.1	15.5	29.0
More control of dealers who buy fish which are illegally caught	65.8	4.0	30.2	21.1
Other suggestions	—	—	—	7.1

About a fifth of the fishermen reported that there was a co-operative in their locality. About half of these, however, were not members. Some gave the distance from their home and their own small scale of operation as reasons why they had not joined. Others (about 40 per cent) said that they had simply "never bothered" to join.

All the fishermen stated that they had a choice of dealers to whom they could sell, most often a choice of two or three dealers. However, about half the fishermen believed that there was collusion between these buyers.

*The Opinions of Operators of Commercial and Angling Waters**

As was mentioned in the introduction above we conducted a survey of operators of commercial and angling waters in addition to our survey of other commercial fishermen. This survey was the source of the information which we gave in previous sections on the holders of fixed engine licences. In this section, we present a summary of the views of the commercial and angling operators, i.e., those who own or rent salmon fisheries either for commercial fishing or angling. The questionnaire used was different from that shown in Appendix B, since it was rather more flexible, and included a number of open-ended questions. As a result, some operators expressed themselves at considerable length. We have not, therefore, given detailed tabulations of their answers and have confined ourselves to trying to convey the general tone of their opinions.

(i) *Quality of Salmon Fishing in 1970.* About two-thirds of the commercial operators thought 1970 was "worse than average" or "very poor", while the remainder thought the season was about average. Thus, the commercial operators were a good deal more pessimistic than the commercial fishermen, of

*The authors would like to acknowledge the very considerable contribution made by Mrs Susan Scott to the collection and analysis of the data on which this section is based.

whom, as we saw above, nearly half felt that 1970 had been average or better. Respondents who operated angling waters were, on the whole, even more disappointed with salmon angling in 1970. Nearly four-fifths thought 1970 was "worse than average" or "very poor". It is interesting that this proportion coincides almost exactly with the percentage of anglers who felt that a "decline" had taken place in salmon angling in 1970. When asked about the reasons for this decline, the operators mentioned excessive drift netting and salmon disease as the main factors responsible. Pollution was also frequently mentioned, especially by operators of angling waters.

(ii) *Suggestions as to Improvement of Salmon Fishing.* The most frequently mentioned policy to improve salmon fishing was the control of pollution. This was particularly popular with angling operators, possibly because they see more of the damage done by pollution since their fisheries are situated in the fresh-water sections of the river. Control of drift netting was also mentioned by a high proportion of the respondents, especially the commercial operators. Re-stocking, removal of obstructions and better protection were also cited. The general feeling of the respondents was that Irish salmon fisheries are seriously threatened and that action is urgently needed to control pollution, curb excessive netting and eliminate poaching.

Asked who should pay for the suggested improvements, most respondents replied that the public authorities should pay any costs involved. However, many respondents added that they would pay their share if other matters were taken care of by the bodies responsible for them. When asked why the improvements had not been undertaken to date, some respondents alleged inaction by the Department, while others mentioned lack of organisation, apathy and lack of funds.

(iii) *Effects of Drainage Schemes.* The effect of drainage projects, especially major arterial schemes, on fisheries is a much disputed question. Some authorities believe that drainage schemes do not have a long-term detrimental effect on fisheries, while others hold the opposite view. We therefore thought it worthwhile to ascertain the views of those operators on whose waters drainage schemes had been carried out. When interpreting the views expressed, one must, of course, take into account that respondents may have felt that the survey would be used to assess compensation. It would thus be in their interest to report detrimental effects. Account should also be taken of the apparent tendency of all those concerned with fisheries to hark back to the "good old days".*

*This is far from being a modern tendency. In 1935, the Commission on Inland Fisheries [5] reported that "the greater number of working fishermen who came before us seemed to be filled with joyous recollection of the past and but few of them were hopeful of the future".

On the whole the respondents felt that the effects of drainage schemes on their fisheries had been very bad. Most of them thought the fishery would never recover, although some thought it would recover, or could recover if certain steps were taken, such as replacement of gravel, massive re-stocking, etc.

Two types of detrimental effect were mentioned. On the one hand, operators felt that the drainage scheme injured stocks and spawning capacity. Spawning beds were reported to have been destroyed and not replaced; water levels were lowered and run-off speed increased so that fish could not reach the spawning beds; and silt was said to have blocked channels, covered gravel and even killed fish. On the other hand, angling operators felt that a severe deterioration had occurred in the quality of angling, quite apart from the question of stocks. Boulders had been extracted from the river, so removing salmon "lies", loose banks were reported to be dangerous and uncomfortable to fish from, as were the very high banks which resulted from the drainage scheme; and quick run-off with consequent low water levels made for unsuccessful angling.

While keeping in mind that the above views are those of a group with a vested interest in salmon fishing, the great concern expressed by the operators at the detrimental effects of drainage schemes would seem to us to warrant a realistic, scientific assessment of the effects which drainage schemes have on fisheries. Account should be taken not only of the short and long-term effects on fish stocks, but also of the ease and comfort with which a river can be fished after drainage.

TRENDS IN SALMON CATCH, 1952-72

IN order to put the data given above in their proper context, it is necessary to look at the trends over time in total salmon catch and in catch by the various types of licence. There are two major sources of information on salmon catch.

- (1) The Reports on Sea and Inland Fisheries mentioned above which are published annually by the Department of Agriculture and Fisheries, and
- (2) the export statistics, published monthly by the Central Statistics Office, which give the volume and value of all salmon exported from the Twenty-six Counties.

The two sets of figures are not completely comparable since the export statistics include fish landed in the Twenty-six Counties but caught in the waters controlled by the Foyle Fisheries Commission, while the Sea and Inland Fisheries Reports exclude such fish. An attempt was therefore made to estimate the amount of exports which originate from waters in the Republic. It was estimated* that about 70 per cent of salmon caught in the Foyle District are bought by dealers in the Republic, and it was assumed that 5 per cent are consumed in the Republic. The Irish export statistics were therefore adjusted by subtracting from them 65 per cent of the catch in the Foyle District. It is these adjusted export figures which are used throughout the rest of this paper. Details of the calculations involved are shown in Table A4 of Appendix A. It should also be noted that the export figures given include an allowance for exports of smoked salmon, which have increased markedly in recent years. On the assumption that a smoked fish weighs about two-thirds of its original weight, the exports of smoked salmon, as published in the Trade Statistics of Ireland, were multiplied by 1.5 and added to the exports of fresh fish in order to give a figure for total exports in each year.

Total Commercial Catch, 1952-72

Figure 1 and Table A4 of the Appendix show total commercial catch, as published in the Reports on the Sea and Inland Fisheries, and an estimate of total exports originating in the Republic, derived in the manner described above. Up to 1961 there was little appreciable difference between the export figures and the published catch figures. Indeed, in some years, such as 1952,

*On the basis of personal communications with the secretary of the Foyle Fisheries Commission and with Fisheries Division, Department of Agriculture and Fisheries, Dublin.

1955 and 1956, estimated exports are greater than total catch. This does not seem realistic, since it would imply that home consumption of salmon was negligible up to 1961, but that it then soared to reach about 37 per cent of the total catch by 1972. It is remarkable that after 1969, when the system of collecting the catch data was improved, the gap between exports and published catch widened sharply, from a difference of 594,000 lb in 1968 to 1,390,000 lb in 1969. A sudden increase of this magnitude in home consumption is most implausible, and it therefore seems reasonable to conclude that the official catch figures understate the true catch for the years prior to 1969.

An attempt was made to obtain more realistic estimates of total catch, and two such estimates are shown in Figure 1 and given in tabular form in Table A4. In the case of both estimates the export figures were taken to be correct, as were the published catch figures for the period 1969-72. The difference between the estimates arises from different assumptions made about the magnitude of home consumption. The "high" estimate was obtained by assuming that home consumption amounted to the same proportion of total catch in each year as it did in the period 1969-72. The "low" estimate was derived by assuming that home consumption rose from 25 per cent of the total catch in 1952 to 37.3 per cent in 1972 at a constant proportionate rate. The true figure probably lies between these two estimates since it is generally believed that home consumption of salmon has increased in recent years,* but an increase of about 50 per cent in home consumption may be thought slightly too large. Throughout the rest of this paper we have accepted the "low" estimate, but most of our conclusions would emerge even more strikingly if the "high" estimate were taken.

As may be seen from Figure 1, estimated catch, exports and published catch all follow the same general pattern. Total catch seems to have shown an overall decline until 1961, although there was a moderate upswing in 1956 and 1957. In 1962, catches were exceptionally good, both in Ireland and elsewhere in Europe. Went [6] is of the opinion that this depressed prices and resulted in increased home consumption. Our "estimated catch" figure, being based on exports, may therefore understate the true catch for 1962. The Irish catch in 1963 was again very high, but the catch in other countries was not exceptional. Hence, exports in 1963 were considerably greater than in 1962. After 1963, total estimated catch fell to a trough of about 2.2 m. lb in 1966, after which it rose more or less continuously to reach a record level of 3.5 m. lb in 1972. This expansion stems mainly from increased numbers of fishermen rather than from improved catches per licence. Numbers of licences issued are discussed more fully below, but it may be worthwhile to point out here that the total number of commercial salmon licences issued rose from 1,272 in 1963 to

*See [6].

2,222 in 1972. By 1972, total catch exceeded its 1963 level, although it was, of course, being shared among a far larger number of fishermen.

Attempts were made by means of regression analysis to investigate the effects on total catch of such factors as rainfall, numbers of fishermen, etc., and to find possible cycles, but in general these did not prove very satisfactory and the results are not presented.

Exports

As was mentioned above, the total quantity of exports follows the same general pattern as the official figures for total catch. Average annual export prices are illustrated in Figure 2 and shown in tabular form in Table A5. In order to allow for the effects of changes in the overall price level, these figures are also shown deflated by the Wholesale Price Index (Food Items), as published in the Irish Statistical Bulletin.

Figure 2 shows that annual average prices, in current terms, remained fairly constant until about 1968, after which a sharp rise took place. However, the deflated figures indicate that this rise in price is due to a general rise in food prices, and that salmon has not become dearer relative to other food items. In fact, the trend in the deflated price was generally *downward* until 1968. If we had used the overall Consumer Price Index rather than the Wholesale Price Index for food, this downward trend would have been even more marked.

If Figure 2 is compared with Figure 1, it will be seen that fluctuations in price around its long-run trend usually correspond to fluctuations in total catch. In years when catches are high, price tends to fall and vice versa. To put this point more precisely, there is a significant negative correlation of -0.59 between the quantity of salmon exported and the (deflated) export price. Export price is also probably influenced by salmon catches in other countries, but attempts to incorporate data on sales of Scotch salmon (Ireland's main competitor) into an equation explaining Irish export price were not successful.

In addition to export prices, Table A5 gives the catch prices (i.e., the price received by the fisherman) as obtained from the Sea and Inland Fisheries Reports. There is a close relationship between the two sets of prices, the correlation co-efficient between undeflated catch price and undeflated export price being 0.91 . Over the whole period, the average difference between the catch price and the export price is about 9.2p, and this is presumably an estimate of the dealers' and exporters' mark-up. It was fairly stable in most years but fell as low as 6p in 1952, 1957 and 1959 and reached 18p in 1969. When expressed as a percentage of catch price, it varied between 20 and 28 per cent in the years 1952 to 1959, after that date it reached a new level, going from 31.5 per cent in 1960 to 54.5 per cent in 1969. It fell again, however, to 25 per

Fig. 1 TOTAL COMMERCIAL CATCH AND EXPORTS (EXCLUDING FOYLE), 1952-72.

