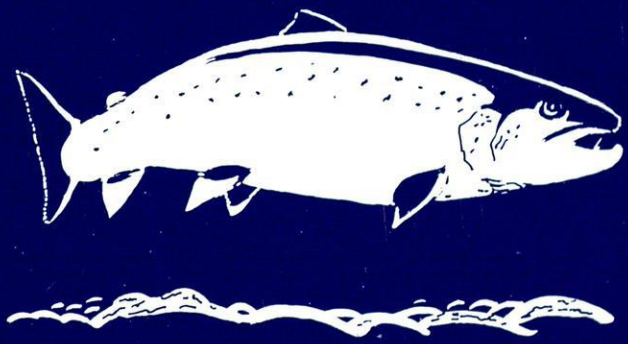
ATLANTIC SALMON TRUST
1967-1992

PROGRESS REPORT

(including Audited Accounts)

December 1992



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Patron:	HRH The Prince of Wales

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RASA	Mr. Richard Buck
BFSS	Major General J. Hopkinson
ASDSFB	Mr. Robert Clerk
SPEY TRUST	(A Representative)
FISHMONGERS	Viscount Leverhulme
	Mr. John Bennett

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J. Browne, M.Sc. (Department of the Marine, Dublin)
M. M. Halliday, Ph.D. (Joseph Johnston & Sons Ltd.)
G. Harris, Ph.D. (Welsh Water plc.)
G. J. A. Kennedy, B.Sc., D. Phil. (Department of Agriculture for Northern Ireland)
E. D. Le Cren, M.A., M.S., F.I.Biol., F.I.F.M.
I. Mitchell, B.Sc. (Tay Salmon Fisheries Co. Ltd.)
J. Solbé, D.Sc., B.Sc., C.Biol., F.I.F.M., M.I.Biol. (Unilever Research)
D. Solomon, B.Sc., Ph.D., M.I.Biol., M.I.F.M.
K. Whelan. B.Sc., Ph.D. (Salmon Research Agency of Ireland, Inc.)
Professor Noel P. Wilkins, (Department of Zoology, National University of Ireland)

Observers:
A representative from the National Rivers Authority
A representative from the Scottish Office Agriculture and Fisheries Department
E. C. E. Potter, B.A., M.A. (Ministry of Agriculture and Fisheries)

INTERNATIONAL CONSERVATION ORGANISATIONS WITH WHICH THE TRUST IS IN CONTACT

France:	Association Internationale de Defense du Saumon Atlantique
Belgium:	Belgian Anglers Club
Spain:	Asturian Fishing Association of Oviedo
Germany:	Lachs- und Meerforellen-Sozietat
U.S.A.:	Restoration of Atlantic Salmon in America Inc.
Canada and U.S.A.:	Atlantic Salmon Federation
Ireland:	Federation of Irish Salmon & Sea Trout Anglers

Registered Charity No. 252742

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CHAIRMAN'S FOREWORD
1967 - 1992

Twenty five years ago the Trust was formed and it was with great pleasure that we were honoured by the presence of our patron, His Royal Highness The Prince of Wales, at the Council of Management meeting on December 1st. The meeting was followed by a Birthday Luncheon in Fishmongers' Hall where His Royal Highness The Prince of Wales was able to meet many of those present.

Almost all the Council of Management and the Honorary Scientific Advisory panel members attended the buffet lunch along with many distinguished guests. It was particularly pleasing to welcome Ian Lang and Sir Hector Monro from the Scottish Office, David Curry from MAFF, Lord Crickhowell from the NRA and the many senior civil servants and scientists from England, Wales, Scotland and Ireland. Malcolm Windsor, Director of NASCO, said he had never seen "so many influential people in the salmon world gathered in one room".

The only two of the original Trustees still living, the Marquis of Lansdowne and the Duke of Devonshire, were present and Lord Lansdowne proposed the toast to the Trust. My predecessors as Chairmen, Hugh Mackenzie and David Clarke, were also with us and it was a happy occasion on which to appoint two long-standing friends of the Trust to join them as Vice-Presidents, Sir Ernest Woodroofe, who was Chairman of the Honorary Scientific Advisory Panel from 1982 to 1988, and Dr. Wilfred Carter, former Director of the Atlantic Salmon Federation and now its President Emeritus.

Our particular thanks must go to the Prime Warden and Clerk of Fishmongers' for their hospitality. It is a great bonus that the Trust is able to hold its meetings in such splendid surroundings as Fishmongers' Hall.

A mention too must be made of J&B Rare Scotch Whisky who generously support the Trust and enable us to employ John Webb as our permanent scientist. It was nice to see James Bruxner, the Chairman of J&B Rare and the Scotch Whisky Association, present. John Webb, incidentally, gave our patron and the Council of Management a fascinating account of his work for the Trust.

Looking back over the last 25 years, I believe that the Trust has established itself as a reasoned and respected voice on salmon matters, strongly backed by our Honorary Scientific Advisory Panel.

There are still many problems facing the wild Atlantic salmon and it is more important than ever that all those interested in the survival of the splendid fish work together to ensure its future.

Finally, may I most particularly thank all those who so regularly and generously support us by Deed of Covenant and donation and all those who unselfishly provide fishing for our annual auction. We are extremely fortunate to have so many loyal supporters. I am confident that the affairs of the Trust are in good shape and that our reputation has never been higher, thanks to

the wide esteem in which our Director, John Mackenzie, and our Deputy Director, Jeremy Read, are held.

Sir David Nickson

* * *

BERNARD LAMY

The Atlantic Salmon Trust has lost a valued friend and ally by the death of Bernard Lamy. A passionate fisherman who loved the Dee as he loved the rivers of France, he was an equally passionate fighter against official indifference and bureaucratic complexity during his strong chairmanship of the Association de la Defense du Saumon Atlantique (AIDSA). He knew how to temper firmness of purpose with considerable personal charm, but no one could deflect him from his aim of protecting the salmon and its habitat from the threats in its native rivers and at sea - he laid an official complaint to the European Community against the French Government for its failure to implement effective salmon conservation. He saw the international perspective very clearly, and set great store by the representation of the AST and other national organisations on the Council of Management of AIDSA. He joined whole-heartedly and effectively in this year's successful joint AST/AIDSA call on the European Fisheries Commissioner, and took a leading part in the 1990 Conference on the Rehabilitation of Salmon Rivers.

The latest issue of "Saumons", the AIDSA quarterly magazine of which he was so proud, contains well deserved tributes to his enthusiasm, organising ability and foresight. Touchingly, it also contains his own final contribution - one article recalls the excitement of his first fish from the Eriff in 1973, and the other sets out the programme that he believed was essential for ensuring the survival of salmon in French rivers. From personal achievement to public crusade, they typify his devotion to the cause to which he gave so much.

DIRECTOR'S REPORT

1992 will be remembered by many anglers as a year, on most rivers, when there were more fish around than had been seen for some time. There were exceptions and the Aberdeenshire Dee was one where catches were very poor. There does not seem to be an obvious answer to the patchy story of recovery and at the moment, although some theories are being put forward, scientists are, I suspect, baffled!

The north east drift nets have continued to occupy our minds and the Trust is most disappointed at the Goverment's intention to accept the NRA's scheme for phasing out the fishery which will take an estimated 30 years. Accompanied by Christopher Poupard, the new Director of the S&TA, I met Mr. Gummer in early October to express our concerns about the Net Limitation Order issued by the NRA. Our meeting was followed by a delegation headed by Cranley Onslow to see Mr. Gummer. Sir David Nickson and Lord Moran represented the Trust, Tom Barnes the S&TA and Robert Clerk the ASDSFB. The result of these meetings can be seen in the exchange of letters between Sir David Nickson and Mr. Gummer.

Lord Moran initiated a debate in the House of Lords and anyone who wants to obtain a copy of the Hansard of Thursday, 5th November, can read some very good speeches which all condemned the Government's stance on the drift nets.

We still await the Minister's Report to the objections to the Net Limitation Order. The main concern remains that although the number of licences issued will go down, it is unlikely that the catch will decrease in proportion.

The Trust is very concerned about the growth of private electricity hydro schemes, particularly in Scotland. The regulations concerning the positioning of smolt screens and the passage of fish are not satisfactory and District Fishery Boards are almost powerless to prevent such schemes going ahead without adequate safeguards. There are plenty of places in Scotland where there are impassable falls for migratory fish, and these could well be used for hydro schemes rather than resurrecting old weirs or building new ones in the main rivers. The Scottish Office is being urged to take a stronger line on these matters.

An article about the high seas fishery buy outs, by Jeremy Read, comes later in the Report.

All good luck for 1993.

D. J. Mackenzie

NORTH-EAST DRIFT NETS

The Rt. Hon. John Gummer MP
Minister of Agriculture, Fisheries and Food
Whitehall Place
London SW1A 2HH

21st October, 1992

Dear Mr. Gummer

Thank you very much indeed for agreeing to see us all with Cranley Onslow yesterday afternoon and for giving us so much of your time.

We do I think understand, and certainly now following our meeting understand much better, the dilemma that you have over the North East Drift Net Fishery, but I am glad that we were able to impress upon you the depth of concern and the high level of disappointment and disillusionment among all the salmon conservation bodies and salmon angling interests throughout the UK.

Everyone agrees that it would be impossible to eliminate this fishery at a stroke but, when the Government gave its welcome commitment to phasing out, the expectation was certainly that this would be for a finite period and over a limited number of years, certainly in single figures.

I can only speak for the Atlantic Salmon Trust, but I hope I was able to convey something of the concern that we feel and the pressure that has been placed upon us by our international colleagues throughout the NASCO countries. Our whole argument is based on the fact that drift netting is an increasingly discredited method, catches mixed stocks indiscriminately and therefore cannot be compared with selective netting in river estuaries and is thus bad management practice.

However, rather than rehash all the arguments again, I would just like to make a few points which are no doubt covered by the Minutes taken by your officials:

1 The Ices Report of 1990 states that England and Wales were the only countries in the North Atlantic, which produced salmon, whose catch in 1990 at 338 tonnes was more than it had been 30 years previously in 1960 (283 tonnes). All other countries' commercial fisheries had declined.

These figures represent declared catches rising to approximately 50,000 fish, taken from p195 of the Salmon Net Fisheries Report. It is interesting to compare this with the declining catches by net and coble in Scotland, taken from pages 185-188, for the districts effected by the North East fishery. These have declined from a peak of

about 150,000 fish in the 1960's to only 40,000 fish in 1990 and to 30,000 fish in 1991 (ie from 300% of the North East fishery in the 1960's to only 60% in 1991). During this time, of course, some £5 million has been spent in buying out many of these fisheries but the effect is that the "take" from these fisheries and therefore the potential to catch any additional stocks from the North East has dramatically declined.

2 You kindly confirmed that your officials were looking most carefully at all the detailed points raised on the Net Limitation Order, both by ourselves and other organisations, with a view to tightening up the position on licensing and partnerships.

3 But easily the most important new issue raised during our discussions was the fact that there must be a strong linkage between the declining number of nets licensed and a declining overall catch from the fishery. Not to achieve this linkage would be perverse. Despite the difficulties, you kindly undertook that your officials would be looking most closely at the best methods of doing this and hopefully ensuring that neither the total take from the fishery nor the catch by individual boats should be allowed to increase as the number of boats decline.

I have asked John Mackenzie with other directors of salmon organisations to respond to your invitation by putting forward at the earliest possible date proposals designed to achieve this end. We hope these will be constructive and helpful and will mesh in with the investigations both legal and otherwise being pursued in your Ministry.

We take the point that it may not be possible to introduce these at the same time as your decision on the Net Limitation Order, but we hope very much that it will be possible for you to make a statement that measures will be put in hand to achieve this effect.

Once again we are grateful to you for the meeting and for listening to our somewhat vehement representations with such patience and good humour.

SIR DAVID NICKSON
Chairman

Sir David Nickson KBE DL
Chairman
Atlantic Salmon Trust
Moulin
Pitlochry
Perthshire
PH16 5JQ

13th November, 1992

Dear Sir David

Thank you for your letter of 21st October about our recent meeting on the north east coast salmon drift net fishery. I am glad that you consider it to have been worthwhile. For my part, I found it helpful to listen to your concerns about the future of British salmon stocks. While we may not agree about the best way forward, I hope that at least we have a clearer appreciation of our respective positions. I am sure that I need not reiterate the clear advice we have had from our scientists, in the context of the Review which Ian Lang and I presented to Parliament last October, about the north east coast drift net fishery. For both legal and scientific reasons, my scope for going further in the direction which you would wish is constrained by the finding of our scientists that this fishery poses no immediate threat to salmon stocks.

As I said at our meeting, I am prepared to look at ways in which the level of drift net catches could be related to the decline in licence numbers of practical and legal difficulties with this approach. These will need to be considered most carefully. I have asked my officials to look at the options open to us and they are already examining the paper which John Mackenzie has put to me suggesting an approach involving tagging and quota proposals. This is not an easy area: and I would be concerned if proposals on these lines were to lead to damaging results in terms of the management of the fishery and its phasing out, which none of us would want to see.

I have already pledged, a year ago when we presented the Review to Parliament, that we will continue to monitor catches most closely. I shall not hesitate to take action if catches in the phase out period are to pose a threat to stocks.

I am also considering carefully the points you put to me about the net limitation order and a number of technical improvements which you would like to see. I shall be in touch with you about this again as soon as I am able.

JOHN GUMMER

4TH INTERNATIONAL SALMON SYMPOSIUM

(by Dr. Derek Mills)

Part of this article has appeared in The Tweed Foundation Newsletter.

The Fourth International Atlantic Salmon Symposium was held this June in St. Andrews, New Brunswick, the venue of the First Symposium in 1972. The co-sponsors were the Atlantic Salmon Trust, the Atlantic Salmon Federation and the Canadian Department of Fisheries and Oceans. The two themes for discussion were Salmon at Sea and New Enhancement Strategies. The former was selected against a background of events suggesting that a likely cause for the recent decline in salmon catches was probably associated with marine environmental factors.

Since 1960 the proportion of the total landings of Atlantic salmon, excluding the Baltic, harvested in the marine environment by the major sea fisheries, namely West Greenland, the northern Norwegian Sea (closed in 1984) and the Faroes rose from about 1% in 1960 to a peak of almost 30% in 1971. Since 1971 it has fluctuated between 14 and 29%, the latter figure being reached at the height of the Faroes fishery in 1982 and before a quota was agreed. In 1990 the West Greenland and Faroes fisheries accounted for about 13% of the total landings. The actual proportion of the salmon catch taken in the sea is much higher if one takes into account all marine fisheries, such as the Scottish and Norwegian coastal fisheries, the fisheries off the west coast of Ireland and north-east England and the fisheries of Newfoundland and Labrador and unreported catches from illegal fishing and fishing in international waters by Scandinavian vessels registered in Panama and Poland.

However, lower harvests in some of these interception fisheries, attributed to imposed restrictions and reduced salmon abundance in the fishing areas, have not enhanced returns of multi-sea-winter (MSW) salmon as might have been expected. The most probable causes for the decline in MSW salmon production are increased marine natural mortality and younger sea-age at maturity.

The apparent stability of smolt populations in both number and freshwater age composition also suggests that marine factors are likely to be more important areas of variation in home water catches.

The findings and conclusions presented by a range of experts at the symposium were numerous and varied and can be only briefly summarised, as follows:

a) Climatic oscillations affecting the marine environment, particularly sea surface water temperatures, seem to have a great influence on salmon abundance and this is apparent from the periods of scarcity and abundance in the historical records over the centuries.

b) The mortality of smolts on first entering the sea might well influence the subsequent level of returns of adults one and two years later and it was suggested that a low post smolt survival in 1989 was responsible for the low catches in the following two years. However, it is not clear that a single climatic effect may act upon all of the different

oceanographic regimes immediately surrounding Britain in order to produce a widespread effect on the sea mortality of smolts during the post-entry phase of their ocean migration through coastal waters. Therefore it is necessary to look at oceanographic conditions along the remainder of the possible migration routes.

c) Once smolts enter the sea they move rapidly away from the coast. Smolts from the eastern rivers of the UK may move east before moving north in order to avoid the persistent southerly flowing currents located along the western boundary of the North Sea.

d) A typical range of migration rates for both 1SW and 2SW fish would be 10-24cm/sec. Thus a smolt leaving a river flowing into the North Sea in May would arrive at Faroes somewhere between August and November and could reach Greenland sometime between January and October.

e) It would appear that sea surface water temperatures critical for the salmon's survival lie between 4 and 8 centigrade. A migration rate of 10cm/sec. results in the fish moving north from Britain and remaining in water within this temperature range and arriving at the productive Arctic water "front" when conditions for feeding are at their optimum. The onset of cooling coincides with the time that fish which are destined to become grilse must return south. It was also demonstrated that fish migrating across the Atlantic from Faroes to West Greenland would move through waters within a similar temperature range, arriving at West Greenland as temperatures began to rise above 4°C. It is believed that this may be a critical temperature that may act as a barrier to ocean migration and may influence survival of postsmolts during the winter. Areas where temperatures now fall below this value being unsuitable as overwintering habitat.

f) Limited findings for Europe suggest that postsmolt habitat had been reduced in recent years while in North America the redistribution of warm water has constricted critical winter habitat.

g) Over the past two decades, the average size of 1SW salmon in the Greenland fishery has decreased, but at a far more rapid rate for European fish than for North American fish. For both continental groups, habitat areas for some seasons have decreased over the same period. These observations are consistent with the view that habitat is only limiting for North American postsmolts for part of the postsmolt year, thus overall growth is not affected. Conversely, for European stocks, a habitat limitation in the spring has been detected; if habitat is limited for the balance of the year one would expect to see overall growth for the postsmolt year impacted.

h) During its marine phase the salmon is an opportunistic midwater predator. Small postsmolts feed on a wide range of planktonic crustaceans and terrestrial insects. Fish predominate in the diet of larger salmon. The species of fish eaten by salmon include capelin, sandeels, lantern fish and sprats, the species varying between areas and between years.

i) Among the mammalian predators of salmon, it's interesting to record bottle-nosed dolphins taking salmon in the Moray Firth.

j) Methods for controlling the marine exploitation of salmon were discussed. Attention was drawn to the incidental catch of salmon in a pelagic trawl fishery for mackerel and horse mackerel in international waters close to the Norwegian EEZ. The fishery, which involves vessels from Lithuania, Estonia and Latvia and possibly also the former German Democratic Republic and Bulgaria, takes place during the summer. An example was given where the by-catch of salmon in one haul amounted to 0.3 tonnes (equivalent to about 70 salmon). With an estimated involvement of between 25-100 vessels the potential catch of salmon could be large. In addition, there is a similar larger fishery for mackerel inside the Norwegian EEZ in the same general area.

The second session, New Enhancement Strategies, was a fitting succeeding theme. Kelts figured prominently and it was encouraging to note that kelt reconditioning has been conducted successfully both experimentally and on a production basis by different agencies in North America for a number of years. For production purposes, only female kelts are reconditioned. Survival rates for the first year kelts average 80% and subsequent years 90%. Some kelts have been in the production unit at one site for 9 years, making them 13 years old, and still producing good quality eggs! Kelts can also be used for recreational fisheries and on the Merrimack and Pemigewasset rivers 1500 reconditioned surplus broodstock will be introduced to create an interim sport fishery until sea-run salmon, resulting from a big stocking programme, start to appear.

There was a good deal of emphasis on the preference for habitat improvement before considering the use of hatcheries. One contributor (Dr. Riddell) summarised the situation very sensibly, saying:

"Salmonid management in the future will likely involve more integrated resource management at the ecosystems and watershed levels..... . Future roles for enhancement programmes will likely be more diversified and reduce past emphasis on large scale production. However, if enhancement does shift from the larger scale production, managers of enhancement programmes must also be prepared to change evaluation standards to acknowledge contributions in areas which are inherently less quantifiable in benefits (e.g. conservation, aesthetics and future values)."

The RESOLUTIONS proposed at the end of the Symposium were as follows:

1. Develop reliable catch, abundance and fishing effort reporting systems for as many river stocks as possible.

2. Whereas high exploitation rates continue to exist in many fisheries and, in some areas, noting the declines in salmon runs below that needed to achieve adequate surplus for harvest, and for those stocks where egg depositions have been found to be limiting smolt production, be it resolved that each salmon harvesting country should continue

reducing marine fishing effort and, where applicable, introducing stricter sport fishing regulations.

3. This conference urges that effective control of North Sea industrial fishing should be instigated immediately in order to reduce the risk of major erosion of the food chain affecting salmon and other species.

4. All enhancement programmes should have the objective of achieving sustainable production from the remaining runs of wild salmon before considering utilisation of stocking with hatchery fish.

Those RECOMMENDATIONS of particular relevance were:

1. Because of apparently high levels of salmon mortality at sea, due to unidentified or unexplained causes other than commercial harvesting, more effort and resources should be directed at determining the reasons, and measures should then be taken to address them.

2. Due to the mixed nature of most marine fisheries, more tagging should be done to determine the contribution of various river systems to these fisheries.

WORKSHOP ON SALMON IN THE SEA

(by Jeremy Read, Deputy Director)

At the International Salmon Symposium in June, it was agreed that there is still a lack of real knowledge of salmon movements, abundance and behaviour during the marine phase of the fish's life. At the suggestion of the Atlantic Salmon Federation, the Atlantic Salmon Trust undertook to organise a scientific workshop to explore the means of increasing this knowledge, in the continuing search for the explanation of the decline in salmon stocks in recent years. A particular aim would be to identify opportunities for international co-operation in running appropriate research programmes.

The workshop took place in Edinburgh on 9th and 10th December in the headquarters of NASCO, who provided invaluable support. It was indeed international in content, with four representatives from Canada - including Dr. John Anderson, Director of Operations for the Atlantic Salmon Federation - four from Norway - including Svein Mehli, recently Vice-President of NASCO - and one from Sweden, as well as strong UK participation from both north and south of the Border. The Freshwater Fisheries Laboratory team was led by Dr. Dick Shelton, Officer-in-Charge at Faskally, Ted Potter brought a group from the Directorate of Fisheries Research at Lowestoft.

One of the aims of the workshop was to look as widely as possible for sources of information. Proceedings were deliberately informal, and this resulted in active, open and fruitful discussion of a range of topics. The workshop began with a comprehensive general review of current

techniques by Ted Potter, who reminded the group of the purposes of salmon research at sea and the reason why the questions were being asked in the first place. David Reddin of the Canadian Department of Fisheries and Oceans then led a detailed exploration of survey methods, and of the availability and significance of environmental information, which included a very interesting exploration of the use of satellite data. Dr. Monty Priede, of the University of Aberdeen, conducted a most productive session on tracking methods, which looked at the development of existing techniques and of novel methods, and at their use individually or in combination at different stages in the salmon's migration and feeding at sea.

As a result of the discussions, Dr. Derek Mills, Chairman of the Trust's Honorary Scientific Advisory Panel, set out a list of programmes in which international collaboration would be fruitful. At the same time, participants were told of existing plans for research work at sea by Norway and Canada, and invitations were issued for scientists from other nations to join the vessels. The group made a number of recommendations for international co-operation; these will be set out in the Blue Book which will contain the report of the workshop, and which will appear as soon as possible. We have strong hopes that several of these ideas will be developed, which would allow the undertaking of tasks that no single nation would be likely to be able to finance, and follow-up work is already in hand.

NOTE BY DIRECTOR

This workshop is a splendid example of how the Trust can help to quickly bring together international experts when a particular problem is identified.

NRA - REPORTS FROM THE REGIONS

The AST is most grateful to the NRA Head Office and their Regions for permission to publish these reports.

ANGLIAN REGION

The main issue within the Anglian Region is the East Coast Review and the intended introduction of an NLO in the Anglian fishery.

NORTHUMBRIA REGION

(Note: A separate article about the Tyne appears later in this Report)

Recently the NRA accepted the Minister's invitation to consider a reduction in drift netting for salmon and sea trout off the north east coast of England and have advertised a Net Limitation Order that will allow this reduction to take place with a halving of the licences issued in 10 years.

Scientific monitoring of juvenile production has increased dramatically over the past two years

to provide an assessment of the success of natural spawning and identify suitable sites as nursery areas for the hatchery progeny.

The size and mobility of the enforcement teams have been increased as has the use of sophisticated surveillance equipment. This increase in enforcement effort has been necessary due to the increased illegal fishing for salmon and sea trout associated with the rapidly improving rivers in the Region.

The Region is now in a position to provide a safe and suitable haven for migratory fish and is constantly monitoring the success of its achievements.

NORTH WEST REGION

NRA NW Region Activities

Fisheries enforcement activities were maintained at high levels throughout the year, protecting fish throughout their migrations in coastal waters, within rivers and on the spawning redds. The Water Bailiffs job continues to be hazardous, with verbal and physical abuse a frequent occurrence. One bailiff's garage was destroyed by fire. Poaching activity is at a lower level than that which has occurred historically and this will be due in part to low summer flows which have resulted in lower numbers of fish in our rivers. Some of the reduction in poaching effort will also be the result of our systematic targeting of illegal activities, both at the water and at the point of sale. In one particular example of this the catering manager of Glaxo at Ulverston was successfully prosecuted for dealing in illegally caught salmon and fined £600 with £200 costs.

Our monitoring work entails extensive electrofishing surveys of rivers and streams to establish the river populations. Ascending adults are monitored at automatic fish counting stations. During the year we have extensively modified and upgraded the fish counter installations on the River Derwent at Yearl Weir and on the River Ribble at Waddow Weir. In a collaborative project with British Nuclear Fuels Ltd., we are constructing a fish pass and counter on the River Calder at Sellafield.