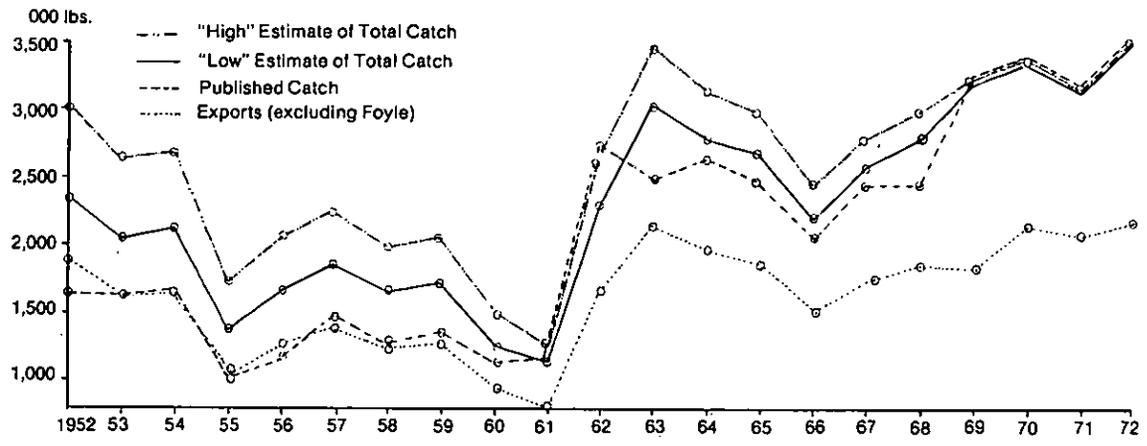
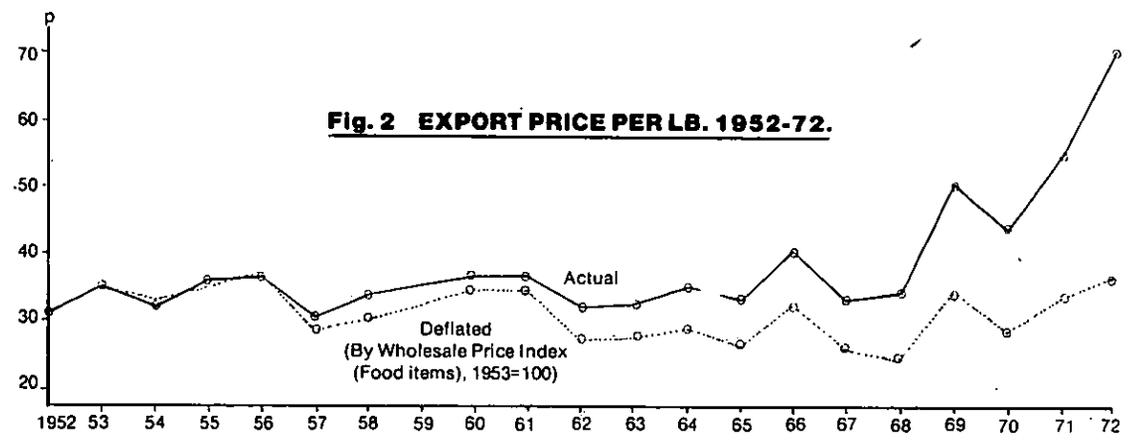


Fig. 2 EXPORT PRICE PER LB. 1952-72.



cent in 1970 and to 19.5 per cent in 1972. A possible explanation for this decline may be the expansion of fishermen's co-operatives in recent years.

We next consider the *seasonal* pattern of exports which is shown in Figure 3 and Table A6. The quantity figures exhibit a broadly similar pattern in each of the periods examined; exports remain low till about May, there is a very pronounced peak in July and the quantity exported is low from August until the end of the year. Despite the overall similarity in the pattern, however, there are some interesting differences between the earlier and later years. In the first place, the quantities of fish exported before May have, in general, been lower in the later years while the quantities exported after May have been higher. This reflects the decline in spring fish and the increase in the catch of grilse, documented by Went and Twomey in [4]. Secondly, the data for 1968-72 show the increasing importance of deep-freezing in the salmon industry. Unlike any previous period, the years 1968-72 saw appreciable quantities of salmon being exported during the close season, i.e. after September. It seems likely that the pattern of exports will be further modified in the years ahead as larger numbers of fish are deep-frozen.

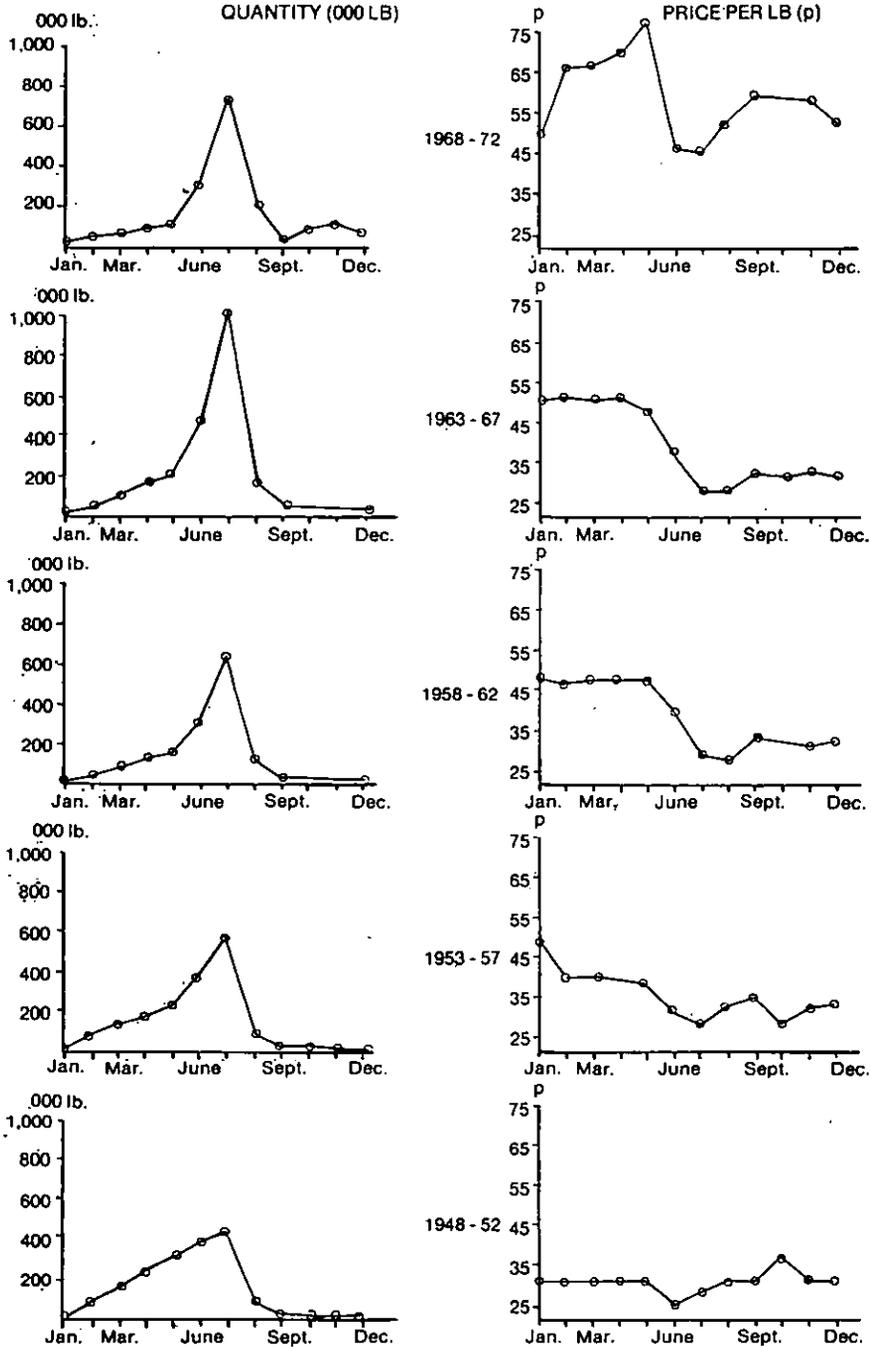
When we examine the seasonal pattern of prices, we find, as might be expected from the seasonal pattern of quantities, that price is, generally speaking, high until about April or May, after which it falls sharply. A slight recovery tends to take place after August. The effect of the increasing use of deep-freeze facilities is evident from the data for 1968-72 when prices actually rose between January and May, presumably reflecting the gradual exhaustion of stocks of fish from the previous season. It should be borne in mind when interpreting these figures that until spring 1950 price control was in effect in Britain, our major export market. This explains why price remains constant at 31p until May in the earliest period shown.

Total Catch by the Different Types of Engine

Figure 4 and Table A7 show total commercial catch by the various engines in the years 1952-72. For the years after 1968, these figures are identical with the catch data published in the Sea and Inland Fisheries Reports. The data for earlier years were obtained by dividing the "low" estimate of total commercial catch, derived in the manner described in the previous section, on a proportionate basis. The proportions used were the proportions of total published catch caught by the various engines, as shown by the official figures.

Probably the most remarkable feature of Figure 4 is the very pronounced rise in the drift net catch. From being about 660,000 lb (26 per cent of total catch) in 1952, it fell to 219,000 lb (18.9 per cent of total) in 1961. It then rose sharply until in 1972 it amounted to 2,347,000 lb (67 per cent of total catch). Draft net catch fluctuated around an average of about 1.1 m. lb until 1960

Fig. 3 Five-year averages (1948-1972) of Quantity of Salmon Exported (In 000 lbs.) in each month and monthly export price.



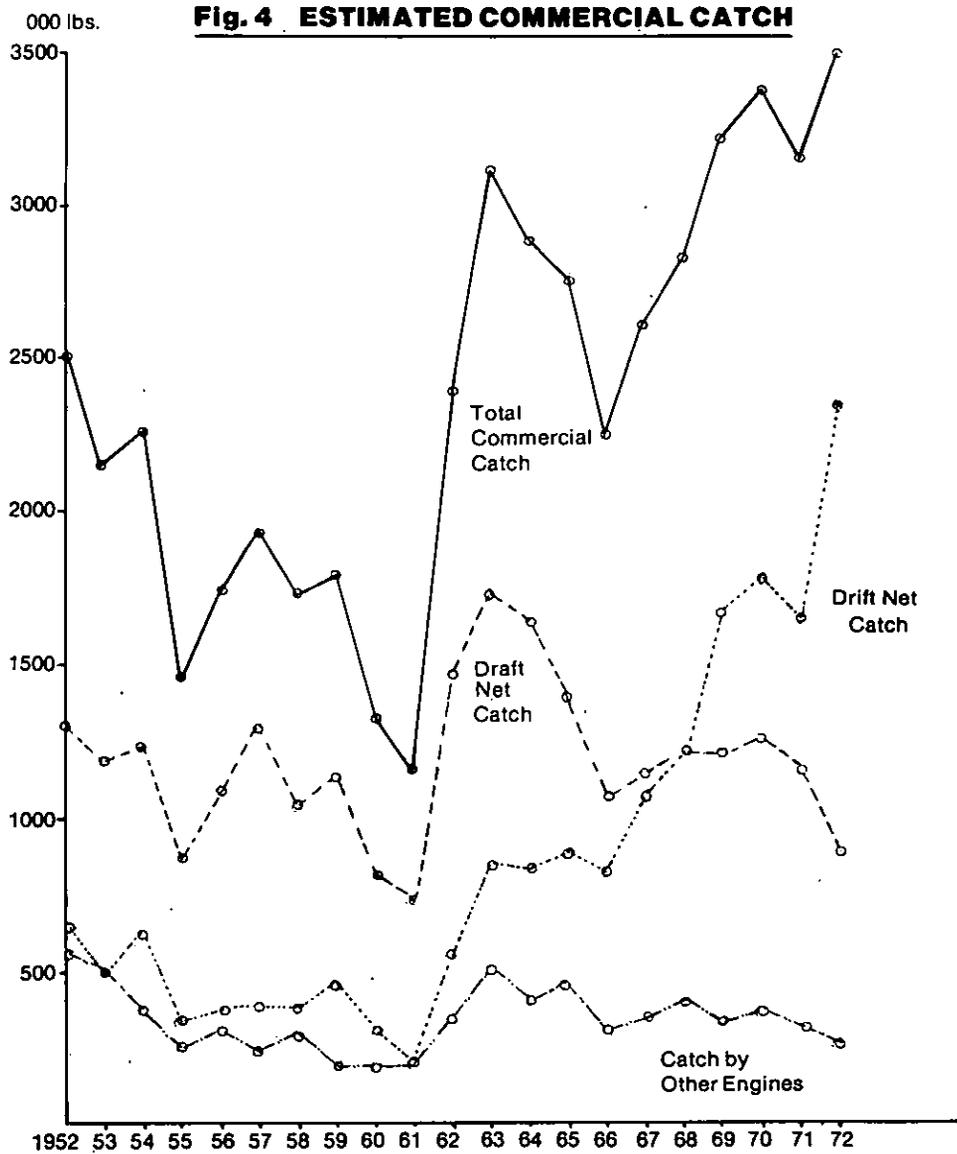
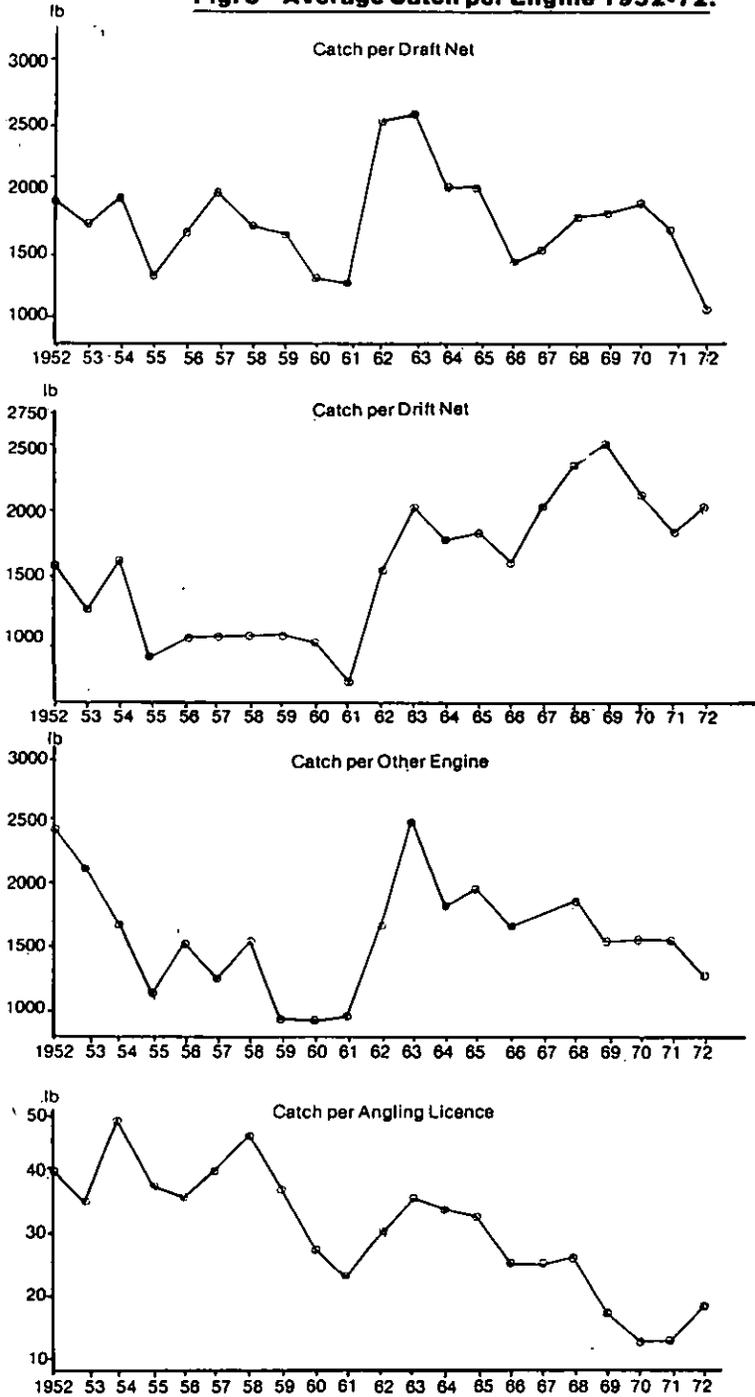