Stocking with juvenile salmonids met our targets. The bulk of our fish are stocked as strong feeding fry but some are reared on to larger fish which can be microtagged. Experimental work is underway to establish the most effective strategy for fish stocking, particularly in relation to the timing of stockings.

Fish passes constructed in previous years on the River Caldew in Carlisle and the River Ribble at Stainforth are proving to be highly successful with extensive runs of fish taking advantage of the newly accessible spawning grounds. The run of fish on the River Caldew has grown to nearly 500 fish in only four years.

Finally, I should mention the Ribble Fisheries Management Plan. Launched in July as a public consultation document, this is our first attempt to deal with all the Fisheries issues of a catchment in a unified manner. The plan is driven by the specific issues relating to that

catchment and proposes a strategy for dealing with them. Joint working with anglers, owners and the community is a prerequisite for its successful implementation. This approach adds to, and compliments, the NRA's commitment to Catchment Management Planning.

SEVERN TRENT REGION

A. RIVER SEVERN

Rod catches

The 1991 salmon fishing season was again one of the poorest recorded in recent times with a declared catch of 324 fish relative to the long term average (1940-1991) of 741. Notable catches included a 15kg fish taken at Shrewsbury Weir in April 91. The 1992 season got off to a reasonable start but from March onwards catches proved disappointing.

Commercial catches

Catches of salmon in 1991 were very much below the long term averages with only 338 caught by lave nets (large hand held nets) and 43 by draft nets against averages of 1145 and 464 respectively. Even the fixed engines, normally the most consistent method, produced 1366 fish compared to 1912 long term. In 1992, the first salmon were caught in mid February but early returns indicate another poor year.

Scale reading

From inspection of salmon scales it is clear that the river Severn population is now dominated by 1 and 2 sea-winter fish. The former are particularly susceptible to the effects of low flows in the summer which is their main period of entry to the river system. Indeed the 1991 summer grilse run did not materialise until after the end of the commercial fishing season.

Salmon spawning

The 1991 spawning season was better than average and considerably better than anticipated from observed catches. The total redd count was 2354 compared with the 1975-1990 average of 1913. It was noticeable that most spawning took place in the main rivers rather than minor tributaries, a situation probably associated with low water conditions.

Poaching

Poaching activity was light, as high water from late October to mid November 1991 made the salmon inaccessible to most illegal methods. Regular patrols were mounted to curb torch and gaff poaching off the redds. One individual was caught with a torch and spear. Leaflets were circulated to hotels and retailers warning of the penalties of dealing with illegally caught salmon.

Salmon passes and counters

To make more of the River Teme available to spawning salmon two fish passes with counters were installed at Powick and Ashford. (The only other salmon counter in the region is on the main River Severn at Shrewsbury.)

Clywedog salmon hatchery

Salmon fed fry are produced each year from the Authority's hatchery at Llyn Clywedog. In 1991, 40,000 fed fry were stocked into upper Severn tributaries and 170,000 ova were collected for incubation.

Juvenile salmon monitoring programme

Stocks of juvenile salmon are surveyed annually. Some sites form part of the national juvenile salmonid monitoring programme and others are assessed in relation to acidification of watercourses due to afforestation.

Byelaw changes

Byelaw changes brought into effect from 1st May 1991 extended the rod fishing season by one week and also banned the use of gaffs.

B. RIVER TRENT

There were 5 confirmed sightings of salmon in the River Trent during January and February 1991. One was caught, one found dead and three seen jumping at weirs. At present the Authority operates an opportunistic policy towards the re-introduction of salmon into the River Trent. The Regional Fisheries Advisory Committee has, however, recently recommended that a more pro-active strategy be adopted. It is intended, therefore, to embark upon feasibility studies with regard to opening up the River Dove by the installation of fish passes.

SOUTHERN REGION

Salmon in Southern Region are restricted to the Rivers Test and Itchen in Hampshire and a small re-introduced population in the River Stour in Kent. Sea trout occur in most rivers of the Region.

Most rivers have man-made obstructions to passage, notably former mills. The Authority has a wide-ranging programme to provide fish passes: nine have been built in Hampshire; twenty-seven in Sussex and three in Kent. Further passes are planned at a number of sites in the Region.

Declining catches and observed low parr numbers show the need for habitat improvement. Collaborative work in Hampshire with MAFF has shown poor egg survival caused by excess of fine particles in spawning gravels. Some gravel cleaning work is being carried out to

rehabilitate spawning gravels and improve fry production. This has included manual digging, raking using heavy plant and washing with water jets to loosen compacted and concreted gravels and reduce the sand fraction. The effects of rehabilitation work are now the subject of a continuous monitoring programme.

Problems have been exacerbated by the current prolonged drought, leaving some nursery areas dry or greatly diminished. Extensive restocking has been carried out for a number of years. Sea trout fry have been produced by the NRA hatchery in Kent, using eggs collected from wild fish. In 1992 in excess of 80,000 fry were planted out, mainly to nursery areas in the catchments where the broodstock were captured.

Salmon enhancement stocking has been carried out on the Test and Itchen since 1986, mainly with smolts reared from local stock, together with some imported strains. Most of these have been microtagged, but returns have been extremely disappointing. A high proportion of the few returns have been from the Irish drift net fishery.

In 1991 and 1992 very large numbers (over 600,000 each year) of small parr were released to the Test and Itchen. The ova were produced by Wester Ross Salmon from broodstocks of River Test origin, reared mainly by the NRA at Keilder and in Wales and planted out in July and August. The 1991 fish were released at a small size due to cold hatchery temperatures, but grew rapidly to produce the best smolt run reported from many years in 1992.

The Hampshire Salmon Project was set up to investigate the environmental conditions necessary for free migratory fish passage on the Test and Itchen. Both rivers have major public supply abstractions near the tidal limit, and projections suggested that large licensed abstraction increases may be necessary in the near future. These would only be allowed if the environmental impact were small and migratory fish were not hindered.

Fish counters were installed on each river to monitor passage and environmental parameters to better understand the pattern of salmon movement. This has been augmented by radio tracking up to 80 individual salmon annually on each river to investigate wider movements.

Results have shown the size of the runs to be much smaller than expected, and the exploitation to be much higher than suspected. In recent years, 35 - 40% of the run on the Test and 50 - 70% on the Itchen have been taken by licensed instruments. Further advances are being made in the operation and evaluation of resistivity fish counters.

SOUTH WEST REGION

In NRA South West the main thrust of the Environmental Protection Department has been to pioneer catchment action plans that will benefit migratory fisheries. These plans, originally introduced by the Fisheries Section, have been developed to incorporate a multi-functional input to catchment improvements. Five year plans have been developed for catchment actions in over 30 river systems. The 1992 programme represents the second year of the five year programme. Catchment Action Plans have been developed in conjunction with riparian owners associations and angling associations and each river system has now its own catchment action

liaison group. Each plan is flexible and is regularly updated.

During 1992 specific Fisheries actions relating to the CAP's programme has included design work on a number of new fish pass projects and the construction or modification of fish passes at Okehampton (East Okement), North Tawton (Taw) and Head Weir (Mole). Trash dam clearance has also been undertaken on several systems together with the rehabilitation of spawning gravels. In many instances, spawning gravels on rivers such as the Tamar, Torridge, Taw, Axe and Otter have become compacted and impregnated with silt. In one exercise 47 gravel sites were reinstated in the upper reaches of the River Tamar.

The major rehabilitation programme for the Rivers Taw and Torridge continues. Netsmen have now been compensated not to fish for the past three years and a further three years are planned as part of the current programme. In conjunction with this measure mandatory back limits for salmon and sea trout have been imposed this year on both river systems. The Torridge, which is the river worst effected has had good runs of fish in 1992 and juvenile monitoring surveys have shown encouraging parr densities, particularly on main river riffle sites.

Tavy netsmen are being compensated not to fish the night tide as part of a five year programme designed to investigate the behaviour of salmon in relation to the tidal barrier at Lopwell.

Radio tracking studies have been undertaken on the Rivers Tamar, Tavy, Taw and Torridge and valuable data has been gathered on fish movements in relation to flows. This latter work is being funded by South West Water.

In 1992 the juvenile salmonid monitoring programme was increased to a three year cycle from the previous five year cycle. This will give valuable information for the better management of game fish stocks.

The first of a new generation of fish counters has been successfully installed at Gunnislake Weir at the tidal limit of the River Tamar. Design work is still proceeding at a number of other sites.

The NRA South West enforcement capability in coastal areas has been greatly enhanced this year with the purchase of two new craft for patrolling the North Cornwall Coast and that that of South Devon. The effectiveness of enforcement measures has also been strengthened by the introduction of a closure byelaw on all netting for sea fish within the Camel and Fowey estuaries during the period May to December. This measure will prove particularly useful in protecting the late runs of salmon.

THAMES REGION

Good progress has been made in a number of important areas of the Thames Salmon Rehabilitation Scheme. The regular run, established since the early 1980's, has been maintained with the total return for 1992 being of the order of three hundred fish.

The success of the Thames Salmon Trust has been essential in obtaining funds for the fish pass programme. This has been achieved mainly by corporate sponsorship, with companies and organisations from a variety of fields becoming associated with a particular pass. Only four passes planned for the initial phase now remain unsponsored and work continues to secure further funding.

The first phase of the fish pass construction programme has the aim of providing fish pass facilities at each of the twenty-four weirs downstream of Reading. Completion of this phase will provide access to the most important potential spawning tributaries in the middle reaches of the river. Three passes have been completed this year, bringing the total to twelve, and the programme is on schedule to be completed by the target date of March 1995.

A further area of progress has been the expansion of the breeding programme to produce juveniles for the stocking initiatives. Although, at the current time, juveniles from commercial aquacultural sources are still being used, maximum use is made of adult returns to provide broodstock. The 1992 stocking programme of 200,000 parr and smolts included 70,000 ex-returnee progeny and it is expected that these will show an improved return rate.

Effective monitoring of adult returns has enabled investigations into the key area of environmental requirements of salmon passage in the Thames estuary to take place. This work is important in identifying future objectives for both water quality and quantity.

WELSH REGION

NRA Welsh region and the South Wales Sea Fisheries Committee byelaws regulating sea fisheries for the protection of salmon are now in force. The most significant areas affected by the byelaws are the Severn Estuary upstream of Cardiff and the Dee Estuary, both areas being notorious for the illegal netting of salmon. Enforcement of the new byelaws by the bailiffs should enable the illegal netting of salmon in the Dee and Severn estuaries to be reduced to an insignificant level.

Further byelaws covering the coast from Cardigan to the Dee estuary are to be promoted by the N. Wales and N. Western Sea Fisheries Committee.

Actions to Save Spring Salmon

The Welsh Region of the NRA is acting to protect spring salmon by promoting new byelaws for both anglers and commercial fishermen in the Wye, Usk and Dee districts. These fish are greatly valued by fishermen as they may weigh over 40 lbs. having spent several years at sea before returning to freshwater.

Over the past 20 years or so catches of spring salmon have declined to a greater or lesser degree on both sides of the Atlantic. In Wales, on the Rivers Wye, Usk and Dee, once noted for prolific runs and catches of spring salmon, the problem is now acute. On these rivers the average weight of salmon has been declining since the 1940's. Overall there has been a shift in the composition of catches from large, early running salmon to small, later-running grilse.

Many factors are likely to have contributed to this decline which include over exploitation, genetic changes, climatic conditions, disease and habitat degradation, although two are thought to be primarily responsible for the decline. Firstly, climatic change in the North Atlantic, where most salmon marine feeding grounds are located, has caused lower ocean surface temperatures which may favour grilse. Secondly, runs of spring salmon have been heavily exploited on the high seas and in homewater rod and commercial fisheries. The Region has examined the evidence and decided to promote a package of byelaws to enable the stocks of spring salmon to recover.

The byelaws include a later start to the season for anglers and commercial fishermen, restrictions on angling baits for the early and latter parts of the season and the prohibition of some methods of taking salmon.

In addition the Welsh Region is proposing to promote a voluntary measure for anglers to release alive all coloured salmon and particularly large fish caught after the end of August. The measures promoted all have the backing of the local fisheries groups and the Regional Fisheries Advisory Committee.

There is also a National R&D proposal to address the genetic aspects of spring run salmon. The objectives are to establish whether there is a specific unique characteristic of spring salmon; to determine whether it is feasible to produce by artificial propagation juvenile salmon which will increase the spring run; to determine the genetic impact on the wild stocks of such enhancement; and to advise and make recommendations on genetic guidelines for hatchery procedures.

Handling of salmon in suspicious circumstances.

The NRA does not confine its fight against illegal fishing to the river bank. This year Welsh Region sent out 'Buyers Beware' leaflets to over 3000 hotels, restaurants and fishmongers throughout Wales and the borders. The leaflets give advice on how to avoid buying illegally caught salmon with a few simple checks. The NRA aims to reduce the outlets for illegally caught salmon to such an extent that poachers are discouraged from taking fish. Although it is recognised that the majority of people buying salmon or sea trout are law-abiding, when offences are detected, firm action is taken.

One example of the application of the law governing the handling of salmon in suspicious circumstances is the case of a man who was ordered to pay £5000 in fines and costs by Brecon Magistrates after he admitted a record number of charges associated with poaching and handling. After being observed taking salmon illegally, a search of his house revealed diaries and ledgers which indicated that the man had for two years been carrying on a business in buying and selling illegally taken salmon. It is hoped the result of this case will be a deterrent to others.

Tawe Barrage (Swansea) Completed.

Visitors to Swansea docks are now greeted by the sight of gleaming white hulled yachts and

motor cruisers moored in Wales' first tidal barrage lagoon. The barrage, situated within the River Tawe estuary started to impound water in July 1992. It consists of primary and secondary weirs with a boat lock and pool and traverse fish pass situated between the two weirs.

The NRA has been examining the behaviour of salmon and sea trout at the barrage during 1992 to assess the efficiency of the fish pass. The work involves the tracking of adult fish of both species with the aid of radio tags. Some fish tracks have indicated that fish have found it difficult to pass the barrage.

In addition a trap 23km upstream of the barrage was used to catch salmon and sea trout to compare numbers of fish before and after closure of the barrage. Some fish caught in the trap have been used for tagging and relocation to sea to monitor their behaviour at the barrage.

Welsh Region Microtagging Programme

Since the microtagging programme began in 1982 over half a million salmon and around a quarter of a million sea trout have been tagged and released into 18 different Welsh rivers. Up to the end of 1991, one adult fish was reported recaptured for every 500 or so young salmon tagged, giving a total of 740 tagged adult salmon. Of these fish, 47% were caught in the estuaries and rivers of Wales with the other 53% being caught in more distant waters.

Of the 393 salmon caught in distant waters the majority (318) were caught in the fishery off the south West coast of Ireland, the remainder being caught in about equal numbers off the coasts of N. Ireland, Greenland, Faroe Isles and the North East of England.

The fish returning to homewaters are recaptured about equally in the commercial fisheries in the estuaries and in the rivers in which they were stocked, with the last 10% found straying to other rivers.

The highest recovery rate of salmon so far has been from wild smolts tagged on the River Wye. The data from the microtagging programme is currently being analysed in detail and will be reported early in 1993.

It is anticipated that a large number of wild fish will be tagged in the future beginning on the River Dee in 1993.

River Ogmore Recovery Programme.

The River Ogmore catchment was one of many in South Wales recovering from the industrial pollution of years gone by. The river was recovering well until a severe pollution in the middle reaches of the river in 1988 caused the virtual elimination of all fish. A four year major restocking programme, fisheries and water quality monitoring programmes and a catchment management plan which identified areas where improvements could be made were instigated.

Apart from restocking with salmon and sea trout areas previously unavailable to migratory fish have been opened up by the NRA. The fish stocks have once again recovered with an annual declared rod catch of sea trout in 1991 of over 300 fish.

River Dee Stock Assessment Programme.

Chester trap is a partial, head of tide trap located at Chester Weir on the River Dee. Modifications to the trap commenced in August 1990 and were completed at the end of March 1991 at a cost of some £200,000. The trap has been operational since May 1991 and forms an integral part of the Dee Stock Assessment Programme (DSAP) which is a long term programme to monitor the migratory salmonids of the River Dee. The programme contains a number of components; these include adult trapping and mark-recapture studies, radio-tracking, automatic fish counting, fishery censuses and microtagging and juvenile salmonid monitoring.

In 1992, the first full year of operation, trapping has been carried out for 64% of available time, the trap being operated on a 6 day on/3 day off rota. 1310 salmon and 885 sea trout have been captured to date, the majority of which were floy tagged for mark-recapture purposes. In addition, 60 trap caught salmon have been radio tagged along with a further 102 caught in the estuary. The trap catches include 19 sea trout floy tagged and released in 1991, which remain an under exploited resource on the Dee.

Cardiff Bay Barrage - Pre-Barrage Monitoring of Salmonid Fisheries.

The proposed construction of a tidal-exclusion barrage across the mouth of Cardiff Bay will impound the flows of the rivers Taff and Ely, creating a large freshwater lake. This will have an impact on the migrations of diadromous fish, and could compromise the full recovery of migratory salmonid populations. The River Taff used to support an important salmon stock, and this together with the sea trout stock is now in the process of recovery following 200 years of severe industrial pollution.

To assess the impact of the proposed barrage on migratory salmonid populations, a monitoring programme has been designed to examine current future stock characteristics. The work is funded by the Cardiff Bay Development Corporation, and is designed to investigate the impact of both the construction and the presence of the barrage on the migratory success of salmonids.

This work is now approaching the end of the third year of the pre-construction monitoring phase, and subject to progress of the Parliamentary Bill, will continue for approximately two or three years during construction and a period of five years or longer after construction. Work is focused on the trapping of fish in the lower Taff, and scanning of the catch for marked fish derived from earlier releases of salmon smolts and previously trapped sea trout. Information on the rates of return will be used in future to assess the impact of the barrage and to determine the requirements for mitigation stocking.

Many other unmarked salmon are caught each year, and these are presumed to be derived from natural production within the river system, although the scale of this is unknown, and from

straying from adjacent catchments. The straying of fish in the Severn Estuary is well known, and further evidence for it is being accumulated during this investigation. Clipped salmon derived from Taff smolt releases are selected for radio and CART tagging. These are relocated to the Severn Estuary and their subsequent behaviour, patterns, and rates of return investigated with a network of acoustic and radio listening stations.

During the past two years the recorded run of salmon in the River Taff has been 195 and 229 and that on sea trout 169 and 222 respectively. This year the run of salmon is likely to be similar to those previously recorded, however the run of sea trout will be considerably larger with over 400 fish noted by mid-October. The majority of the salmon are grilse, with the remainder being 2SW fish, however the sea trout vary in age from whitling to 4SW fish with several repeat spawners.

Careful monitoring is ongoing with two upstream traps routinely operated, and one downstream trap to assess smolt migration and to provide kelts for the study of their downstream migration shortly to be constructed. An anglers log-book scheme has also been initiated this year to improve catch returns, and to maximise the value of the information received from anglers.

The rates of return of clipped grilse to the river have been disappointingly low at only 0.33% and 0.29%, and appear to be equally low this year. A proportion of these fish have been selected for the telemetry studies, and the majority have shown rapid returns to the river. In the first two years 100% and 72% of the tagged fish were recorded re-entering the river, and so far this year 54% have returned. Many fish have covered the distance of about 5km from the release site back into the river within one or two days, although some individuals have been absent for over three months.

The fish which are not detected presumably include some whose tags have failed, however tagged salmon are known to have entered other local rivers. This year two clipped fish which were trapped in the Taff and then radio-tagged and released in the estuary have been caught and reported by anglers - one from the Usk and the other from the Wye. Previously, fish tagged in the Taff have also been reported from the Ely and Rhymney, adjacent industrial rivers, and in contrast smolts released in rivers such as the Ebbw, Usk and even the Tywi have been captured by Taff anglers.

The information now being collected on the rates of return of fish to the Taff catchment, and on the behaviour and timing of return of individual fish will be invaluable should the barrage be built. The data will suggest ways in which barrage operation may be adjusted to minimise adverse effects on fish migration, and will provide a means of determining the mitigation requirements to ensure that the stock is adequately protected.

WESSEX REGION

Fish Pass Construction

The Authority has continued its programme of building and improving fish passes to enable

easier upstream migration of salmon and sea trout. Two passes have been built on West Somerset Streams to allow sea trout to move further upstream, new structures have been built on the Chew a tributary of the Bristol Avon and improvements made to passes in the Hampshire Avon catchment.

Enforcement

A new fisheries patrol boat is now operational off the Somerset coast in the Bristol Channel and joint enforcement operations with adjoining NRA regions, Wales and South West, have been carried out.

Spring Salmon

The Authority has taken a number of initiatives to arrest the decline in spring salmon in the Hampshire Avon. After seeking the advice of Dr. D. J. Solomon and carrying out extensive consultation, a package of conservation and investigative measures was formulated, notably:

- to undertake a study of the composition and suitability of spawning gravel

- together with NRA Welsh Region to begin a feasibility study of spring salmon enhancement by stocking with particular reference to the genetic implications

- to make byelaws introducing restrictions on rod and net seasons and fly only fishing in the early season.

YORKSHIRE REGION

The rivers throughout Yorkshire were, historically, salmon rivers. Salmon entered the River Humber and River Esk in great numbers and distributed throughout the extensive river system to the spawning grounds in the upper reaches. However, industrial pollution over the last 100 years has taken its toll on the rivers and severely limited the return of salmon to this region. The NRA is involved in many schemes to help the return of salmon to this region.

The River Esk is Yorkshire's principal salmon and sea trout fishery. This river has suffered various problems associated with low flows and habitat deterioration over the past 50 years. The NRA and the riparian owners of the River Esk set up the River Esk Action Committee with the aim of investigating the problem of declining fish stocks and to formulate a plan that would encourage the return of salmon to this river. During 1991 the NRA advised on several habitat improvements, including raking of gravel on the river bed to improve the quality of existing redds, as part of this plan.

In March 1992, as part of the Esk Action Plan, a total of 50,000 salmon parr were introduced, of which 20,000 were micro-tagged to enable their return to be monitored. The NRA also partially funded the acquisition of 50,000 eyed ova to be raised for future introductions.

Juvenile salmonid monitoring is performed on a yearly basis to assess and monitor the

population in the river. Smolt trapping is also performed on the rivers Ure and Esk to monitor salmon and sea trout stocks in the two systems.

We are constantly striving to improve the habitat of rivers and, where possible, aid the passage of migratory fish. Consequently, all new or renovated weirs in the region must now incorporate a fish pass. We are currently in the process of repairing a severely damaged fish pass at Sleights on the River Esk which has been hindering the passage of salmonids returning to this river. We are also involved in a joint venture with John Smiths Brewery at Tadcaster on the River Wharfe. The existing weir is being upgraded and will include a Denil fish pass.

This region has a very active enforcement unit and has recently acquired a second sea boat which will operate mainly in the River Humber. This will enable better protection and monitoring of salmon returning to the River Humber and Ouse system.

THE RECOVERY OF SALMON STOCKS IN THE RIVER TYNE

(by A. S. Champion)

(This article first appeared in The Salmon Net and is reproduced with the authors consent.)

By English standards the River Tyne was and is now once again a major salmon river notable for the large average size of its fish and the occurrence of significant numbers around the 30lb. mark.

It is a relatively large river with a catchment of 1,140 sq. miles but, because it splits into two approximately equal sized tributaries (the N. and S. Tynes) 34 miles from its mouth, has a maximum length of only 72 miles from the source of the S. Tyne in the Pennines to the sea.

In 1871 it was reported that 121,600 salmon and sea trout were taken by net and coble in the river and by hang nets around the entrance to the Tyne. It is not known how the proportion of the fish taken by these different types of instrument was split but 163 drift net licences were issued in 1873 although it is very probable that many of these were fished off the beach as hook nets, one end being laid on the beach and the other being allowed to drift round, or even as fixed engines. We now know that a proportion of these fish may have been of Scottish origin but since the fishery was very local and collapsed almost totally with the collapse of salmon populations in the Tyne the proportion was probably small. Either way it is hardly surprising that the perhaps apocryphal tale of apprentices insisting on the inclusion in their indentures of a clause prohibiting their employers from feeding them with salmon more than three times a week is most frequently quoted in connection with Tyneside.

By 1891 the catch had declined and the Chairman of the local Fishery Board blamed the nets despite the fact that he admitted that the river was grossly polluted and the Clerk to the Board, in evidence to a Royal Commission held in that year, stated that he was of the opinion that pollution was solely responsible for the decline and, in support of his opinion cited a horrific list of abuses from lead mining which had wiped out the nursery areas of the South Tyne to the

discharge into the estuary of raw sewage and effluents from coke and plating works.

There seems to be no record of any success by the Chairman in reducing netting and certainly pollution increased during the subsequent years to the point where probably one third of the spawning and nursery areas had been destroyed and a substantial proportion of those smolts that were produced in the North Tyne no doubt died in transit through the estuary. Both net and rod fisheries continued to decline but the message had still not penetrated and efforts were made to save the stock in 1934 by introducing a bylaw banning the river nets despite the fact that few fish were caught therein because they were virtually unsalable due to their tarry taste.

Needless to say redistribution of or a failure to collect the golden eggs does nothing for the goose that is being poisoned and in 1959 no salmon were caught by rod and line in the Tyne system.