Fig. 5 Average Catch per Engine 1952-72.



when it fell to 823,000 lb. It fell further in 1961 to 743,000 lb after which it rose dramatically in 1962 and still further in 1963. Thereafter, it fell to 1,069,000 in 1966, after which it rose slightly to 1,261,000 in 1970, and then fell to 900,000 lb or about 26 per cent of total catch in 1972. Catch by "other engines" (i.e. snap nets, fixed engines, etc.) fell from 564,000 in 1952 to 193,000 lb in 1961, after which it rose to 515,000 in 1963. Thereafter, it declined until 1972 when it stood at 255,000 lb.

It is interesting to note that until about 1963 the three curves seemed to be moving more or less in step, which suggests that they were not competing with each other to a significant extent. After 1963, however, drift net catch continued to rise while catch by all other engines fell, suggesting that some element of competition had been introduced. The question of competition between different types of net is further explored below.

Catch per Licence

Figure 5 and Table A8 show average catch by the different types of licence in the years 1952-72. These figures are, like those in Table A7, based on the estimated commercial catch, and not on the catch figures published in the Sea and Inland Fisheries Reports. As can be seen from Figure 5, catch per draft net rose from 1,906 lb in 1952 to 1,978 lb in 1957, after which there was a continuous decline until it reached a trough of 1,262 lb in 1961. In 1962 and '63 catch per draft net was remarkably high, but thereafter it experienced an overall decline until it reached its lowest point (about 1,041 lb) in 1972. Catch per drift net was also very low in 1961, but showed a considerable improvement in 1962 and 1963. However, after 1962 the similarity with catch per draft net ends, since the improved catch per licence first reached in 1962-63 has been more or less sustained, despite some fluctuations. The improvement in catch per drift net is no doubt due to the considerable numbers of larger and more efficient trawler-type boats which have begun drift-netting in recent years. Catch per other engine has a broadly similar pattern to that of catch per draft net: low catches in the years 1959-61, followed by a sharp peak in 1962-63 and a continuous decline thereafter. For purposes of comparison, Figure 5 also includes catch per angling licence. Again, we find a trough in 1961, an improvement in 1962-63 and a steady decline thereafter.

Regression Results

Probably the most noteworthy feature of the above diagrams is the overall decline in catch per licence experienced by all except drift nets since 1963. A sustained trend like this one is unlikely to be due to random fluctuations such as the vagaries of weather or other natural causes. In order to arrive at a more systematic explanation, a series of regression equations was run incorporating

such factors as competition between the different types of net, rainfall, salmon disease, Greenland netting, spawning escapement, cycles, etc. The results from using many of these variables were disappointing, probably because the measures used were inadequate. For instance, we attempted to estimate the effect of rainfall on catch by means of a global figure for rainfall for the country as a whole, derived from the meteorological data in the Statistical Abstract. Clearly, such a measure has grave defects, since it does not take account of the *distribution* of rainfall over the country, nor over the year. In many other cases our measures were, of necessity, equally defective, and perhaps it is not surprising that some of the variables did not perform well. It is also true, of course, that fluctuations in runs and catches are inherently difficult to explain, since they are natural phenomena subject to all sorts of random influences, many of which are unknown or at least unobservable.

However, several satisfactory equations did emerge and these are presented below. The first equation to be dealt with is that explaining catch by draft nets. Despite considerable experimentation with a large number of fairly plausible independent variables, no fully satisfactory equation emerged for the full period. This is, however, probably no more than a reflection of the fact, noted in the above comments on Figure 5, that in the early 'sixties new factors began to influence catch by draft nets. It therefore seemed appropriate to run two separate equations, one for the period up to 1962, and one for the post-1962 period. As was mentioned above, runs of fish were exceptional in 1962 and 1963. It was therefore thought advisable to include a dummy variable for these years in each equation. The best of the equations for the 1952-62 period was:

(*t*-values are given in parenthesis)

$$DA_t = 570.13 + 1.18DI_t + 259.56E_t$$

(4.34) (4.01) (1.92)

$$R^2 = 0.71 \quad F\text{-value} = 13.08 \quad D.W. = 1.55$$

DA_t = Total draft net catch (000 lb) in year *t*

DI_t = Total drift net catch (000 lb) in year *t*

E_t = Dummy variable = 1 in 1962
= 0 elsewhere.

Thus, for this period, there seems to have been a positive relationship between catch by draft nets and total drift net catch. In other words, the two variables rose and fell together, both of them probably being determined by the size of

the run of fish. For the post-1962 period, however, the picture is quite different. The best of the equations to emerge for this period was

$$DA_t = 1558.5 - 0.24DI_t + 395.3E_t$$

(8.89) (2.01) (2.00)

$$R^2 = 0.52 \quad F\text{-value} = 5.8 \quad D.W. = 1.48$$

where E_t = Dummy variable = 1 in 1963
= 0 elsewhere

and all the symbols have the meanings assigned to them earlier. It is clear that in this period there is a significant *negative* relationship between total catch by draft nets and total drift net catch. This seems to imply that when drift netting expanded beyond a certain point, it began to compete with draft netting so producing a negative relationship between the two variables.*

The relationship uncovered by the regressions may be noted in Figure 5. Up to 1963, the two lines representing total draft net catch and total drift net catch move in phase; after this point, total draft net catch falls while total drift net catch rises. It seems reasonable to conclude that this is a cause and effect relationship.

Apart from a time trend, none of the variables which we tried proved useful in explaining catch per drift net. The trend was positive, ($r = 0.61$), and is presumably due to the increasing proportion of large trawler-type boats engaged in drift-netting.

Catch by other engines refers to catch by snap nets, loop nets and fixed engines. Figure 5 above showed that this variable displays a broadly similar pattern to that of catch by draft nets—it fluctuated around a fairly stable mean until the early 'sixties after which a decline took place. Separate regressions were again calculated for the period 1952-62 and 1963-72. These confirmed the impression gained from Figure 5 that in the early 'sixties a substantial shift occurred in the relationship between catch by other engines and total drift net catch. The regression for the period 1952-62 was:

$$O_t = 9.83 + 0.70DI_t$$

(0.11) (3.68)

$$R^2 = 0.57 \quad F\text{-value} = 13.53 \quad D.W. = 1.80$$

where O_t is total catch by other engines (in 000 lb) and the other symbols have the meanings assigned above. Though the coefficient of determination (R^2) is rather low, we find a significant positive relationship between catch by other

*A rigorous test of the significance of the change in the underlying relationship is provided by the Chow test [7]. When applied to the present data, the Chow test gives an F-value of 7.20, which is significant at the 99 per cent level. This implies that there was a substantial change in the factors determining the level of draft net catch in the two periods.

engines and total drift net catch suggesting that during the period under review the magnitudes of both these variables were determined basically by the run of fish and that they did not influence each other to any marked extent.

The best equation for the post-1962 period was

$$O_t = 515.29 - 0.11DI_t$$

(12.17) (3.51)

$$R^2 = 0.56 \quad F\text{-value} = 12.34 \quad D.W. = 2.28$$

In this equation the highly significant negative coefficient for DI should be noted, implying that catch by other types of licence has fallen as drift net catch has risen. As was the case with catch by draft nets, we therefore have evidence of a shift in the underlying relationship.*

Although the level of significance of the relationships is rather low, it still seems reasonable to suggest that catches by one type of licence holder began to affect other fishermen's catches in the early 'sixties, and that this effect has become more marked over time. If this conclusion is valid, then it follows that the allocation of salmon licences is an extremely important question, since the granting or withholding of certain types of licence will not only affect the individuals concerned, but will also determine the level of other fishermen's catches and income. In fact, the whole issue boils down to the simple point that the salmon stock is limited and that rational decisions must be made on how to divide this stock between regions and individuals. The number and distribution of licences issued is therefore discussed in the next section.

Number of Licences Issued

Table A9 shows the numbers of various types of licence issued in the years 1952-1972. The number of draft nets remained fairly constant at about 600 to 700, falling to 589 in 1961 and rising to 813 in 1964, and to over 700 in 1966 and 1967. The highest number of draft net licences ever issued was in 1972, when 864 licences were issued. The number of drift nets shows a steady decline from 415 in 1952 to 318 in 1960 followed by a sustained rise from 319 in 1961 to 1,156 in 1972. The number of snap net licences fluctuated around 130 to 150, the lowest number (125) being issued in 1957 and the highest (153) in 1970. An average of about 30 loop nets were licensed in each year, and an average of about 50 fixed engines. Thus, the overall picture is of a considerable increase in drift nets with the numbers of other types remaining pretty static. The question therefore arises as to whether the former should be curtailed and if so the extent of the curtailment. This and other issues are discussed in the next section.

*Applying the Chow test (*op. cit.*) to the data gives an F-value of 14.80, significant at the 99 per cent level.

IRISH SALMON FISHING: AN OVERVIEW

HAVING completed our study of Irish salmon and sea-trout fishing, by both anglers and netmen, we now attempt to draw the various threads together and assess the total "value" (in the broadest sense) to the community of having and maintaining a thriving salmon fishing industry. To do this, we consider the income and exports which the industry generates and the employment and recreation which it provides. We then go on to discuss the various factors which could potentially cause a decline in stocks and a diminution in the value of salmon fishing.

The "Value" of Irish Salmon Fishing

The "value" of an industry is not a clearly defined concept. Several quite different definitions can be advanced, depending on the purpose of the evaluation. Gross output is one possible definition, i.e. the total value of all sales by the industry. Sales by the salmon fishing industry involve three basic components: sales of angling services to foreign visitors; sales of angling services to Irish anglers and sales of salmon by commercial fishermen. Estimates of these components are shown in Table 22, broken down by fishery district. This table shows that, for the country as a whole, expenditure on salmon fishing by out-of-state visitors amounted to about £533,000, expenditure by Irish anglers to £326,000 and sales of salmon by commercial fishermen to £1,199,000, giving a total gross output of the salmon fishing industry of £2,058,000 in 1970.

The figures for gross output in Table 22 reveal that, from a financial point of view, angling compares favourably with commercial fishing. Forty-two per cent of gross output arises from angling, while 58 per cent arises from commercial fishing. Some people are inclined to dismiss angling as a "mere recreation", of no real economic significance but the above figures show this opinion to be inaccurate.

These figures also indicate the relative importance of angling and commercial fishing in the different districts. Dublin, Wexford, Kerry and Galway/Connemara/Ballinakill seem to benefit more from angling, while Waterford, Lismore, Limerick, Sligo/Ballyshannon and Letterkenny earn significantly more from commercial fishing. In general, there seems to be a tendency for the popular holiday areas of the West and South-West to benefit most from angling, while other areas rely mainly on commercial catch.