By this time most of the lead mines on the South Tyne had been worked out but the spoil heaps remain to this day and while the lead content of the water is insignificant it is not known whether the low fish populations in the upper reaches may be due to a high lead content in the gravels. Certainly in 1891 it was said that gravel abstracted from the South Tyne and spread on a carriageway had killed the abstracter's hens. This no doubt served him right but regrettably he was not the only riparian owner to take advantage of the ready-washed gravel in the now untenanted spawning areas of the Tyne. Much of the South Tyne, never a gravel-rich river, has been despoiled by gravel abstraction and now spawning areas are severely limited. The top of the North Tyne was also denuded in a similar fashion and commercial abstraction at Hexham on the main Tyne and at Haltwhistle on the South Tyne lowered the river bed to such a degree that the foundations of Hexham bridge and Haltwhistle viaducts were endangered. Remedial work at Hexham resulted in the construction of a stepped weir so beloved by engineers but totally inimical to free access for migratory fish and consequently the Fishery Board had to construct at their expense a series of easements to fish passage when that money might well have been used better elsewhere. Haltwhistle viaduct remains a problem which, for an engineering solution, will cost many hundreds of thousands of pounds and although other solutions have been tried their efficacy has not been high and the exposed footings of the viaduct remain an obstacle at all but high flows.

Other parts of the Tyne system have been destroyed for ever on the human time scale. The River Derwent has not recovered from the silt deposited in the catchment as a result of the construction of Derwent reservoir, the river's flow regime is unsatisfactory (the reservoir is designed to spill only once every three years) and the small amount of compensation available was frittered away on restocking with trout. Catcleugh reservoir on the River Rede also drowned a significant spawning area but an additional problem my depreciate the value of the remaining nursery areas in that the compensation water is drawn from the bottom of the reservoir and may be causing reduced productivity in the upper reaches.

The grand prix for habitat destruction must go to Kielder Reservoir which inundated 7 miles of the best spawning and nursery area in the system. It might have been worse, the tributaries upstream had already been destroyed by gravel abstraction and the planting of the biggest man-made forest in Europe. Regrettably these are only the obvious manifestations of Kielder, the

huge volume of water in the reservoir acts as a heat sink and has altered the temperature regime of the river in the immediate vicinity of the dam and probably much further downstream when the large discharges required for hydroelectric power generation are being released. It has been established that the comparatively warm releases in the winter accelerate the maturation of eggs and fry and the still cold releases in the spring are not sufficient to allow the fry to feed.

The total effect of the changed flow and temperature regimes are not clear but are being studied by the National Rivers Authority.

All the above problems are by and large obvious and to some degree quantifiable but what cannot currently be assessed is the damage which has accrued to the river system from smaller forestry schemes, moorland drainage, overgrazing and other manifestations of intensive agriculture encouraged periodically by government grant.

The National Rivers Authority have been quick in getting to grips with point sources of pollution but fertiliser run off and acidification of minor water courses will remain a problem, the scale of which is still unknown especially in terms of their effect on salmon production.

Water abstraction is yet another abuse from which the salmon fisheries of the Tyne have suffered. The aforementioned Catcleugh and Derwent reservoirs were built for public supply and further major abstractions for the same purpose take place from the North Tyne and from the main river although these are supported in dry weather by releases from Kielder reservoir. All well and good in theory; the compensation releases in the North Tyne are probably two to three times the historical minimum and the minimum flow is adequate for the short term health of the river but, there are conflicting requirements in the management of the river. There is a necessity to control spillage from the reservoir in order to minimise the risk of catastrophic flooding in the catchment so the reservoir level is normally maintained at approximately one meter below the spillway by releasing water at a rate similar to a small spate in the mid North Tyne (ideal salmon fishing conditions if there are any fish about). In the winter and spring this is more or less continuous and probably benefits the fishing at the expense of the general ecology of the river due to the adverse temperature of the releases, but in the summer these releases have historically been pulsed in order to maximise the income from generation and a diurnal twelve-fold fluctuation in flow may help the angler if fish have recently moved into the beat on a natural flood but once again the benefit to river ecology is at best questionable. As a result of these constraints in recent years low flows have been maintained for longer periods than would otherwise have normally occurred. It is easy to speculate that this diminishes the habitat area and over such long periods could result in diminished juvenile production; but there is also reason to believe that the "catching" in Kielder reservoir of small spates which otherwise might have brought migratory fish up from the sea has on occasion diminished the quality of fishing and the lack of major flood events may be allowing armouring of spawning areas. These matters are being investigated by the National Rivers Authority but it is a difficult area of research and considerable effort over a long period will be required to untangle the skein of interacting effects. Fortunately the hydroelectric generation tariff has now been changed which will allow much more flexibility in the management of releases for generation without loss of income.

So far this article has concentrated on the abuses which the Tyne has suffered and which still continue and it would be reasonable to wonder under the circumstances at the miracle of the river's recovery; but the best guess of the adult salmon production of the system must be in the region of 10,000-20,000 fish with probably rather more sea trout so it is still a far cry from the teeming squadrons of migratory fish which the river apparently supported in the last century. Perhaps we should wonder instead at the remarkable persistence of the salmon and consider what has been done to aid the species in its re-establishment in the system.

The first crucial factor is probably that the salmon never completely vanished from the river. Even although in 1959 no salmon were caught on rod and line it is probable that fish were present in the river system and certainly there will have been a population of parr from previous years. Those fish which did succeed in penetrating the estuary in the worst years will have been the large spring fish because only in the spring after the estuary had been scoured by winter floods will it have been possible for fish to penetrate into the cleaner fresh water environment on high flood flows and it is a fortunate accident that the smolts could migrate out in the same way. It is worth noting that even in the late 1970's it was local wisdom that 4ft. of extra water over Hexham weir (150 yds. wide) was required to induce a run of fish and the last few that came through always tasted of creosote. It will not have required many of these large fish, laying perhaps 15,000 ova per female, to stock the prime nursery areas of the North Tyne where they invariably spawned, thus the puny annual introduction of 100,000 ova/year carried out in the 1960's are unlikely to have had a significant effect and in fact modern beliefs would have it that the introduction of these eggs from a variety of Scottish sources was probably counterproductive. However, it must be said that there was a marginal improvement in the runs in the 1960's but this also happens to have been coincident with the re-siting of a substantial factory from the lower non-tidal reach.

Restocking on a large scale did not commence until 1979 when the Northumbrian Water Authority constructed a hatchery to facilitate compensation stocking to replace spawning grounds lost under Kielder Water. Initially Scottish ova were used but an electronetting technique was developed for the collection of brood stock and since 1985 all introductions have been of Tyne origin. Numbers and sizes of introductions have varied from yearling pre-smolts down to 4 month old parr. The numbers have averaged about 250,000/year and stocking has been carried throughout the river system particularly in areas not normally spawned naturally. Whilst it is still not possible to estimate the contribution of stocked fish to the system the Ministry of Agriculture, Fisheries and Food have carried out an extensive microtagging exercise on the introduced fish and recaptures have been made in high seas fisheries, many times more in the local drift net fishery and a relatively small number in the river however, the percentage of microtag returns from among rod caught fish is low and there must be some doubt as to the efficacy of the programme if it is to be judged on the basis of numbers of fish recaptured or even on comparative numbers of recaptures in the local fisheries.

Moreover, the fact that recaptures occur is no proof that the total population has been improved; stocking parr into areas already tenanted may even be harmful in that natural parr could be displaced by the new introductions.

There must also be some doubt as to whether the programme assisted in the rehabilitation of

the river; the pattern of increasing rod catches is the best available guide to improvement and it is interesting that the annual catches of sea trout follow closely the same pattern as the increases in salmon catches. No sea trout were stocked; their increased population can only have come about through improved natural spawning and survival. There is therefore room for the belief that the natural recruitment of salmon throughout the recovery period swamped the stocking effort.

However, there is no doubt whatever that the major contribution to the recovery of the river as a salmon fishery was the improvement of water quality in the estuary which now allows the smolts to migrate without danger of suffocation or poisoning in the tidal reaches.

It seems astonishing today that even in 1875 local authorities were aware that something must be done about the increasing health hazard of the river in the centre of Newcastle but up to that date the only action seems to have been to refrain from abstracting drinking water from the river so as to lessen the risk of cholera epidemics which had affected the city. Only 80 years later did they succeed in agreeing on a solution but it was not until 1973 that construction of the Tyneside Sewerage Scheme into the estuary which contributed nearly 4 cumecs of untreated sewage to the tideway where it was frequently locked in the river by complex flow patterns. Small wonder that in 1969 a Public Inquiry in the centre of Newcastle was adjourned due to the stench from the Tyne yet incredibly salmon were still able to enter the river under conditions of high flow.

The Tyneside Sewerage Scheme will ultimately intercept all the sewage outfalls into the Tyne estuary, transfer them through the interceptor sewers to the lower part of the estuary and there provide primary treatment before returning the effluent to the river. In fact, the interceptor sewers are virtually complete and in recent years, despite isolated mortalities amongst adult fish in very hot weather and an associated disease problem, migratory fish have been seen to pass through the still questionable reaches at all states of the tide and even at minimum flow conditions.

The timing of the return of large runs is interesting. In the 1970's the catch by anglers was already beginning to improve with occasional annual returns of 300 or so salmon despite the fact that by this time the local drift net fishery had reached its peak; but they stabilised at that level in the early 1980's after the commissioning (in October 1980) of the most significant step in the sewerage scheme, the Howden treatment works. Whilst this only provides primary treatment the effluent is discharged into the lower part of the tideway where it streams down one bank and out to sea without travelling up and down the river on the tide so now there is always a pathway of relatively clean water down one side of the estuary which migratory fish may travel. The rod catch doubled in 1985/86 and again in 1987/88 since when it has declined slightly probably due to the prevalence of dry weather flows during the fishing season. Since the Tyne produces predominantly 2 and 3SW salmon it is tempting to speculate that the dramatic improvement since 1985 was due to the return of the progeny of the increased escapement in the river.

The point is arguable but the coincidence is remarkable and adds further weight to the conclusion from the sum total of experience on the Tyne that salmon are very capable of

looking after themselves if their habitat is properly maintained and protected. Of course there must be restrictions on cropping but these must take their place in a much more general river management plan lest we fall into the same trap as the aforementioned Chairman of the Tyne Fisheries Board and blame any decline in stock on over-exploitation while the real problems continue to multiply and destroy not just the fish but the river itself.

Note:

A. S. Champion is now and independent Fishery Consultant. He wishes to thank his ex colleagues on the National Rivers Authority for their help without which this article would not have been possible; however, the opinions expressed therein are his own and may not be the same as those held in that organisation.

1992 SEA TROUT CATCHES AND AN UP-DATE ON ON-GOING RESEARCH PROGRAMMES

(by Dr. K. F. Whelan, The Salmon Research Agency of Ireland Inc.)

ROD CATCHES - 1992

Sea trout angling in Ireland was generally very good during 1992. Good rod catches were reported from the River Dargle and the River Slaney tributaries along the east coast. Some very large sea trout were taken in the River Dargle, particularly during September. Rod angling was also very good in rivers along the south coast particularly in the Rivers Bride and Argideen. Good sea trout catches were reported from many rivers in the northwest, particularly the Owenmore, Moy estuary, Glen and Tullaghobegley.

In contrast angling in Lough Currane, Ireland's premier sea trout fishery, was considered poor. Due to poor angling in July and early August rod effort was much reduced for the remainder of the season. Some excellent individual catches were made in September and early October, although numbers of finnock and 1+SW sea trout were poor. A record number of 33 specimen sea trout (over 6lb) were recorded from the lough. Again the majority of these fish were taken both early and late in the season.

In the mid-west (Table 1) sea trout catches were exceptionally poor. Although the Erriff, Delphi and Costello fisheries showed a slight improvement the overall catch records make for depressing reading. Particularly worrying was the drop in catches in the Clew Bay area which had shown signs of a significant recovery in 1991. The total run of sea trout back to the Burrishoole fishery fell from 342 in 1991 to 151 in 1992. The rod catch dropped from 106 to 25 despite increased rod effort. In contrast the catch of grilse and salmon rose from 109 to 280 in 1992.

RESEARCH PROGRAMMES

Results from the 1992 sea trout research programme are currently being analysed in

preparation for a meeting of the Department of the Marine's Sea Trout Working Group in early December.

Preliminary results from the Burrishoole trap facilities indicate a drop in smolt survival to finnock from 10% in 1992 to 3.7% in 1992 (historic range 11-32%). Traps in the Gowla and Invermore systems have recorded upstream adult escapements of 1 and 25 sea trout respectively.

Sea lice counts on sea trout returning to the Clew Bay systems (Newport, Burrishoole, Owengarve) have increased significantly in 1992. This is in contrast with 1991 when low juvenile lice numbers were present. The numbers of juvenile lice on sea trout in the Killary Harbour systems (Erriff and Delphi) have shown a reduction to 25% of the 1991 levels.

In this regard it is interesting to note that Killary Harbour underwent a partial fallowing during the winter of 1991/92 while cages containing adult farmed salmon were moved into Clew Bay in January 1992. The bay had been clear of salmon cages since April 1990.

It was suggested that the presence of furunculosis recorded from two wild returning sea trout in 1991, might implicate the disease as a possible cause of the sea trout problems in the mid-west of Ireland. During 1992 two groups of fish, both descending smolts and prematurely returning, heavily lice infested sea trout were stress tested but all samples proved negative. In addition lice infested sea trout from four separate embayments were tested for the presence of the disease and again all samples proved negative. From these results and previous pathology on several hundred samples over a three year period, it seems unlikely that furunculosis is a significant factor in the decline of sea trout in the mid-west.

On-going studies in the Burrishoole catchment have shown that periodic acid events in some of the smaller feeder streams have no detectable influence on the pH of Lough Feeagh, which contains the bulk of the sea trout pre-smolts and all of the over-wintered finnock. The streams affected by acidity are now largely devoid of salmonids and sea trout spawning takes place in streams free of acid influences.

ENHANCEMENT

The re-conditioned kelts and finnock, held in Lough Furnace since the spring of 1991, have grown exceptionally well during the past summer. It is expected that the broodstock will provide some 100,000 sea trout ova. The resultant fry and parr will be used to enhance the Burrishoole catchment.

A comprehensive survey, part funded by the Trust, of Lough Feeagh (Burrishoole catchment) and its feeder streams is on-going. The project is designed to characterise groups of juvenile trout so as to develop techniques for the identification of potential sea trout smolts. Features being studied include: changes in body morphology, changes in growth rate, differential gonadial development and the use of parasite species as biological tags.

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Annual Sea Trout Catches from Mid-Western Fisheries 1985-1992

Fishery	1985	1986	1987	1988	1989	1990*	1991*	1992*
Kylemore	2411	1099	543	1116	198	10	450	200
Culfin	298	173	222	235	36	8	175	60
Erriff	770	433	450	308	120	N/R	219	293
Delphi	2150	1281	832	675	309	112	437	494
Carrow-nisky	135	97	90	160	45	N/R	65	10
Bunowen	475	110	146	340	88	10	120	25
Clifden R.	95	70	98	20	4	N/R	6	N/R
Belclara	95	70	98	400	0	6	60	20
Ardbear	86	75	36	27	5	N/R	15	N/R
Newport	1155	1485	783	1049	135	N/R	N/R	30
Burris-hoole	497	614	237	245	41	39	106	24
Inagh	N/R	N/R	1369	824	29	10	7	46
Inver Beg	254	220	67	18	0	0	10	60
Ballyna-hinch Upr.	378	398	306	173	10	0	0	N/R
Ballyna-hinch Mid.	202	150	224	75	5	0	30	45
Ballyna-hinch Lwr.	2300	2000	1500	850	20	90	200	60
Gowla	1035	967	266	210	0	0	0	0
Doohulla	200	150	100	20	1	N/R	N/R	N/R

Crumlin	328	222	261	26	0	N/R	N/R	N/R
Invermore	1481	1345	325	199	48	0	0	0
Carna	60	180	100	60	3	N/R	N/R	N/R
Costello & Fermoyle	2745	2316	1698	1851	462	140	234	375
Letter-muckoo	74	50	100	30	2	0	0	N/R

N/R = Not Recorded

*1990 to 1992 - all sea trout taken on a catch and release basis
*1992 - Provisional Figures

NORTH ATLANTIC SALMON FUND

(by Jeremy Read, Deputy Director)

Due to pressure of other responsibilities, Lord Tryon has had to step down from the Chairmanship of the Committee of the North Atlantic Salmon Fund (UK), and Edward Whitley has been elected to the post - Lord Tryon is to become President of the Fund. Robert Clerk has been elected Vice-Chairman, and an Executive Sub-Committee has been set up to handle the detailed organisation of the Fund.

The delay in launching the appeal for funds has been due to the need to establish the possibility of charitable status of the Fund. This has been important, because without such status, organisations bound by charitable constraints, like the Atlantic Salmon Trust, will not be able to contribute to it. However, the ASCT(S), after lengthy representation to the Inland Revenue Claims Branch (who administer the taxation aspects of charities in Scotland) have confirmed that the Trust's charitable purposes of protecting the Atlantic Salmon in Scotland may be extended first to any UK waters and secondly to the North Atlantic so long as contributions from the Scottish/UK sector are in proportion to both the number of Scottish/UK fish "saved" and the amounts contributed by other participating approved countries.

This means that the ASCT(S) will be in a position to ingather charitable funds from the UK, to arrange the professional fund management of the capital and to apply on an annual basis relevant proportional quota payments. Arrangements are in hand for close liaison between the Committee of the North Atlantic Salmon Fund UK and the ASCT(S) to encourage fund raising and to arrange administration matters thereafter. Intimation of the proposals have been given to the Lord Advocate's Office in Edinburgh in light of the new charitable responsibilities

which the Department holds.

The Faroese long-line fishery has already ceased, and a contribution from the UK to the buyout cost is overdue. The UK share of the cost has been re-assessed at the reduced level of 17% (originally 22%) which would require yearly compensation funding of about £90,000. However, it is still not possible to assess the total cost of buying out all high seas fishing. Negotiations with Greenland are well advanced, and Orri Vigfusson is confident of obtaining an agreement early next year, with substantial North American support, which may limit the period over which UK contributions will be sought. The other delaying factor - the continued existence of the North-East drift net fishery - is still not fully resolved, because the final form of the new Net Limitation Order is not yet known, nor is the Government's response to representations on the need to phase out the fishery faster than the thirty years that the original proposals would take. This means that no decision has yet been taken on whether the Fund should also be involved in accelerating the end of the North-East fishery.

The Committee wishes to avoid any further delay in meeting the obligation to join other nations in supporting the Faroes buyout, and in preparing for a Greenland agreement. The Association of Scottish District Salmon Fishery Boards has already considered how District Boards might make provision to the Fund in respect of Scottish proprietors. At the same time, the means of approaching proprietors in England and Wales is being explored. The Executive Committee will be meeting early in January to set up the arrangements for a public appeal in the Spring to supplement the approaches to proprietors. In fact, numerous voluntary contributions have already been made, and the ASCT(S) is setting up a special account to handle money for NASF(UK).

WHAT GENES TELL US

(by Alan Youngson, SOAFD Marine Laboratory, Aberdeen)

For several, years scientists from the Marine Laboratory in Aberdeen and the Freshwater Fisheries Laboratory in Pitlochry have been studying the genetics of salmon in Scottish rivers. We have been trying to find out how much salmon populations differ from one another and what the implications are for fisheries management. It is clear from recent correspondence in the angling press that this is a matter of interest for fishermen too.

The findings of our studies are not readily available to non-scientists. In any case, geneticists have a language of their own that even other scientists can find difficult to understand. In an attempt to remedy matters, I have described in this article what we have discovered - in what I hope is a readable form.

The most straight-forward approach to the study of the genetics of salmon is to examine the various proteins that make up their body tissues. Each protein results from the activity of a gene that codes for it specifically. Every gene is present in the nucleus of all the living cells that together form the tissues of the body. Slight differences in the same gene result in a difference in the protein it codes for and this difference can be detected in the laboratory. By

studying differences in the form that particular proteins take in different fish we can compare the types of genes that those individuals contain.

Our first problem is that it is technically possible to examine only a handful of the many thousands of genes that are present in every salmon. This is a major limitation. It means that the chances of being able to study the most interesting genes among the many, are very small. However, by a stroke of good fortune, it has been possible to gain an important insight into the effects that genes can have on salmons' lives by studying the particular gene that codes for the protein known as malic enzyme. I will refer to malic enzyme again later in this article.

The other way of using the small amount of information we can obtain is to examine the genes present in groups of salmon sampled from different places. The same genes and the same forms of the genes occur across the salmon's range. However when we compare the frequencies with which different forms of the same gene are present, distinct genetic populations of salmon can be shown to exist. It has been found that the extent of the genetic difference between populations increases with the distance that separates them. Thus, the salmon of North America and Europe are most distinct, Baltic salmon differ from those of Atlantic Europe, and Norwegian salmon differ from those in Scotland. Even with Scotland the salmon of different river catchments have been shown to differ and sometimes separate populations can be shown to exist in different parts of the same river too.

Interpreting these differences is not straightforward. Usually scientists assume that variation in the sorts of genes that we are able to examine is not of great importance in itself. If this is so, natural selection for the different forms of these genes will not have taken place and the differences we observe between populations must exist for other reasons.

What the differences do indicate is that salmon populations are reproductively isolated. In other words, genes are not being exchanged freely enough between populations to counter-balance the tendency of the populations to drift apart genetically over the generations. Reproductive isolation is caused by the homing of salmon returning to spawn in rivers and streams. Everyone knows that salmon tend to home to the rivers in which they lived before they went to sea. However, recent tagging experiments on the Girnock Burn, a tributary of the Aberdeenshire Dee, show that salmon home with substantial accuracy within rivers too. Genetic measurements suggest that homing is very accurate indeed. For instance, the size of the genetic differences among the salmon populations of the Kyle of Sutherland catchment suggests that of all the many fish which spawn each year in each of its three main rivers (the Shin, Oykel and Carron), only about 15 are strayers.

Now, even if the genetic differences which we can detect are of no special importance in themselves, the reproductive isolation that has under-pinned their development will foster other genetic changes too. Important genes may well have been affected by differences in the environments where these isolated populations live. The frequency of occurrence of some of the many genes that we can not examine directly may well have been increased or reduced in places where fish live or die as a result of the form that their genes take. Individuals constitute populations and populations change to reflect the genetic make-up of successful individuals.

River populations of salmon differ from one another in a number of ways. For instance, they differ in the size at which fish first return from the sea - compare the large salmon of the renowned Norwegian rivers with the small fish of the spate rivers of western Scotland. Populations differ in the time at which they return to freshwater - compare the spring salmon of the Dee with the late-running fish of the Nith.

The populations of parts of the same river differ too. Radio-tracking studies have shown that fish run earlier to the upper than the lower reaches of such rivers as the Dee and the Spey. In line with this, fish tagged as smolts leaving the Girnock Burn do not contribute evenly to the rod fishery on the Dee when they return as adults. The differences observed are almost certainly a consequence of population structure and a reflection of the fishes' homing to the locations in which they were spawned themselves.

It is difficult to prove that differences like these are genetic. However, it is obvious that many practical people believe that this is the case. Over the years, fishery managers have often moved the eggs of spring fish or the eggs of particularly large fish from one river to another in the hope of altering the character of their favoured fishery. In fact, it has never been shown conclusively that moving fish from one river to another has produced the intended effect. On the other hand, it has been shown that moving fish can be ineffective. In recent years for instance, salmon eggs have been imported from Scotland and Iceland to replenish the rivers of northern Spain. The vitality that the imported salmon show in their own northern rivers is not evident in Spain. They do not contribute substantially to the fisheries because their survival is poor. It seems quite likely that this results from crucial genetic differences between populations - at least between those of northern and southern Europe. But genetic differences are important on a finer scale too.

This can be shown by considering genetic variation in malic enzyme which I mentioned earlier. In fact there are a number of malic enzymes but the one that is of particular interest is called malic enzyme 2. In the remainder of this article I will refer to the gene which codes for this enzyme as the ME-2 gene. It is worth considering the gene in some detail because so much follows from what we have discovered about it. To consider the gene properly a little more detail will be necessary. But the reader should take heart - we will be concerned with the general principles the ME-2 gene illustrates rather than what it does exactly.

Each gene in every fish comprises two units that act together to produce the gene's effect. One part of each gene is donated by each parent. When the female's egg is fertilised by the male, both parents donate at random one of the pair of units they possess themselves. For many genes each of the paired units is identical but for ME-2 this is not the case and two types of unit exist. It does not really matter what the units are called but I will distinguish the different forms by calling them 100 or 125.

The two forms of the ME-2 unit can be assembled in individual fish in three combinations - 100/100, 100/125 or 125/125 - depending on which units were present in the parents and which of the pair of ME-2 units each parent donated at spawning. The ME-2 gene can be measured in populations by adding up the paired units contributed by individuals and calculating the proportion of all the ME-2 units which take the 100 or the 125 form.

When this is done, clear differences emerge among populations distributed from north to south in the salmon's range. In northern Canada the 100 form of the ME-2 unit is absent and all the fish take the 125/125 form. In Spain the reverse holds true and all fish take the 100/100 form. At intermediate latitudes both 100 and 125 units are present, but in varying proportions. The exact pattern in which the proportions of the two types of unit vary with latitude suggests that differences in temperature have caused the genetic differences among populations. In warm southerly latitudes, 100/100 fish seem to be greatly favoured while in the cold of the north only 125/125 fish survive. In populations living at intermediate latitude, temperatures are less extreme and the overall advantage of carrying either form of the ME-2 unit is less clear. As a consequence both forms of the ME-2 unit are present and fish with any of the three ME-2 unit combinations are found.