Another definition of the "value" of an industry is the "net output" or value added by the industry. This involves subtracting from the gross output of the

TABLE 22: Gross Output and Net Output (Value Added) by the Salmon Fishing Industry, Classified by Fishery District

Fishery District	Out of State Visitors			Irish Anglers			Commercial Fishermen			Total Industry	
	Gross Output = Total Expenditure	Import Content	Net Output	Gross Output = Total Expenditure	Import Content	Net Output	Gross Output = Total Value of Catch	Import Content	Net Output	Gross Output	Net Output
						£000					
Dublin	19.7	4.8	14.9	21.1	5.6	15.5	2.6	0.4	2.2	43.4	32.6
Wexford	14.4	3.5	10.9	9.5	2.5	7.0	10.3	1.4	8.9	34.2	26.8
Waterford	17.8	4.4	13.4	24.9	6.7	18.2	208.4	28.5	179.9	251.1	211.5
Lismore	27.5	6.8	20.7	13.0	3.5	9.5	118.8	16.3	102.5	159.3	132.7
Cork	19.9	4.9	15.0	24.2	6.5	17.7	51.4	7.0	44.4	95.5	77.1
Kerry	133.8	32.9	100.9	30.3	8.1	22.2	114.4	15.6	98.7	278.5	221.8
Limerick	14.5	3.6	10.9	49.7	13.3	36.4	132.7	18.1	114.5	196.9	161.8
Galway/Connemara/ Ballinakill	116.7	28.7	88.0	47.8	12.8	35.0	31.8	4.4	27.4	196.3	150.4
Bangor/Ballina	71.5	17.6	53.9	47.0	12.6	34.4	166.1	22.7	143.3	284.6	231.6
Sligo/Ballyshannon	20.0	4.9	15.1	17.2	4.6	12.6	118.2	16.2	102.0	155.4	129.7
Letterkenny	67.6	16.6	51.0	25.5	6.8	18.7	204.9	28.0	176.8	298.0	246.5
Drogheda/Dundalk	10.0	2.5	7.5	14.5	3.9	10.6	39.0	5.3	33.7	63.5	51.8
Unknown				1.5	0.4	1.1				1.5	1.1
<i>Total</i>	533.4	131.2	402.2	326.2	87.3	238.9	1,198.5	164.0	1,034.5	2,058.2	1,675.5

industry all the costs incurred in producing the goods or service in question. From the point of view of the individual firm such costs are simply its total expenditure on non-labour inputs such as raw materials, transport, etc. From the point of view of the economy as a whole, however, it is only the import content of these costs that should be subtracted since the domestic content represents net output (or value added) by the Irish economy.

In order to estimate the net output of salmon fishing it was assumed (i) that the average import content of visiting anglers' expenditure was the same as that of other tourists' (24.60 per cent*), (ii) that the average import content of Irish anglers' expenditure was equal to that of personal expenditure in Ireland (26.76 per cent*) and (iii) that the average import content of commercial salmon output was equal to the average import content of all exports from the fishing industry (13.68 per cent*). The import contents were calculated on this basis and deducted from gross outputs to give a net output of £402,000 for sales to visiting anglers; of £239,000 for sales to Irish anglers and of £1,035,000 for sales of salmon by commercial fishermen. Thus, the total net output or value added by salmon fishing in 1970 is estimated at £1,676,000.

In our two previous papers [1, 2] the concept of a "multiplied" value† and the difficulties associated with its use were discussed. In particular, it was emphasised that the multiplied values cannot be taken to measure benefits in a welfare sense. It was explained in [2] that the conditions for the application of a multiplier were met by the expenditure of the visiting anglers, but that a multiplier could not be applied to the Irish anglers' expenditure. In the case of receipts from commercial fishing, the conditions for the application of the multiplier, which were outlined in [2], seem to be met, since the regions where salmon fishing is practised tend to have high unemployment rates and few alternative forms of economic activity.

Assuming that it is appropriate to apply the multiplier of 1.6 to the total receipts of commercial fishermen, it is estimated that the multiplied value of commercial salmon fishing in 1970 amounted to £1.91m. The multiplied value of visiting anglers' expenditure as given in (1) is £829,000.‡ Adding these to the unmultiplied value of home anglers' expenditure (i.e. £326,000) gives an estimate of £3.1 m. for the total value of all activity, direct and indirect, generated by the Irish salmon fishing industry in 1970.

A different criterion of the value of salmon fishing to the State is its export earnings. These are shown in Table 23. In 1970, export earnings from angling

*See [8].

†The basic idea of a multiplied value is that each pound of income from salmon fishing generates further rounds of expenditure (income). Both the initial income and that arising in subsequent rounds is thus attributable to salmon fishing.

‡This includes adjustments for travel expenditure, payments to foreign travel firms and expenditure on non-angling visits.

(i.e. expenditure by out-of-state salmon anglers in Ireland) amounted to about £530,000, while exports of salmon were estimated at about £1.1 m. Thus the relative merits of angling as against commercial fishing are not quite so pronounced on this criterion as they were on the basis of gross output. However, account should be taken of the fact that, in addition to its export earnings, angling helps to redistribute income within Ireland in a socially desirable way, since urban Irish anglers visit the more depressed regions in pursuit of their sport.

Yet another way of evaluating the benefits from salmon fishing is on the basis of employment. We saw above that about 5,300 people are engaged in commercial salmon fishing and, on average, they spend about 12 weeks each year salmon fishing. Many of them are unemployed or under-employed at other times, so that this fishing forms quite an important part of their livelihood. It has been estimated that those salmon fishermen who experienced some

TABLE 23: *Value of Total Exports of Salmon, 1952-72*

<i>Year</i>	<i>Total Fresh (a)</i>	<i>Total Smoked (b)</i>	<i>Originating in Foyle Area* (c)</i>	<i>Originating in Republic (d) = (a) + (b) - (c)</i>
		£000		
1952	638.4	—	39.9	598.8
1953	666.1	—	88.8	577.3
1954	635.6	—	93.2	542.4
1955	451.9	—	64.7	387.2
1956	557.0	—	110.2	466.8
1957	534.0	—	109.4	424.6
1958	533.6	13.4	114.6	432.4
1959	547.1	12.6	92.4	467.3
1960	474.3	13.3	111.4	376.2
1961	393.0	15.2	81.0	327.2
1962	658.4	14.6	144.5	528.5
1963	822.5	24.9	153.9	693.5
1964	901.7	31.5	204.4	728.8
1965	723.8	35.6	104.3	655.1
1966	782.3	31.3	170.2	643.4
1967	752.1	32.9	174.6	610.4
1968	755.3	53.3	124.4	684.2
1969	1,087.0	85.0	168.6	1,003.4
1970	1,100.0	117.2	155.3	1,061.9
1971	1,283.0	78.8	146.4	1,215.4
1972	1,693.0	69.0	172.6	1,589.4

Sources: See Table A4 (i).

*See Table A4 (i) for method of calculation.

unemployment received about the same amount from the sale of salmon as they did from the State in the form of unemployment benefits (i.e. £300,000 from each source spread over 1,700 people). It was not possible to estimate accurately the employment content of the angling side of salmon fishing, but if we assume that it is proportional to total expenditure by all anglers then a very rough estimate would be about 3,800 persons, again employed for about 12 weeks each.

All the definitions of "value" which have been examined so far concentrate on the more quantifiable aspects of the concept—output, income, exports, etc. They do not reflect the full "amenity value" in the Clawson or Hotelling sense [see 2] nor do they take account of externalities such as the benefits which may manifest themselves in capitalised form near recreational facilities. Despite some efforts to estimate such "amenity values", we found, as explained in [2], that, for various practical reasons, we had to confine ourselves to the more easily quantifiable definitions.

Even on the basis of these definitions, however, salmon fishing was found to be an important national asset. It generates £2-3 m. in income, creates employment in regions which are relatively depressed and provides about £1.6 m. in export earnings. Its output has a low import content, so that its relative contribution to the economy is greater than that of many industries with much larger turnover.

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 incomes 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.

Dangers to Stocks

The vital question thus seems to be how we can best safeguard our salmon stocks. In order to understand the issues involved, it is convenient to think of the catches of Irish salmon according to the "exploitation sequence", illustrated in Fig. 6.

The first fishermen to catch adult Irish salmon are the deep-sea netmen off Greenland and elsewhere, who catch the fish on the feeding grounds. Irish open-sea drift netmen are next, operating mainly off the north and north-west coast. Then it is the turn of the draft, snap and loop netmen, and the inshore drifters. Fixed engines next take their toll, and anglers try their luck with the remaining fish which ascend the rivers. Those fish which survive constitute the breeding stock, when allowance is made for the effects of natural predators and poachers.

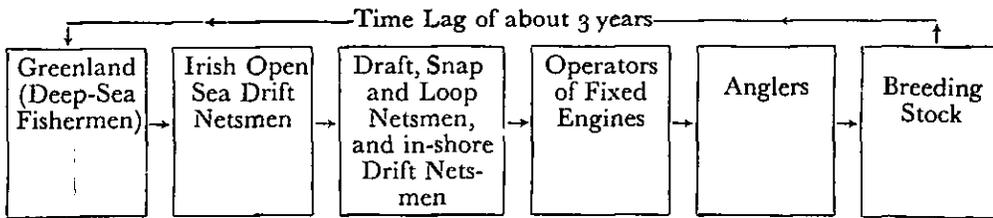


FIG. 6: The "Exploitation Sequence": Arrows indicate the effects of each type of fisherman.

It is also useful to remember that there is probably a maximum capacity for the production of Irish salmon, determined basically by the extent of spawning and nursery areas in the streams. Clearly, this capacity will vary from year to year depending on weather, drainage operations, pollution, etc., but for simplicity, let us assume it has some fixed average value in the long run. There will, therefore, be a fixed quantity of salmon which it is necessary to allow up to spawn in order to sustain the maximum average production. In addition, there will be a surplus or "crop" of fish which it is possible to catch without diminishing the stocks in the long run. If total catch by all methods is below this crop, it is possible to expand catch by one or more methods without causing a long-term decline in stocks. However, if total catch exceeds the crop, catches by fishermen further down the exploitation sequence will be affected, and total stocks will begin to decline.

Many of the anglers and the commercial fishermen that we interviewed expressed concern about the dangers which beset our salmon stocks. Excessive exploitation by one means or another was probably the single most frequently mentioned danger. However, the different groups of fishermen had, predictably, different views about how much each type of fisherman should be allowed to catch. This issue is discussed below, but before going on to it, we should mention some of the other dangers to stocks which were agreed to be of vital importance by both anglers and netmen.

Almost every fisherman we interviewed mentioned care of the spawning fish as an urgent priority. Many policies were suggested, but among those most frequently cited were: elimination and prevention of pollution; more careful protection of the spawning fish; improvement of the spawning beds; restocking and the prevention of poaching. Most anglers and netmen felt that, if our salmon stocks and the income and jobs which they provide are not to meet the fate of the salmon in other European countries, such measures must be implemented.

We now come to the question of exploitation, i.e. from the point of view of the community as a whole, what is the most rational way in which to utilise

our salmon resource? We consider the claims of the various types of fishermen in the order in which they appear in the exploitation sequence in Fig. 6.

Many of the fishermen mentioned excessive netting off Greenland as a major problem. An international agreement designed to limit the Greenland catch to about half of its previous level by 1976 has been signed since our survey was carried out. If its provisions can be adequately enforced, it should help to safeguard future stocks from excessive exploitation on the feeding grounds.

Drift nets are next in the exploitation sequence. The numbers of this type of net have expanded very rapidly in recent years, while the numbers of other types of engine have remained fairly constant. Catch per angler has shown a pronounced decline since 1963,* and catch per draft net also seems to have declined somewhat. Thus, some limitation on the number of drift net licences issued was appropriate and the Ministerial orders of 1972, 1973 and 1974 stabilised the numbers of draft nets at a level about three times that prevailing in the early 'sixties.

Many of the anglers and commercial fishermen that we interviewed felt that the number of drift net licences issued in 1970 (817) was excessive. They would be presumably even more concerned by the number issued in 1972, namely 1,156. The question then arises of how much validity these views have. The answer seems to hinge on two issues. The first is the determination of the maximum sustainable crop. Essentially, what is required is a (very rough) assessment of the spawning capacity of Irish rivers, combined with adequate monitoring of runs of fish. Such steps are an essential prerequisite for rational management of our salmon stock, since they will provide an estimate of the maximum sustainable crop and the size of the runs. If exploitation is above this maximum, then catches must be curbed or the salmon will disappear. Valuable information on these topics is already being obtained by the Salmon Research Trust on an individual river system. However, for the purposes of national policy, information, no matter how crude, on a wide variety of systems is also required, and steps should now be taken to begin the collection of such data.