In Scottish salmon populations the 100 and 125 are represented about equally and 100/100, 100/125 and 125/125 fish live side by side. Even here however, it seems that the three types of fish do not compete on an entirely equal footing. In fact the pattern which emerged from examining salmon populations across the latitudes is present in microcosm within single rivers. Thus in the Dee and in the Kyle of Sutherland rivers, colder upland populations of salmon carry more of the 125 form of the ME-2 unit than populations living in warmer downstream locations. From the fishes' point of view the ME-2 units that they carry appear to affect their lives to a considerable extent. In juveniles, growth differs among fish containing each of the three possible ME-2 unit combinations. Among adults, more of the fish carrying paired 100 and 125 units return to freshwater as grilse rather than salmon compared with those fish in which both units of the pair are identical.

So, by considering the ME-2 gene we have been able to link the geography of salmon populations with adaptation to the environment. We have been able to go even further, linking differences in the ME-2 gene with important and noticeable differences in the development of individual fish. Surprisingly, it has been possible to do all this by considering only one of the very few genes that we are able to examine at present. Much more must remain to be learned about genes and salmon when it becomes possible to examine others of the many thousands of genes that the fish contain.

Even now however, it should be evident to the reader that genetics do matter for those with a practical interest in salmon fisheries. In particular, it seems clear that a cautious approach to moving fish from one place to another - and a light touch when this must be done - are essential for the proper management of local salmon populations.

ROYAL SOCIETY OF EDINBURGH

SYMPOSIUM REPORT
(by Dr. A. D. Hawkins, SOAFD Marine Laboratory)

A symposium on Salmon Farming and the Ecology of Scottish Coastal Waters, organised by the Royal Society of Edinburgh in association with The Scottish Marine Biological Association and the Atlantic Salmon Trust, was held in the Society's Wolfson Theatre on Wednesday 13th May. Chaired by Professor Bill Fletcher of the University of Strathclyde, the meeting was attended by a mixed audience of over 100 scientists, fish farmers conservationists and administrators.

The opening speaker, Professor Ron Roberts of Stirling University, reviewed the development of the salmon farming industry from its very earliest days. In addition to Scots and English pioneers, Professor Roberts singled out the Swedes as making a particularly strong contribution to the freshwater phase of development, while the Norwegian Vik brothers and, in the UK, Unilever had developed the marine phase. Professor Roberts brought the audience up to date on the economic problems facing the industry, but stressed the large contribution being made by salmon farming to the fragile economy of the west coast of Scotland.

Dr. Graeme Dear, the Farms Director of McConnel Salmon Ltd. described vividly what it was like to be a salmon farmer. He emphasised the problems of disease control, fish husbandry, and minimising the impact of farming on the environment. In all these areas, farmers had worked with other agencies towards improving salmon husbandry, and ensuring that the environment was maintained in a good state. Local management agreements between farms brought strong benefits both to the farms themselves and the environment. Like all farmers, whether land-based or sea-based, Dr. Dear could not avoid mentioning the weather, and the major effects this could have on farming operations.

Christine Howson took the audience beneath the waves for a guided tour of the seabed, pointing out the beauty and diversity of marine wildlife and marine habitats, and clearly establishing the very special nature of Scottish sea lochs. She demonstrated that fish farming is only one of several activities having an impact upon the marine environment. Fishing, marina developments, maerl extraction, suction dredging, seaweed harvesting and various types of land use all posed threats. Setting up a handful of marine nature reserves was not an adequate solution. The creation of larger marine protected areas was required to protect a wide range of unique habitats and species.

Simon Pepper of the World Wide Fund for Nature emphasised the need for sustainability of both the salmon farming industry and the environment which supported it. He remarked on our poor knowledge of the marine environment, and the clear lack of resources and powers to protect it. The apparently elaborate control system in place had been assembled too late. Most farms had been located without prior survey, and without the imposition of proper systems of control. In the future, additional public funds were required to upgrade existing controls and provide a more effective and confidence inspiring system of management.

Dr. Lars Petter Hansen, of the Norwegian Institute for Nature Research described the fish farming scene in Norway, where the industry is even larger that it is in Scotland. He pointed to the large numbers of fish escaping from farms, mainly as a result of storm damage to pens. The numbers of farm escapes exceeded the annual run of wild salmon into Norwegian rivers by five-fold in some years. A large proportion of the fish caught in coastal fisheries were farm escapes, and in some rivers thirty or forty percent of the spawning fish were farmed stock with very different genotypes from wild fish. The significance of this level of escape upon the genetics of wild populations was difficult to assess, but as precautionary measures he suggested the use of sterile fish at farms, the setting up of gene banks, and measures to strengthen the state of wild stocks of salmon. Dr. Hansen also described the great harm done to wild salmon stocks through the introduction to Norway of both a parasitic fluke, *Gyrodactylus salaris*, and a bacterial disease of salmon, furunculosis.

Dr. John Davies, of the Marine Laboratory Aberdeen described the chemicals used at fish farms to control disease and to prevent biological growth on the pens. He described procedures for assessing the impact of specific chemicals, including dichlorvos, a potentially dangerous substance used to treat fish against sea lice. Investigations included determining the quantities used, investigating the toxicity to marine organisms and any sub-lethal effects upon wildlife, the deployment of sentinel species in cages around farms, modelling the dispersion of particular substances, and local surveys of animal communities. Dr. Davies also considered environmental effects arising from the use of antibiotics at fish farms, and the problems of organic enrichment.

A lively question and answer session raised a variety of subjects including the presence of toxins in shellfish, algal blooms, the dangers of vessels colliding with offshore cages, the spawning of farm escapes in Scottish rivers, the validity of Environmental Quality Standards based on non-indigenous species, and wider questions on the principles of marine conservation.

In bringing the meeting to a close Professor Hawkins thanked Professor Fletcher, the chairman, Professor Currie, the president, and Miss Sandra McDougall and her staff for their efforts in making the meeting such a success. The best wishes of the meeting were passed on to Dr. Richard Gowen, one of the listed speakers, who had been unable to attend as a result of a car accident.

80TH STATUTORY MEETING OF THE INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA

(by Dr. David Piggins)

Warnemunde, Rostock, Germany, 24th September to 2nd October, 1992.

In my capacity of Observer for the Atlantic Salmon Trust at the above meeting, I attended sessions of the Anacat Committee, Maricultrue Committee, the Theme Session on "Diseases and Parasites in Wild Fish" and the Special Lecture on "Advance in Fisheries/Oceanography in

Relation to Climate Change and Fish Population". Multispecies assessment came up in the Demersal Fish Committee at the same time as an Anacat Committee meeting.

The first session of the Anacat Committee was largely concerned with "business" discussions, the most important being the Report on Salmon Assessment Methodology. It was decided to recommend this for publication as a Cooperative Research Report by ICES. Shorter submissions for the annual Report of Activities were requested by the Chairman (a perennial plea!) and the extensive list of microtags, finclips and external tags applied in 1991 was noted. The Chairman suggested as a Special Topic for 1993 "The Effects of Environmental and Oceanographic Factors on Atlantic Salmon and any Observed Links to Productivity of the Marine Environment". Possible Study Groups were also discussed but the suggestion of such a group on Glass Eels was not proceeded with.

The Committee was informed that an ICES/NASCO Dialogue Meeting would be held in conjunction with the 10th Annual Meeting of NASCO in 1993. The terms of reference for Working Groups in 1993 were discussed as well as the Reports of the North Atlantic and Baltic Salmon Working Groups. Models had been prepared on possible catch options for Atlantic Salmon to maintain target spawning escapements of 2SW fish in Canada and possibilities of developing predictive models of abundance of 1SW fish off West Greenland. Baltic salmon stocks continue to decline but the regulation of the fishery by TAC's was rejected by the Baltic Salmon Commission. The coastal fishery is to close this year at an earlier date and this may improve spawning escapements.

Sessions 2 & 3 were concerned almost exclusively with submitted papers, each presented by the author or a knowledgeable substitute, with the aid of slides and/or overheads. With two others, I was asked to decide on the best presentation, for the annual prize.

Salient points from the more significant papers include:-

M 30 Declining recovery rates of coded wire tags from Greenland. No change in the ration of CWT's to adipose fin clips. US had 3% recovery of CWT's at Greenland. 50% of entire Greenlandic catch examined for marks.

M 25 Generally depressing outlook for salmon stocks in Europe.

M 11 Compensation stocking for damage caused by logging and dredging in Simojoki river begun in 1984 and first increase in catch seen in 1990. Baltic Sea catch regulated in 1986 (Finnish effort) but fishing allowed to begin early in 1990. Resulted in loss of parr in 1991 and pronounced fall in smolt numbers in 1992.

M 14 Estimation of parr numbers from electric fishing of R. Tornionjoki - used only 0.3.8% of total parr production area. Good correlation between spawning stock size and resulting juvenile population. Parr population said to have been stable throughout '80's.

M 15 Coastal trap net fisheries in Gulf of Bothnia not restricted by TAC's since spawning migration takes place in the middle of the fishing season. Exploitation if frighteningly high -

92% in 1975-85 and only reduced to 89% by management practices since 1986. More fish now caught in north - the exploitation rate in the main basin of the Baltic is about 80%.

M 20 An interesting paper which proposed a change from TAC's to individual transferable quotas. TAC's are difficult to limit to a pre-set level, they result in a competitive fishery with heavy fishing effort at start of season, and catch is poorer in quality and sells at much the same price for all. Proposed that TAC be divided into personal quotas, with the right to buy and sell to other people and that the quotas be based on numbers, not weights of fish. Under this regime, fishermen would fish when costs were low and prices high and would tend to discard small fish in the catch. (This raises a number of problems in eugenics as well as in regulating the size of the spawning escapement.) Proposal was for Baltic fishery - not Greenland or Faroes.

The problem of when to close the season would have to rely on fishermens statements of catch-to-date (quoted as "unreliable"!) and quota enforcement would depend on carcass tags - another source of fiddling.

M 13 Comparisons of growth in different years from scale-reading of Baltic salmon. As would be expected, growth during the summer was strongly correlated with sea temperature, not with sprat biomass. Smolt survival usually, not invariably correlated with sea temp.

M 8 Salmon assessment methodology - discussed refinement of various models and compared Baltic with Atlantic salmon growth. No change proposed in life-history terminology.

M 5 Selection experiments in salmon ranching. Found variation in return rate from 0.00% to 9.5%. Straying also variable but the two release sites were quite close together? Forward planning seemed hazy - various plans in the air but no fish in the water.

M 6 Discussed relative merits of grilse and 2SW fish for ranching in Iceland. Found grilse preferable due to losses of around 60% among 2SW's during second year at sea. Compare this with 12%/yr for wild 2SW's.

M 7 Used starvation as possible tool to prevent "grilsing" of Arctic charr in sea cages. Concerned lest it affect growth to harvest size. Maintained temperature in exptl. conditions to 7-8°C, with natural photoperiod. Starvation for 4 weeks during Feb/Mar period resulted in 15% maturation, f.f. 30-35% in controls. Will continue with starvation starting November.

M 18 Effects of maturity among S2 Swedish salmon smolts. Those that had matured as males before release were 6-8 times less likely to survive to adult fish. Recognised that this is not the case for mature male smolts in more southerly latitudes, c.f. Umea in Northern Sweden. No effect of early maturity on eventual adult size or on grilse/2SW ratio. Effect on survival linked to incomplete smolting. Countermeasures could include controlling the hatchery environment to reduce male maturation, increase early spring water temps in hatchery to "mend" the male smolts or separation of mature male smolts and then release them at a larger size at a later date.

M 19 Study of fecundity and egg size in Polish salmon. No correlation.

M 31 In my view, this was the most significant paper presented to the Committee, in terms of content. It summarised the continuing effects of sea cage escapes on the Norwegian stocks. In 1991, some 217,500 tonnes of farmed salmon were produced in the N. Atlantic area (largely Norway and Scotland) and thought that they provide 30-40% of the total catch of 4,000 t. as escapees from farms. From scale-reading of Faroes area long-line catch, some 25-48% were adjudged reared/farmed fish. Recent sampling of Norwegian catches suggest 50% escapees in home waters. Escapees more likely to be caught due to greater availability, since their homing instinct is poor. Fears that these escapees could mask the decline in wild fish - further worries about genetic effects of interbreeding with wild fish and lowered disease resistance.

M 17 Electrophoretic differentiation of Twaite and Allis shad populations in Portugal. Polymorphism found in three proteins. Gene analysis confirms that it is possible to distinguish these two species and perhaps, the different populations of Portuguese Twaite shad.

M 22 First of three striped bass contributions from USA - Chesapeake Bay. All three presented very competently by Edward Rutherford (Cornell) who was adjudged winner of the Presentation Prize for 1992. M 22 detailed three effects of temperature at hatching on survival of early stages - sometimes 100-fold variation, due to temperature range of up to 15°C. If temp. falls below 12°C, total episodic mortality experienced. Very good survival if temp. for incubation and hatching exceeded 17°C.

M 23 Although density-independent factors (e.g. temp.) are responsible for most of the variation in recruitment of striped bass juveniles, thought to be a possible effect of larval density. Found to be predicted 100% reduction in recruitment through density-dependent growth.