If exploitation is at or near the maximum sustainable level, the number of licences of various type issued will determine how the benefits from salmon fishing are divided among various groups of fishermen. The second vital issue is therefore the question of how best, from the point of view of the whole community, to divide the salmon crop between the various groups.

Let us consider first of all the potential conflict between the interests of drift and other (mainly draft) netmen. The number of licences issued to drift netmen will fundamentally affect the catch by the others. It might be argued that

*It must be remembered that Salmon Disease (U.D.N.) which began to affect Irish rivers in 1964 has also had an effect on catch per angler.

preference should be given to that group which is most in need, that is, has the highest unemployment rate or the fewest alternative occupations. However, from the data given above, there seems to be little difference between drift and other netmen on these points. Thus, the two groups should be given an equal chance to catch salmon. This may mean limiting drift netting more than other netting, since drift nets are the first in the exploitation sequence.

The relative merits of angling versus all commercial fishermen are also difficult to assess. As was shown above, angling is far from being a mere hobby; it is a valuable source of income, employment and export earnings. However, this case must not be overstated. Over-zealous advocates of angling sometimes do this by quoting the value of a salmon to a commercial fisherman as being, perhaps, £2, while to a foreign angler the same fish is worth over £100 (in the sense that the total expenditure by all foreign anglers divided by their catch gives an average of over £100). The fallacy in this argument is in its implications rather than its facts, for it implies that if one more salmon is let up the river, an extra £100 will be spent by anglers.

Let us assume that commercial catch is at or below the maximum sustainable, and that commercial netting is restricted so that 1,000 salmon are allowed upstream which would otherwise have been caught by netmen. The figures given in the 1972 Annual Report of the Salmon Research Trust [9] show that in the Burrishoole riversystem in Co. Mayo, where the total number of ascending salmon is counted, the percentage of the total salmon stock in the system taken by anglers was about 22–24 per cent. If we assume that this is reasonably typical of the State as a whole, then the efficiency rate of angling in Ireland is 20 per cent.

This will give a catch of 200 salmon from our initial 1,000. In 1970, we have estimated that 15 per cent [2] of the catch went to visitors and 85 per cent to Irish residents. If we assume that these proportions continue to hold, about 30 salmon of this two hundred will be caught by visitors and 170 by Irish anglers. We have also estimated [1] that the catch for visiting anglers is 1.1 lb per rod/day (= 0.16 salmon, at 7 lb per fish) and the catch of Irish anglers is 1.0 lb per rod/day (= 0.14 salmon, again at 7 lb per fish). Thus, the 200 fish will yield 188 (= 30/16) rod/days for visitors and 1,214 (= 170/14) rod/days for Irish anglers. Visitors spend an average of about £7.2 per rod/day while Irish anglers spend about £1.2 per rod/day. This gives a total expenditure of about £2,800 for the 1,000 salmon (= 188 × 7.2 + 1,214 × 1.2), i.e. a value per fish of about £2.81. The commercial value of a salmon in 1970 was about £2.45.

Several qualifications to this illustrative example must be kept in mind. In the first place, it makes many assumptions about the constancy of the various proportions involved. We assume that in the new situation the proportion of Irish to visiting anglers remains constant. This may not be valid if total stocks

are considerably above or below their 1970 levels. Furthermore, the efficiency of angling may be somewhat high. Lower rates would lead to a lower figure for value per fish.

Secondly, it should not be forgotten that a certain proportion of the salmon which escape the anglers will survive spawning, and return in later years to provide either income for netsmen or sport for anglers. If all the 1,000 fish are caught by netsmen, this cannot happen.

Thirdly, it cannot be over-emphasised that the above example refers to a situation *where adequate numbers are allowed to spawn*. If the numbers of fish allowed upstream are below the spawning capacity of the river, then allowing up this 1,000 extra fish will yield not only a return of £2·81 per fish in the current year, but will also yield returns to both anglers and netsmen in future years. The advisability of restrictions on netting in this case is obvious.

A fourth, and final, qualification relates to the responsiveness of numbers of anglers to changes in the stocks of salmon. In the above example, we have assumed that, for each proportionate increase in the numbers of catchable salmon, the rod/days and money spent by anglers will increase in the same proportion. The validity of this assumption* cannot be accurately assessed at the moment.

However, the British National Angling Survey [10] does show that there are half a million game fishermen in Britain, of whom only about one in ten usually catches salmon, but nearly half of whom would like to catch salmon more than any other game fish. This is evidence of a large and unsatisfied demand for salmon angling, and suggests that increases in the salmon stocks in our rivers would be matched by increases in the numbers of visiting anglers.

The choice between exploitation by angling or by commercial methods is thus far from clearcut. It is further complicated by the fact that, in places, whole communities are dependent on commercial salmon fishing as an important part of their livelihood. Excessively stringent restrictions will hit these communities hard. On the other hand, so would a decline in salmon stocks. Furthermore, advocates of angling argue that angling is a far less "salmon-intensive" way of creating income and employment than is commercial fishing. That is, in a time of heavy pressure on stocks, more income and employment would be provided by angling than by commercial fishing. They also claim, with some justification, that angling should be encouraged because anglers help to protect rivers by reporting poaching and pollution, so benefiting all fishermen.

*The economist might term this concept the elasticity of demand for salmon angling with respect to the (expected) success rate. In the example, we have assumed it to be equal to 1. It could just as easily have other values, either greater or less than 1·0. An elasticity of greater than 1·0 would imply that the above value per rod-caught fish of £2·81 is an underestimate, while an elasticity of less than 1 would imply that this value is an overestimate. An attempt was made to assess the elasticity by means of regression analysis in [2], but the results were unsatisfactory.

The argument is sometimes taken even further and a total ban on all commercial salmon fishing is suggested. We feel that this is too extreme a view in the present Irish context, as it would probably lead to considerable wastage of fish which could be harvested without long-term detriment to the stocks, or severe losses in income of employment from angling. The best course would seem to be to strike a balance between the interests of those at various stages in the exploitation sequence. These interests are frequently in conflict, and so this balance will, implicitly or explicitly, involve value judgements. However, the over-riding consideration of policy should be to ensure the survival of our salmon stocks. Ultimately, this must be to the benefit of *all* salmon fishermen.

SUMMARY

THIS paper forms the third and final part of a study entitled "An Economic Evaluation of Irish Salmon and Sea-Trout Fishing" which was sponsored by the Department of Agriculture and Fisheries. This part describes the activities and opinions of commercial fishermen and owners of waters, analyses trends in salmon catches over time and attempts to sketch a comprehensive picture of Irish salmon fishing based on the results of the three parts of the study.

Types of Fishing Engine Used

Drift Nets: These nets operate by "meshing" salmon and are used in estuaries and the open sea. In 1970, 817 such nets were licensed, i.e. 47 per cent of all commercial engines.

Draft Nets: These nets are cast from a boat and are hauled up onto the shore. In 1970, 667 draft net licences were issued, comprising 39 per cent of all commercial engines.

Snap Nets: These nets are confined to the districts of Waterford and Lismore. They are operated from two boats and involve doubling the net around the fish. In 1970, 153 snap nets were licensed, i.e. 9 per cent of all commercial engines.

Loop Nets: These consist of a triangular wooden frame with netting attached. They are operated by a single fisherman and are confined to the Letterkenny district. Thirty-four such licences were issued in 1970.

Fixed Engines: These include a wide variety of other devices such as Bag Nets, Stake Nets, Head Weirs, Boxes, Cribs, etc. Fifty-four such licences (i.e. 3 per cent of all commercial licences) were issued in 1970.

THE SURVEY

Having conducted a small pilot study in early 1970 with satisfactory results, the main study was carried out in 1971. Two samples were involved. The first was a random sample of 328 names, selected from the Department's licence counterfoils and stratified by district of issue. Provision was made for the use of substitute names if the sample size fell below the desired level in any district. When these substitutes were used, the achieved sample amounted to 313 or 95 per cent of the target. The second sample consisted of owners of waters and was drawn from the General Valuation Office records.

Results of Survey

Employment: The total number of persons engaged in salmon fishing was estimated at 5,265. About 4,600 (88 per cent) of these were share fishermen, about 280 (5 per cent) were employees, 170 (3 per cent) were relatives assisting, about 150 (3 per cent) were non-fishing share members and the remaining 1 per cent were employers.

Time Spent Fishing: The average number of weeks during which some fishing was carried out amounted to 12. The season in the eastern and southern districts seems longer than in the western districts. The total number of man weeks engaged on salmon fishing amounted to about 63,000.

Respondents spent an average of about 5 weeks fishing for species other than salmon. Drift netmen spent a higher than average number of weeks (seven) at this activity. The number of weeks during which some farmwork was done by respondents averaged about 14 weeks and varied from none in Dublin to 28 in Bangor/Ballina. Respondents spent an average of about 16 weeks in non-farm occupations and about 9 weeks wholly unemployed. However, this does not take account of under-employment which is known to be high in many of the districts involved.

About one-third of the respondents experienced at least one week's whole-time unemployment. The average duration among these respondents is very high, amounting to 27 weeks for the country as a whole. Average weekly unemployment payments amounted to about £7 and the total amount of unemployment payments made to salmon fishermen in 1970 was in excess of £300,000.

Capital Investment: Capital was valued at replacement cost and discounted on a straight line basis. Total capital investment for the country as a whole amounted to about £931,000, about 60 per cent of which was in boats and engines, 17 per cent in dams, weirs, etc., 13 per cent in nets, 7 per cent in cars, vans, etc., 2 per cent in boat-houses, etc., and the remaining 1 per cent in other items. Average capital investment was about £540 per licence, and varied from £77 per licence in Drogheda/Dundalk to £1,002 per licence in Bangor/Ballina.

Costs: Total costs (including depreciation) were estimated at about £389,000 for the country as a whole. About 40 per cent of these costs was attributable to depreciation, about 14 per cent to repairs to boats and buildings, about 13 per cent to fuel and oil, 10 per cent to other repairs, 8 per cent to licences, etc., and the remaining 15 per cent to other costs. Average expenditure per licence amounted to about £226 overall, including depreciation.

Catch: Estimates of total catch based on data obtained from the survey corresponded quite closely with the official catch statistics as published in the Sea and Inland Fisheries Reports. The official figures were therefore accepted in preference to the sample estimates. Total catch in 1970 amounted to about 3.4 m. lb valued at £1.2 m. Drift nets accounted for about 52 per cent of this total, draft nets for 37 per cent, snap and loop nets for 6 per cent and fixed engines for 6 per cent. The overall average catch per licence was 1,966 lb. Drift nets caught an average of about 2,140 lb per licence, draft nets an average of 1,891 lb, snap nets about 1,000 lb each, loop nets about 180 lb and fixed engines about 3,600 lb. Catch per licence was highest in Bangor/Ballina and Lismore and lowest in Dublin and Wexford.

Income Arising in Salmon Fishing: Income arising from salmon fishing in Ireland amounted to about £810,000. Total income arising was highest in Letterkenny and lowest in Dublin. About 15 per cent of this total was paid out in wages and salaries and the remaining 85 per cent accrued to self-employed persons. Income arising per licence is highest in Lismore and Kerry and lowest in Dublin and Wexford. Income arising per man per day tended to be highest in drift netting regions such as Letterkenny and Sligo/Ballyshannon.

Sales Outlets and Division of Catch: About 76 per cent of the total catch was sold to private dealers, about 18 per cent to co-operatives, 2 per cent was directly exported and about 4 per cent sold to hotels, guesthouses and private consumers.

It is estimated that 46 per cent of the catch accrued to the licence holders, about 51 per cent to other crew members and the remaining 2 per cent to non-fishing share members. These percentages varied little as between the different districts.

Opinion Data: About 48 per cent of the commercial fishermen felt that the 1970 season had been average or better, while the remainder believed that it had been worse than average. Greenland netting, excessive draft or drift netting and pollution were the main reasons given by those who felt the fishing had deteriorated. Given a list of proposed policies from which to choose, 37 per cent of fishermen felt that "more restocking and improvement of spawning beds" was the most important policy, 15 per cent opted for "lengthening the fishing season", 11 per cent for "tougher laws on river pollution" and 10 per cent for restrictions on drift netmen.

Unlike the commercial fishermen, a clear majority of the operators of commercial and angling waters felt that the 1970 season had been worse than average. Their most frequently mentioned remedy for this problem was the

control of pollution. Those operators whose waters had been the subject of drainage schemes felt that these schemes had had a detrimental effect.

TRENDS IN SALMON CATCH

The published catch figures for the years prior to 1969 seemed somewhat unrealistic, and were re-estimated on the basis of the export statistics. Total commercial catch seems to have shown an overall decline until 1961 when it stood at an estimated 1.2 m. lb. In 1962 and 1963 catch increased dramatically, then fell to 2.2 m. lb. in 1966, after which it rose to a record level of 3.5 m. lb in 1972.

Average export prices, in current terms, remained fairly constant until 1968, after which they rose sharply. However, deflating these figures shows that the rise in price coincided with a general increase in food prices, so that salmon has not become appreciably dearer relative to other foodstuffs. Exports exhibit a strong seasonal pattern, being low till about May, then rising to a pronounced peak in July and declining thereafter. However, due to the increasing use of deep-freeze facilities, this pattern has become less pronounced in recent years.

Drift net catch has risen substantially since 1961 when it stood at an estimated 0.22 m. lb or 19 per cent of total catch. In 1972 it amounted to 2.35 m. lb or 67 per cent of total catch. Draft net catch has declined from 1.74 m. lb in 1963 to 0.90 m. lb in 1972, while catch by all other engines has fallen from 0.51 m. lb in 1963 to 0.26 m. lb in 1972. The trend in catch per drift net has been generally upwards since 1963, whereas that of catch per draft net, per other engine and per angling licence has been downward. Regression analysis suggests that increasing drift net catches since 1963 have been causing a decline in catch by other methods.

IRISH SALMON FISHING: AN OVERVIEW

The "Value" of Irish Salmon Fishing

Several different definitions of the value of an industry can be advanced. Gross output is one such definition, and the gross output of the salmon fishing industry in 1970 is estimated at £2.1 m., 42 per cent of which arises from angling while 58 per cent arises from commercial fishing.

Net output or "value added" is another possible definition. Net output of the salmon fishing industry amounted to about £1.7 m. Assuming that it is valid to apply multipliers to the value of the catch and to the visiting anglers' expenditure, an estimate of £3.1 m. is arrived at for the total value of all activity, both direct and indirect, generated by salmon fishing in 1970.

Export earnings from salmon fishing amounted to £1.6 m. About 5,300

people are employed in commercial salmon fishing, for an average of about 12 weeks each. A rough approximation to the numbers employed in supplying services to anglers amounted to about 3,800 persons, again employed for an average of about 12 weeks each.

Salmon fishing is therefore an important national asset. It generates £2-3 m. in income, creates employment in regions which are relatively depressed and provides about £1.6 m. in export earnings. Its output has a low import content so that its relative contribution to the economy is greater than that of many industries with much larger turnover. The value of the industry seems likely to increase in the years ahead.

Dangers to Stocks

It is therefore vital that our salmon stocks be exploited in the most rational fashion possible. Firstly, the Irish Government should continue to press for a solution to the problem of excessive netting off Greenland at international level. Secondly, further information must be obtained regarding the total spawning capacity of Irish rivers and the runs of fish should be adequately monitored.

Thirdly, consideration must be given to limiting the number of licences issued for the various different types of engine. There seems to be little difference between the draft and drift netmen as regards the level of unemployment experienced or the alternative occupations available. Both groups should therefore be given an equal chance to catch salmon. This may mean limiting drift netting more than other forms of netting, since drift nets are the first in the exploitation sequence.

Although salmon angling is indeed an important source of income and employment, excessive claims are sometimes made for the value of each fish that is caught by an angler. Provided one can make the (rather contentious) assumption that spawning escapement in 1970 was sufficient to keep stocks at or near their maximum level, then it is estimated that the value of an extra fish being allowed upstream which would otherwise have been caught by the netmen was £2.81. The value of such a fish if caught by netmen was £2.45. However, in a time of mounting pressure on salmon stocks the balance will be tipped increasingly in favour of angling, since this is less "salmon-intensive" than netting.

Weighing the merits of the claims of the various groups (drift netmen, draft netmen, anglers, owners, etc.) will necessarily involve difficult value judgements. However, the overriding consideration for policy makers should be the survival of the salmon.

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APPENDICES

APPENDIX A

TABLE A1: Licences Issued and Catch Returns† 1955-70

Year	Licences Issued		Catch													
			Salmon						Sea Trout							
	Commercial	Rod and Line	Commercial				Anglers		Total Salmon	Commercial				Anglers		Total Sea Trout
			Drift Net lb	Draft Net lb	Other lb	Total lb	Weight lb	Number		Drift Net lb	Draft Net lb	Other lb	Total lb	Weight lb	Number	
'000																
1955	1,244	6,604	234.6	606.4	173.8	1,014.8	246.5	28.6	1,261.4	1.4	27.5	2.0	30.9	42.3	46.6	73.2
1956	1,229	7,495	250.7	720.8	207.8	1,279.0	264.2	35.8	1,443.2	1.2	33.6	2.1	36.9	56.2	57.7	93.2
1957	1,246	7,785	298.4	1,003.4	188.3	1,490.1	309.5	39.6	1,799.5	3.6	37.4	3.0	41.0	56.6	56.5	100.5
1958	1,146	8,294	286.1	772.4	220.0	1,278.5	375.4	49.7	1,654.0	1.4	23.6	1.1	26.1	40.3	38.3*	66.4
1959	1,230	7,567	352.5	865.8	146.2	1,364.5	259.9	31.6*	1,624.4	5.6	24.5	6.1	36.2	41.5	45.4*	77.7
1960	1,195	8,477	263.5	701.2	169.2	1,133.9	230.4	27.2	1,364.3	1.3	16.2	1.1	18.6	43.4	45.1	61.9
1961	1,121	8,322	218.2	741.3	192.7	1,152.2	193.4	25.3	1,345.6	1.2	23.0	1.8	26.0	64.1	64.9	90.1
1962	1,180	8,780	606.8	1,622.6	376.8	2,606.2	257.6	34.3	2,836.9	1.4	23.4	2.5	27.3	63.0	59.9	90.4
1963	1,289	9,435	687.2	1,395.9	412.0	2,495.1	341.5	40.3	2,836.6	0.8	21.9	4.1	26.8	64.8	65.7	91.7
1964	1,523	11,353	761.6	1,496.0	365.0	2,622.6	390.1	52.5	3,012.7	1.2	29.7	2.9	33.6	71.9	74.6	105.7
1965	1,435	12,378	795.0	1,250.2	407.8	2,453.0	416.3	54.9	2,869.3	4.6	25.0	0.3	29.9	83.7	83.0	113.6
1966	1,492	11,621	744.0	961.4	319.4	2,024.8	301.6	35.7	2,326.4	2.0	20.2	0.9	23.1	63.3	64.8	86.4
1967	1,531	10,502	1,015.7	1,071.3	366.0	2,453.0	267.8	35.3	2,720.8	8.5	51.3	1.1	60.9	68.1	70.0	129.0
1968	1,451	9,676	1,040.4	1,059.0	351.2	2,450.6	251.4	33.7	2,702.0	8.1	45.9	1.0	55.0	69.6	70.2	127.3
1969	1,608	10,506	1,678.5	1,206.8	336.3	3,221.6	182.2	23.8	3,403.8	7.9	46.8	1.0	55.7	71.6	72.0	127.3
1970	1,769	11,210	1,730.9	1,261.0	381.7	3,373.6	136.8	17.9	3,520.4	5.1	40.3	0.9	46.3	40.4	60.6	86.7

Sources: Sea and Inland Fisheries Reports, 1955-1969.

*Estimates by authors.

†Duc to rounding errors the figures in each row do not necessarily add to the totals shown.

TABLE A 2: Percentage Distribution of Commercial Fishermen who Favoured (Yes) and Opposed (No) Certain Suggestions for the Improvement of Commercial Salmon Fishing, Classified by Fishery District and Type of Licence*

Fishery District	Suggestion																						
	Restrict drift netsmen		Restrict draft netsmen		Restrict other commercial fishermen		Restrict number of anglers		Shorten weekly closing time		Lengthen fishing season		Tougher laws on pollution		More restocking and better spawning beds		Restrict drainage operations		More and better piers moorings, etc.		More restrictions on net sizes		
	No.	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	<i>Per Cent</i>																						
Dublin	13	31.0	62.1	39.3	53.6	10.7	71.4	14.3	67.9	10.7	78.6	78.6	14.3	93.1	0.0	93.2	0.0	93.1	0.0	93.0	0.0	25.0	28.6
Wexford	18	16.1	11.3	16.4	39.4	4.9	16.4	11.3	27.4	27.4	33.9	56.4	33.9	95.2	0.0	95.2	0.0	50.8	16.4	61.3	0.0	4.8	22.6
Waterford	40	81.9	10.4	27.3	16.7	42.8	26.2	15.5	57.6	10.3	82.2	29.8	63.9	91.1	2.6	97.4	2.6	89.7	2.6	76.5	0.0	47.8	26.1
Lismore	28	46.9	46.9	17.5	51.5	35.7	51.0	8.3	87.6	10.3	87.6	43.9	56.1	98.0	2.0	100.0	0.0	87.7	0.0	73.5	2.0	28.9	51.5
Cork	27	42.4	43.5	42.4	43.5	43.5	41.2	11.8	67.1	14.1	76.5	48.2	42.4	100.0	0.0	97.7	0.0	79.1	8.1	58.8	8.2	27.1	58.8
Kerry	22	51.6	35.1	21.9	68.8	8.3	78.3	14.4	85.6	36.5	50.6	76.3	23.7	100.0	0.0	96.9	0.0	60.4	14.6	92.7	3.1	45.8	33.3
Limerick	26	30.9	38.8	23.0	35.1	37.7	31.9	27.2	38.2	39.1	49.5	78.0	11.0	81.1	7.9	88.6	0.0	49.7	23.6	46.1	3.7	30.4	23.0
Galway/ Connemara/																							
Ballinakill	23	30.6	50.9	28.0	53.3	13.0	63.0	8.3	59.3	1.9	47.2	62.0	8.3	53.5	5.6	87.2	0.0	33.0	14.7	70.4	5.6	11.1	38.9
Bangor/Ballina Sligo/	27	40.2	54.3	32.3	37.0	66.9	20.5	11.7	81.3	11.8	78.7	49.2	43.8	88.3	0.0	94.5	0.0	47.7	21.9	94.5	0.0	27.4	60.9
Ballyshannon	27	55.8	44.2	37.5	50.0	34.1	47.3	7.0	61.2	15.5	84.5	66.4	22.7	96.1	0.0	100.0	0.0	50.4	7.0	84.5	0.0	69.5	19.5
Letterkenny	31	38.8	54.1	41.2	51.4	34.5	37.7	15.5	91.0	14.3	45.5	28.2	41.2	98.4	0.0	100.0	0.0	76.8	3.2	69.0	3.1	49.2	7.1
Drogheda/ Dundalk	20	55.2	4.8	35.2	40.0	44.8	20.0	14.5	55.7	0.0	100.0	80.6	9.7	100.0	0.0	100.0	0.0	60.5	9.7	50.0	9.7	20.2	50.0
<i>Licence Type</i>																							
Draft	151	48.5	26.5	29.5	49.7	29.9	39.7	14.4	55.5	19.4	65.9	7.5	17.5	91.0	2.3	95.6	0.0	57.7	15.8	63.5	5.4	35.5	32.8
Drift	123	47.2	44.2	28.4	37.7	42.9	36.8	15.0	68.2	22.7	66.8	39.6	45.2	91.3	1.8	95.6	1.1	73.5	5.6	83.6	1.2	37.3	32.3
Snap and Loop	28	63.0	23.4	41.9	18.5	27.2	31.5	0.0	87.6	15.1	79.0	37.0	60.3	83.3	1.1	100.0	0.0	69.7	4.9	40.9	1.1	42.7	20.5
All	302	49.5	34.9	30.5	40.4	36.0	37.5	13.0	65.5	20.5	67.9	51.7	35.9	91.0	1.9	96.2	0.6	67.0	9.6	71.0	2.0	37.2	31.2

*In any cell the difference between the percentage answering "Yes" and "No" and the total percentage, is accounted for by "No Answer's".

TABLE A3: Percentage Distribution of "Best Suggestion" for Improvement of Commercial Salmon Fishing Classified by Fishery District and Type of Licence

Fishery District	More restocking and improvement spawning beds	Lengthening of fishing season	Tougher laws on river pollution	Restrict drift netsmen	More or better piers	Various* other improvements	More restriction on size of nets	Restrict draft netsmen	Restrict other commercial fishermen	Shorten weekly closing time	Restrict anglers	Restrict drainage operations	No answer	Total No.
	Per Cent													
Dublin	7.4	3.7	66.7	0.0	3.7	0.0	0.0	0.0	0.0	11.1	0.0	0.0	7.4	100- 18
Wexford	67.4	11.5	16.4	0.0	4.9	0.0	0.0	0.0	0.0	4.9	0.0	0.0	4.9	100- 18
Waterford	33.9	0.0	18.4	20.7	0.0	10.4	8.0	0.0	7.8	0.0	0.0	0.0	0.0	100- 40
Lismore	29.5	8.4	4.2	11.8	8.4	27.4	4.2	0.0	4.2	2.1	0.0	0.0	0.0	100- 28
Cork	63.7	8.4	8.4	7.2	2.4	2.4	0.0	0.0	0.0	0.0	0.0	0.0	2.4	100- 27
Kerry	13.6	38.6	8.4	0.0	30.2	0.0	0.0	0.0	0.0	9.4	0.0	0.0	0.0	100- 22
Limerick	19.4	58.1	3.7	3.7	0.0	0.0	0.0	7.9	0.0	3.7	0.0	0.0	3.7	100- 26
Galway/Connemara/ Ballinakil	42.3	21.1	0.0	15.4	1.9	5.8	0.0	5.8	1.9	1.9	0.0	1.9	1.9	100- 23
Bangor/Ballina	20.6	5.6	17.5	14.3	23.8	0.0	0.0	12.7	0.0	5.6	0.0	0.0	0.0	100- 27
Sligo/Ballyshannon	34.9	4.0	0.0	23.0	20.6	12.7	2.4	2.4	0.0	0.0	0.0	0.0	0.0	100- 27
Letterkenny	64.4	0.0	5.1	1.6	5.5	0.0	8.7	0.0	2.0	0.0	11.1	0.0	0.0	100- 31
Drogheda/Dundalk	35.8	25.2	14.6	4.9	0.0	0.0	0.0	9.8	0.0	0.0	0.0	4.9	1.6	100- 20
<i>Licence Type</i>														
Draft	36.3	24.1	8.8	9.4	8.4	1.1	1.8	4.4	0.3	2.3	0.0	1.2	2.0	100- 151
Drift	33.1	9.5	9.0	3.5	8.5	8.5	3.8	3.1	8.8	2.1	8.4	0.0	1.1	100- 123
Snap and Loop	32.0	2.2	22.6	21.0	0.0	8.3	9.9	0.0	2.8	1.1	0.0	0.0	0.0	100- 23
<i>All</i>	37.4	14.5	10.5	10.4	7.4	5.3	3.7	3.2	2.3	2.0	1.7	0.5	1.2	100- 302

*This category of suggestions is comprised of the wide variety of responses to Q. 12 (See Q. 12, p. 98, in the questionnaire, Appendix B).

TABLE A4 (i): *Total Exports and Total Commercial Catch (Published and Estimated) of Salmon 1952-72*

Year	Exports from Republic				Published Catch in Republic	Estimated Catch in Republic	
	Total Fresh	Total* Smoked	Originating in Foyle Area†	Originating in Republic		"High" Estimate	"Low" Estimate
	(a)	(b)	(c)	(d) = (a) + (b) - (c)		(e)	(f)
000 lb.							
1952	2,020.4	—	126.3	1,894.1	1,632.7	3,044.6	2,525.5
1953	1,877.8	—	250.4	1,627.4	1,640.3	2,616.0	2,187.0
1954	1,962.8	—	287.9	1,674.9	1,683.6	2,692.3	2,268.8
1955	1,247.1	—	178.5	1,068.6	1,014.8	2,117.7	1,459.1
1956	1,519.2	—	245.9	1,273.3	1,179.0	2,046.8	1,752.7
1957	1,759.5	—	360.4	1,399.1	1,490.1	2,249.0	1,941.6
1958	1,568.7	21.8	358.6	1,231.9	1,278.5	1,980.2	1,723.6
1959	1,532.4	20.7	279.4	1,273.7	1,364.5	2,047.4	1,796.9
1960	1,223.0	20.2	307.6	935.6	1,133.9	1,503.9	1,330.9
1961	1,014.6	24.0	233.2	805.4	1,152.2	1,294.6	1,155.4
1962	2,109.4	22.7	485.6	1,646.5	2,606.2	2,646.7	2,382.1
1963	2,629.4	37.8	530.0	2,137.2	2,495.1	3,435.5	3,118.5
1964	2,535.9	47.7	622.5	1,961.1	2,622.6	3,152.4	2,886.3
1965	2,175.0	57.8	371.3	1,861.5	2,453.0	2,992.3	2,763.6
1966	1,921.8	46.4	464.4	1,503.8	2,024.8	2,417.3	2,252.2
1967	2,265.5	54.6	580.5	1,739.6	2,453.0	2,796.3	2,628.5
1968	2,222.9	81.1	447.1	1,856.9	2,450.6	2,984.9	2,830.9
1969	2,167.3	126.0	462.2	1,831.1	3,221.6	3,221.6	3,221.6
1970	2,509.3	148.3	502.7	2,154.9	3,373.6	3,373.6	3,373.6
1971	2,333.1	98.6	365.0	2,066.7	3,159.3	3,159.3	3,159.3
1972	2,443.1	86.2	334.9	2,194.4	3,502.5	3,502.4	3,502.4

Sources: Trade Statistics of Ireland 1952-1972, Central Statistics Office, Foyle Fisheries Commission Annual Reports, 1952-1972. Reports on Sea and Inland Fisheries, Department of Agriculture and Fisheries, 1952-1972.

*The figures shown in this column are salmon which are "dried, salted or smoked but not further prepared", as recorded in the export statistics, multiplied by 1.5 to convert to original (unprepared) weight.

†The figures shown in this column are 65 per cent of the catch by licensed commercial fishermen in the Foyle area, on the assumption that 65 per cent of the total Foyle catch (excluding catch by the Commission itself) is bought by salmon dealers in the Republic for export.

TABLE A4 (ii): Value of Total Exports and of Total Commercial Catch (Published and Estimated) of Salmon 1952-72

Year	Exports from Republic				Published Catch in Republic	Estimated Catch in Republic	
	Total Fresh	Total Smoked	Originating in Foyle Area*	Originating in Republic		"High" Estimate	"Low" Estimate
	(a)	(b)	(c)	(d) = (a) + (b) - (c)	(e)	(f)	(g)
£000							
1952	638.4	—	39.9	598.8	415.9	775.6	643.3
1953	666.1	—	88.8	577.3	465.5	742.3	620.6
1954	635.6	—	93.2	542.4	425.6	680.6	573.5
1955	451.9	—	64.7	387.2	294.7	498.6	423.7
1956	557.0	—	110.2	466.8	339.0	588.2	504.0
1957	534.0	—	109.4	424.6	363.4	548.5	473.5
1958	533.6	13.4	114.6	432.4	347.6	538.4	468.6
1959	547.1	12.6	92.4	467.3	405.3	608.1	533.6
1960	474.3	13.3	111.4	376.2	334.3	443.4	392.3
1961	393.0	15.2	81.0	327.2	345.4	388.1	346.4
1962	658.4	14.6	144.5	528.5	546.1	554.6	499.1
1963	822.5	24.9	153.9	693.5	602.1	829.0	752.5
1964	901.7	31.5	204.4	728.8	667.6	802.5	734.7
1965	723.8	35.6	104.3	655.1	588.9	718.4	663.4
1966	782.3	31.3	170.2	643.4	578.1	690.1	643.0
1967	752.1	32.9	174.6	610.4	581.3	662.7	622.8
1968	755.3	53.3	124.4	684.2	617.8	752.4	713.7
1969	1,087.0	85.0	168.6	1,003.4	1,047.0	1,047.0	1,047.0
1970	1,100.0	117.2	155.3	1,061.9	1,180.9	1,180.9	1,180.9
1971	1,283.0	78.8	146.4	1,215.4	1,263.7	1,263.7	1,263.7
1972	1,693.0	69.0	172.6	1,589.4	2,031.4	2,031.4	2,031.4

Sources: See Table A4 (i).

*See Table A4 (i).

TABLE A5: Price per lb of Catch and Exports (Actual and Deflated) 1952-72

Year	Catch Price		Export Price		Difference between Export Price and Catch Price	
	Actual	Deflated*	Actual	Deflated*	Absolute	As percentage of Catch Price
			p.		p.	Per Cent
1952	25.5	—	31.6	—	6.1	23.9
1953	28.4	28.4	35.5	35.5	7.1	25.0
1954	25.3	25.8	32.4	33.1	7.1	28.1
1955	29.0	28.3	36.2	35.2	7.2	24.8
1956	28.8	29.1	36.7	37.2	7.9	27.4
1957	24.4	22.9	30.3	28.3	5.9	24.2
1958	27.2	23.9	34.0	29.9	6.8	25.0
1959	29.7	26.0	35.7	31.3	6.0	20.2
1960	29.5	26.5	38.8	34.8	9.3	31.5
1961	30.0	26.6	38.7	34.3	8.7	29.0
1962	21.0	18.4	31.2	27.3	10.2	48.6
1963	24.1	21.1	31.7	27.7	7.6	31.5
1964	25.4	20.7	35.6	28.9	10.2	40.2
1965	24.0	18.8	33.3	26.1	9.3	38.8
1966	28.6	22.8	40.7	32.4	12.1	42.3
1967	23.7	18.6	33.2	26.0	9.5	40.1
1968	25.2	18.1	34.0	24.5	8.8	34.9
1969	32.5	22.1	50.2	34.3	17.7	54.5
1970	35.0	22.7	43.8	28.4	8.8	25.1
1971	40.0	24.7	55.0	33.9	15.0	37.5
1972	58.0	30.9	69.3	36.9	11.3	19.5

*The deflator used was the wholesale price index for food items, as published in the Irish Statistical Bulletin (Base period=1953). This deflator was not available for 1952.

TABLE A6: Five Year Averages (1948-1972) of the Quantities of Salmon Exported* in each Month and Monthly Price per lb

Year	Jan.	Feb.	Mar.	Apr.	May	Month						
						June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<i>Quantities (000 lb)</i>												
1968-72	27.89	34.27	54.54	87.7	103.94	317.41	85.44	210.90	12.77	91.28	102.37	70.11
1963-67	11.09	45.25	97.39	146.61	199.58	447.10	1,025.92	180.99	52.30	43.45	34.72	26.34
1958-62	3.58	35.95	74.70	124.1	145.04	300.38	639.30	116.82	23.86	16.02	4.93	8.06
1953-57	4.26	82.88	121.07	185.25	204.18	382.70	584.08	80.30	10.42	13.89	1.46	2.69
1948-52	10.86	88.41	137.16	248.53	297.34	433.66	82.10	82.10	12.66	1.37	3.40	3.89
<i>Average Price (p. per lb)</i>												
1968-72	49	66	68	70	78	46	45	53	59	50	58	53
1963-67	51	52	50	51	48	36	28	28	33	32	33	32
1958-62	47	46	47	47	47	37	28	27	34	33	31	32
1953-57	49	40	41	40	39	32	29	33	35	29	33	34
1948-52	31	31	31	31	31	25	28	31	31	37	31	31

*Including salmon caught in the Foyle District but exported from the Republic.

TABLE A7: *Estimated Commercial Catch by the Various Types of Engine, 1952-72*

Year	Quantity				Percentage			
	Draft	Drift	Other	Total	Draft	Drift	Other	Total
	ooo lb.				%			
1952	1,301.6	659.6	564.3	2,525.5	51.5	26.1	22.3	100.0
1953	1,190.9	495.2	500.9	2,187.0	54.5	22.6	22.9	100.0
1954	1,241.6	639.5	387.8	2,268.8	54.7	28.1	17.1	100.0
1955	871.9	337.4	249.8	1,459.1	59.8	23.1	17.1	100.0
1956	1,071.5	372.7	308.5	1,752.7	61.1	21.3	17.6	100.0
1957	1,307.5	388.8	245.3	1,941.6	67.3	20.0	12.6	100.0
1958	1,041.3	385.7	296.6	1,723.6	60.4	22.4	17.2	100.0
1959	1,140.2	464.2	192.5	1,796.9	63.4	25.8	10.7	100.0
1960	823.0	309.3	198.6	1,330.9	61.8	23.2	14.9	100.0
1961	743.3	218.8	193.2	1,155.4	64.3	18.9	16.7	100.0
1962	1,483.0	554.6	344.4	2,382.1	62.2	23.3	14.5	100.0
1963	1,744.7	858.9	514.9	3,118.5	55.9	27.5	16.5	100.0
1964	1,646.4	838.2	401.7	2,886.3	57.0	29.0	13.9	100.0
1965	1,408.5	895.7	489.5	2,793.6	51.0	32.4	16.6	100.0
1966	1,069.4	827.6	355.3	2,252.2	47.5	36.7	15.8	100.0
1967	1,147.9	1,088.4	392.2	2,628.5	43.7	41.4	14.9	100.0
1968	1,223.5	1,201.7	405.7	2,830.9	43.2	42.4	14.3	100.0
1969	1,206.8	1,678.5	336.3	3,221.6	37.5	52.1	10.4	100.0
1970	1,261.0	1,730.9	381.7	3,373.6	37.4	51.3	11.3	100.0
1971	1,178.8	1,651.2	329.3	3,159.3	37.3	52.3	10.4	100.0
1972	899.9	2,347.1	255.4	3,502.4	25.7	67.0	7.3	100.0

TABLE A8: *Catch per Licence by the Various Types of Engine, 1952-72*

Year	Type of Licence			
	<i>Draft Net</i>	<i>Drift Net</i>	<i>Other Engine</i>	<i>Rod and Line</i>
	000 lb			
1952	1,905.7	1,589.3	2,401.4	39.4
1953	1,731.0	1,241.0	2,113.7	34.9
1954	1,927.0	1,614.8	1,693.3	47.3
1955	1,339.3	880.8	1,189.7	37.3
1956	1,687.4	1,029.5	1,512.2	35.3
1957	1,978.1	1,083.0	1,245.2	39.7
1958	1,709.8	1,172.5	1,520.8	44.9
1959	1,686.6	1,423.5	930.1	35.4
1960	1,300.2	972.7	906.6	26.4
1961	1,262.0	686.0	961.4	22.5
1962	2,517.9	1,527.9	1,663.9	28.6
1963	2,596.3	2,179.8	2,499.7	35.1
1964	2,025.1	1,760.8	1,716.6	33.5
1965	2,062.2	1,835.4	1,938.8	32.5
1966	1,441.2	1,622.7	1,660.1	25.0
1967	1,568.2	2,049.6	1,758.8	25.0
1968	1,796.6	2,379.7	1,861.0	25.5
1969	1,814.7	2,508.9	1,528.8	17.5
1970	1,890.5	2,118.6	1,584.0	12.2
1971	1,691.3	1,802.6	1,546.0	12.4
1972	1,041.5	2,030.4	1,283.5	19.5

TABLE A9: *Numbers of Different Types of Licence issued 1952-1972 (excluding Special Local Licences)*

Year	Type of Licence					Total
	Draft	Drift	Snap	Loop	Fixed Engines*	
1952	683	415	147	37	51	1,333
1953	688	399	148	37	52	1,324
1954	644	396	143	32	54	1,269
1955	651	383	129	31	50	1,244
1956	635	362	128	29	47	1,201
1957	661	359	125	31	41	1,217
1958	609	329	118	28	49	1,133
1959	676	326	129	28	50	1,209
1960	633	318	144	29	46	1,170
1961	589	319	129	27	45	1,109
1962	589	363	133	28	46	1,159
1963	672	394	137	22	47	1,272
1964	813	476	151	34	49	1,523
1965	683	488	151	40	46	1,408
1966	742	510	142	25	47	1,466
1967	732	531	149	27	47	1,486
1968	681	505	141	29	48	1,404
1969	664	669	134	37	49	1,554
1970	667	817	153	34	54	1,725
1971	687	916	130	35	48	1,826
1972	864	1,156	130	24	48	2,222

*Including Bag Nets, Stake Nets, Weirs, Boxes, Cribs, etc.

APPENDIX B

SURVEY OF COMMERCIAL FISHING FOR SALMON AND
SEA TROUT

Code No.:

1. What kind of licence(s) for commercial salmon and sea-trout fishing have you taken out during the current season? Give the price paid opposite the licence(s) taken out.

<i>Type of Licence</i>	<i>Cost of Licence(s) (£)</i>
(i) Draft net	
(ii) Drift net	
(iii) Snap net	
(iv) Loop net	
(v) Other (specify)	
(A) <i>Total Licence fees</i>	

2. (a) Details of boat(s), crew members and share members.

<i>Type of boat(s)</i> <i>(indicate length and</i> <i>any other relevant</i> <i>particulars)</i>	<i>No. of men</i> <i>in crew in-</i> <i>cluding</i> <i>yourself</i>	<i>Status of Crew</i>			<i>Non-</i> <i>fishing</i> <i>share</i> <i>members</i> †
		<i>Relatives</i> <i>Assisting*</i>	<i>Share</i> <i>Members</i>	<i>Employees</i>	
	No.	No.	No.	No.	No.

*Unpaid relatives who assist with the fishing and whose share of the catch accrues to the respondent.

†These might include the owner of the boat, of the nets, etc.

2. (b) Method of payment of crew and share members

(i) Is the respondent fishing as (circle the appropriate number):

- | | |
|-------------------------------------|---|
| a share member and also an employer | 1 |
| a share member only | 2 |
| an employer only | 3 |
| an employee | 4 |
| other (specify) | 5 |

(ii) If fishing is conducted on a share basis, what proportion of the catch is received by each of the following:

<i>Person</i>	<i>Proportion of catch received</i>
Respondent (if he is a share member)*	
Other crew members	
Non-fishing share members	

*Include here any share accruing to respondent on behalf of an unpaid "relative assisting".

(iii) If there are any paid, non-share fishing members (including yourself) in your crew, please indicate to the best of your ability the wages they receive.

	<i>No. of weeks employed on salmon/sea trout fishing</i>	<i>Average wage per week paid</i>	<i>Total wage Bill</i>
Employee No. 1			
" " 2			
" " 3			
" " 4			
Respondent (if an employee)			
Total paid to all employees			

3. (a) Please indicate below how much time you spent at each occupation in which you were engaged during the past year.

<i>Occupations</i>	<i>No. of weeks in which you did some of this work</i>
Salmon/sea-trout fishing	
Other fishing	
Farm work on farm owned by respondent	
Farm work on farm owned by parents or relatives	
Other occupation in Ireland (specify)	
Occupation in Britain and elsewhere (specify)	
No. of weeks spent wholly unemployed	
<i>Total*</i>	

*Total No. of weeks need not add to 52 as a man may do some farming (say) and fishing in the same week.

3. (b) During the weeks in which you did some salmon fishing how many hours per week on average did you devote to this activity?

..... hours

4. (a) Did you draw any unemployment benefit, assistance or social insurance, etc. during the past year?

Yes 1

No 2

- (b) If the answer to (a) is Yes give the following details below:

<i>Type of benefit and assistance</i>	<i>No. of weeks drawn</i>	<i>average amount per week</i>
		£

5. Information on fishing equipment, etc. (Omit any equipment, etc. not used at all for salmon or sea-trout fishing but include items used for both salmon, sea-trout and other fishing).

<i>Item</i>	<i>Year of Purchase or erection</i>	<i>Initial Cost (£)</i>	<i>Est. Life (Years)</i>	<i>Proportion to salmon/ sea trout</i>	<i>For Office Use</i>	
(1) Boats (describe)						
(2) Outboard engines						
(3) Boathouses						
(4) Cold store						
(5) Refrigerator						
(6) Other Store						
(7) Office						
(8) Sheds						
(9) Nets (describe)						
(10) Boxes and cribs						
(11) Fish Containers and Boxes						
(12) Motor Car						
(13) Van						
(14) Trucks						
(15) Other (specify)						

6. If boat or boats are purchased under B.I.M. scheme indicate

(a) No. of years over which repayments are spread _____ years.

(b) Amount to be repaid annually in instalments £ _____

7. Costs of commercial salmon and sea-trout fishing, 1970. Include only the costs attributable to salmon and sea-trout fishing and indicate the proportion of these costs paid by other crew members.

<i>Item</i>	<i>Amount charged to salmon/sea trout</i>	<i>Proportion of this cost paid by other crew members</i>
	£	£
Fishing rates		
Fishing rental		
Rent and/or rates paid for buildings		
Repairs to boats and buildings		
Repairs to cars, vans or trucks		
Repairs to nets, boxes and cribs		
Fuel oil, etc. for boats		
Fuel oil, etc. for cars, vans and trucks		
Purchases of reels, lines, other small items		
Purchase of canvasses or other protective material for boats and engines		
Fishing clothes, boots, etc.		
Wages paid to workers other than crew members		
Cost of ice (if not made in own ice box)		
Cost of packaging if any (excluding capital cost of containers, etc.)		
Cost of transport to market (if not in own vans)		
Auctioneer and commission fees		
Telephone		
Light and heat		
Printing, postage, stationery		
Other Cost (specify)		
<i>Total</i>		

8. Details of catch in 1970.

<i>Waters fished (a)</i>	<i>No. of days fished in each water for (b)</i>		<i>Average No. of hours fishing per day (c)</i>	<i>Weight of fish taken (lb)</i>	
	<i>Salmon</i>	<i>Sea Trout</i>		<i>Salmon</i>	<i>Sea Trout</i>

(a) Specify location and name of water

(b) Include time spent repairing boats, mounting and repairing nets, etc.

(c) Include time spent travelling to fishing grounds, unloading and marketing fish, etc.

9. Please indicate below how you disposed of the catch in 1970.

<i>Method of Disposal</i>	<i>Weight of fish (lb)</i>		<i>Amount received (£)</i>	
	<i>Salmon</i>	<i>Sea trout</i>	<i>Salmon</i>	<i>Sea trout</i>
(a) Purchased by fishermen's co-op.				
(b) Sold privately to merchant/dealer				
(c) Sold privately to local hotels, guest-houses, individual consumers				
(d) Sold by auction (locally)				
(e) Sent directly to Dublin market				
(f) Exported directly				
(g) Other (specify)				
<i>Total</i>				

Comments and Suggestions relating specifically to Salmon Fishing

We would like to have your views on the following questions:—

10. (a) The following have all been suggested as ways of improving commercial salmon fishing. In the case of each item, please say whether you would favour or oppose its introduction into your area.

Ring the appropriate number

	<i>Favour</i>	<i>Oppose</i>	<i>No opinion</i>
1. Restriction on number of drift netmen	1	2	3
2. Restriction on number of draft netmen	1	2	3
3. Restriction on number of other commercial fishermen	1	2	3
4. Restriction on number of anglers	1	2	3
5. Shortening of weekly close time	1	2	3
6. Lengthening of fishing season	1	2	3
7. Tougher laws on river pollution	1	2	3
8. More restocking of rivers and/or improvement of spawning beds	1	2	3
9. Restriction on drainage operations in rivers	1	2	3
10. More or better piers, mooring places and so forth	1	2	3
11. More restriction on size of nets	1	2	3

12. Is there any improvement not mentioned above which you would like to see made? (Specify)

10. (b) In your opinion, which one of all these improvements would be of most benefit to fishermen in your area?

Number.....

10. (c) How do you suggest that the costs (if any) involved in this improvement be paid?

- By Department of Agriculture and Fisheries 1
- By fishermen 2
- By Bord Iascaigh Mhara 3
- By Local Board of Conservators 4
- Partly by fishermen, partly by Department of Agriculture and Fisheries 5
- Partly by fishermen, partly by Local Board of Conservators 6
- By some other means (specify) 7

11. Please indicate by ringing the appropriate number how good the salmon fishing was in your waters in 1970.

Very good	1
Somewhat better than average	2
Average	3
Somewhat worse than average	4
Very poor	5

12. Give briefly your opinion as to why the fishing was as indicated to Q.11 above.
-

13. (a) Is there a fishermen's co-operative in your area?

Yes	1
No	2

- (b) If the answer to (a) is Yes state if you are a member.

Yes	1
No	2

- (c) If there is a fishermen's co-operative in your area and you are not a member, please indicate briefly why you are not a member.
-

14. Please indicate by ringing the appropriate number which of the following methods of disposal of your catch (other than to a co-operative) are normally open to you.

Private sale to merchant/dealer	1
Private sale to local hotels, guesthouses, individual consumers, etc.	2
Sale by auction (locally)	3
Direct sale to Dublin market	4
Direct exportation	5
Other (specify)	6

15. (a) If you have ringed "1" in 14 above, do you have a choice of dealers to whom you can sell?

Yes	1
No	2

- (b) If the answer to (a) is Yes how many dealers do you have access to?
-
-

16. If you have ringed 3 in 14 above, how many buyers normally participate in the auction?

17. If you have ringed 1 or 3 in 14 above, do you believe that there is:

	<i>Yes</i>	<i>No</i>	<i>Don't know</i>
(a) Collusion between buyers buying privately	1	2	3
(b) Collusion between buyers buying at auctions	1	2	3

18. (a) The following have been suggested as ways of improving the marketing arrangements for salmon. In the case of each suggestion, would you please say whether you would favour or oppose its introduction into your area?

	<i>Ring the appropriate number</i>		
	<i>Favour</i>	<i>Oppose</i>	<i>No opinion</i>
1. Setting up of co-operative (if one does not already exist)	1	2	3
2. Increase in the number of buyers	1	2	3
3. More control of dealers who buy fish which were illegally caught at week-ends	1	2	3

4. Is there any improvement not mentioned above which you would like to see made to your marketing arrangements for salmon? (Specify)

18. (b) In your opinion which one of all these improvements would be of most benefit to fishermen?

Number.....

18. (c) How do you suggest that the costs (if any) involved in this improvement be paid?

- By Department of Agriculture and Fisheries 1
- By fishermen 2
- By Bord Iascaigh Mhara 3
- By Local Board of Conservators 4
- Partly by fishermen, partly by Department of Agriculture and Fisheries 5
- Partly by fishermen, partly by Local Board of Conservators 6
- By some other means (specify) 7

19. Please give the name(s) and address(es) of the person(s) or organisation(s) to whom the catch of your boat was sold.

	<i>% of catch sold to this person or organisation</i>
(1) Name: _____ Address: _____	
(2) Name: _____ Address: _____	
(3) Name: _____ Address: _____	
Total	100%

For Classification Purposes

Name of Respondent _____

Address _____

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