M 24 Used a total of 20 million reared larvae to conduct mark and recapture experiment in Patuxent and Nantichoke Rivers of Chesapeake Bay. Otoliths were marked by immersion in alizarin complexone. Found that reared larvae could contribute significantly to total recruitment e.g. 32,000 reared out of 146,000 total at 92 days post-hatch, in Patuxent R.

Two papers from other sessions should be mentioned:-

F 11 IPN virus in farmed Atlantic salmon in Scotland. Monitoring over the past ten years suggests that control measures against the disease have worked satisfactorily in fresh water but in the past three years there has been a rapid spread of the infection in sea sites. May be due to lateral transmission in sea water or to carrier-state infections in parr and smolts, undetectable by present methods.

M 32 (Theme Session O) Susceptibility of Scottish salmon to Gyrodactylus salaris. Transmission experiments conducted in Norway demonstrated that Scottish parr had no natural resistance to this infection.

REVIEW OF CURRENT LITERATURE ON SALMON RESEARCH AND DEVELOPMENT

(by Dr. Derek Mills, Institute of Ecology and Resource Management, University of Edinburgh)

DISTRIBUTION AND STATUS

1. Distribution of Atlantic salmon, Salmo salar L., in freshwater bodies of Europe. R.V. Kazakov, 1992. Aquaculture & Fisheries Management, 23. 3. 461-475.

This review of the distribution of salmon in freshwater bodies of Europe. They dwell in 14 hydrological systems, including basins of 11 lakes and 3 rivers. Nine of the lakes (Ladoga, Onega, Kuito, etc.) are located in Russia, one in Finland (Saimaa) and one in Sweden (Vanern). All the rivers inhabited by freshwater salmon flow within Norwegian borders. Most of the lakes and rivers have good connection with the Baltic, White or Norwegian Seas. Over the past 20 years the freshwater salmon stock in Lake Imandra (the Kola Peninsula) has completely disappeared as a result of heavy human impact. The situation with such non-migratory salmon, which used to be important to fishing and trade, is also critical in all other water bodies. It is necessary, therefore, to elaborate effective measures for protecting and restoring freshwater salmon in the lakes and rivers of Europe.

ENHANCEMENT

1. River bed construction: impact and habitat restoration for juvenile Atlantic salmon, Salmo salar L., and brown trout, Salmo trutta L. N.A. Hvidsten & B.O. Johnsen, 1992. Aquaculture & Fisheries Management, 23, 4, 489-498.

The River Soroya, Norway, was canalized for agricultural purposes. In order to compensate for damage to the salmon and trout populations, weirs were constructed. Restoration of the river bed with blasted stones provided salmon with more territories. Densities of trout increased after the river bank was covered with stones. Sediments transported downstream from the canalized river stretch decreased the densities of juvenile salmon and trout.

2. Feeding, reconditioning and rematuration responses of captive Atlantic salmon (Salmo salar) kelt. L.W. Crim, E.E. Wilson, Y.P. So, D.R. Idler & C.E. Johnston, 1992. Canadian Journal of Fisheries & Aquatic Sciences, 49: 1835-1842.

Wild Atlantic salmon kelt were reconditioned in the laboratory by initiating their feeding during the winter on freshly thawed Atlantic silverside supplemented with vitamins and trace minerals. Some kelt improved in condition by April, and by June the majority were reconditioned. Some females missed a year of reproductive activity with most rematuring a second time the following year. One group of females rematured and was spawned a third time without missing another reproductive cycle. Although good quality eggs were collected from reconditioned kelt according to high egg fertilisation rates and high rates of egg survival through the eyed and hatching stages, most kelt yolksac larvae died just prior to swim-up. It is

suggested that either the silverside diet is nutritionally deficient or that the physiology of reconditioned kelt broodstock is inadequate for good-quality egg production.

GENETICS

1. The use of genetic marking to assess the reproductive success of mature male Atlantic salmon parr (Salmo salar, L.) under natural spawning conditions. 1992, W.C. Jordan & A.F. Youngson, Journal of Fish Biology, 41 613-618.

The reproductive success of mature male Atlantic salmon parr under natural spawning conditions was estimated using the polymorphism at the MEP-2* locus as a genetic marker. The percentage of eggs per redd fertilised by parr varied considerably over the five redds examined (0.9 - 27.7%, mean 10.8%), but a gametic contribution from mature parr was detected in each case. Parr reproductive success has important implications for the population structure and evolution of the Atlantic salmon through its effect on gene flow.

2. Genetic protein variation in natural populations of Atlantic salmon (Salmo salar) in Scotland; temporal and spatial variation. W.C. Jordan, A.F. Youngson, D.W. Hay & A. Ferguson, 1992, Canadian Journal of Fisheries & Aquatic Sciences, 49: 1863-1872.

Levels of temporal and spatial genetic heterogeneity within and among Atlantic salmon populations in Scotland were assessed through starch-gel electrophoretic analysis of variation at 30 protein-coding loci. Over three year-classes the level of temporal variation within populations was generally nonsignificant, although significant heterogeneity among year-classes was found at some loci at some locations. While there was no evidence of subpopulation of differentiation among a number of samples of salmon from the River Tweed system, significant genetic heterogeneity was observed among samples from different river systems within Scotland. Comparison of the levels of among-population heterogeneity in the salmon with those found in the brown trout over a similar geographical area shows the salmon to be relatively genetically homogeneous.

3. Unidirectional natural hybridization between brown trout (Salmon trutta) and Atlantic salmon (Salmon salar) in Newfoundland. C. McGowan & W.S. Davidson, 1992. Canadian Journal of Fisheries & Aquatic Sciences, 49:1953-1958.

Protein electrophoresis and mitochondrial DNA analysis were used to detect the frequency and direction of natural hybridization between brown trout and Atlantic salmon in 9 Newfoundland rivers. In total, 37 hybrids were discovered in a sample of 792 juvenile fish for a regional frequency of 4.67%. All of the hybrids sampled were produced from matings between female brown trout and male salmon. It is proposed that an abundance of sexually mature male salmon parr in Newfoundland streams is responsible for both the frequency and direction of hybridization observed in this study.

SALMON FARMING

1. Occurrence of farmed salmon in the Norwegian Sea. J.A. Jacobsen, L.P. Hansen &

R.A. Lund, 1992. International council for the Exploration of the Sea. C.M.1992/M:31.

Samples of salmon caught with long-lines north of the Faroe Islands were examined in order to estimate the proportion of escaped farmed fish in the fishery. Scale analysis was used for identification. The proportion of farmed fish was estimated to range from 25 to 48% in the different samples, suggesting a very high proportion of escaped farmed fish in the Norwegian Sea. Farmed fish were significantly smaller than wild. Most of the farmed fish, it is suggested, are of Norwegian origin, but farmed fish from Scotland, Ireland and the Faroes also contribute to the fishery. High rates of reared salmon in fisheries and stocks, if not accounted for, will seriously affect the assessments and status of wild salmon stocks.

2. IPN virus in farmed Atlantic salmon in Scotland. A.L.S. Munro & D.A. Smail, 1992. International Council for the Exploration of the Sea. C.M. 1992/F:11.

The results of both 10 years of monitoring the prevalence of infectious pancreatic necrosis virus and the use of official powers to prevent the spread of the virus were presented for farmed salmon. The control policies have worked well in the freshwater stage of salmon rearing but in the last three years there has been a rapid spread of the virus in sea sites. The cause of this spread and changes in modes of industry operation which may reduce the prevalence are suggested and include a reservoir of infection in sea water which can be reduced by adopting fallowing policies at sea sites.

3. Escaped farmed Atlantic salmon, Salmo salar L., feeding in Scottish coastal waters. J.R.G. Hislop & J.H. Webb, 1992, Aquaculture & Fisheries Management, 23, 721-723.

Escaped reared salmon were distinguished from wild salmon in the catch of a coastal salmon fishery on the west coast of Scotland. The stomach contents of 54 escaped fish were examined. Nineteen (35%) fish were found to contain food. The predominant food items were whiting, other gadoid fish, sandeels and young hermit crabs.

PARASITES

1. Comparative susceptibility of native Scottish and Norwegian stocks of Atlantic salmon, Salmo salar L., to Gyrodactylus salaris Malmberg: Laboratory experiments. T.A. Bakke & K. MacKenzie, 1992. International Council for the Exploration of the Sea, C.M.1992/M:32.

At a fish disease research station in Norway 150 hatchery-reared salmon parr of each of two stocks from the rivers Shin and Conon together with 150 from the Norwegian river Lierelva were infected by exposing them concurrently to wild Norwegian salmon parr naturally infected with Gyrodactylus salaris and then transferred to experimental tanks. No natural resistance was observed in the three stocks of salmon tested and all three were susceptible to Gyrodactylus. However, 3-5 weeks post infection a marked heterogeneity in the course of infection was observed in all three stocks, with highly susceptible, moderately susceptible and responding individuals in each tank. In the tanks where fish were isolated in small cages parasite numbers tended to decrease 30-36 days post infection. It is pointed out that the response of some fish to infection is genetically based. This has important evolutionary

consequences and is of practical importance because it provides a basis for genetic manipulation and selection. Selective breeding from survivors of experiments like those described, and stocking of infected rivers with their progeny, could enhance the effects of natural selection in restoring infected salmon rivers.

2. Distribution and structures of the population of sea lice, Lepeophtheirus salmonis Kroyer, on the Atlantic salmon, Salmo salar L., under typical rearing conditions. A. Jaworski & J.C. Holm, 1992. Aquaculture & Fisheries Management, 23, 577-589.

Samples of salmon held in sea cages and tanks with running water were examined for the presence of sea lice. A new method has been used to express parasitic intensity in fish of different size. Effects of different factors on the degree and character of infestation such as fish size, habitat and chemical treatment were studied. Different lice categories have shown different susceptibility to delousing with dichlorvos. Running water has been found to 'flush out' the lice from the fish body.

THE ATLANTIC SALMON TRUST
(As at 30 June 1992)

The Constitution of the Company is as follows:

REGISTRATION

The Company, which is limited by guarantee, is registered in England and its registered number is 904239. The charity registration number is 252742.

PRINCIPLE OFFICE

This is located in Scotland at Moulin, Pitlochry, Perthshire PH16 5JQ.

COUNCIL OF MANAGEMENT

Members of the Council of Management during the year were:

President	The Duke of Wellington
Vice Presidents	Vice-Admiral Sir Hugh Mackenzie
	Mr. David Clarke
Chairman	Sir David Nickson
Vice Chairman	Lord Moran
Director	Rear Admiral D. J. Mackenzie
Deputy Director/ Secretary	Mr. J. B. D. Read
Treasurer	Mr. P. J. Tomlin
Members	Mr. G. Bielby
	Lt. Col. R. A. Campbell
	Dr. W. M. Carter
	Mr. J. A. G. Coates
	The Hon. Mrs. Jean Cormack
	Dr. J. Cunningham MP
	The Hon. E. D. G. Davies
	Mr. A. D. J. Dickson
	Mr. J. Douglas-Menzies
	Mr. R. Douglas Miller
	Mrs. Llin Golding MP
	Mr. N. Graesser
	Mr. I. Gregg
	Dr. G. Harris
	The Hon. Lord Marnoch
	Mr. M. D. Martin
	Dr. D. H. Mills
	Mr. I. Mitchell

Mr. Moc Morgan
Mr. C. Onslow MP
Dr. D. J. Piggins
Sir Alick Rankin
Dr. D. Solomon
Mr. C. S. R. Stroyan
Mr. P. Tallents

INVITED REPRESENTATIVES OF OTHER ORGANISATIONS

ASF (USA)	Mr. J. F. Cullman 3rd
ASF (CANADA)	Mr. L. G. Rolland
AIDSA	Ambassador Claude Batault
RASA	Mr. R. Buck
BFSS	Major General J. C. O. R. Hopkinson
ASDSFB	Mr. R. Clerk
SPEY TRUST	(A Representative)
FISHMONGERS	Viscount Leverhulme
	Mr. J. Bennett

BANKERS

Midland Bank plc
20 Eastcheap
London EC3M 1ED

INVESTMENT ADVISERS

Schroder Investment Management
36 Old Jewry
London EC2R 8BS

AUDITORS

Davies Watson
Chartered Accountants
15A Lesbourne Road
Reigate
Surrey RH2 7JP

CHAIRMAN'S REPORT

The Chairman presents his report and the audited accounts for the year ended 30 June 1992.

OBJECTIVES AND FUNDING

The principal objectives of the Atlantic Salmon Trust is to protect and enhance the stocks of salmon in the United Kingdom for the benefit of the community. To achieve this objective, it draws the attention of the appropriate authorities to the particular dangers facing the salmon; it offers advice to Government Ministers and to their Departments and to the European Community; it finances scientific research, arranges workshops and international conferences and publishes booklets on matters of general and scientific interest about the salmon for the benefit of salmon managers, scientists and anglers.

In order to raise the necessary finance for its principal objective, the Trust is entirely dependent on donations and, wherever possible, sponsorship support towards the cost of scientific projects. In that connection, the Trust is particularly fortunate to have been sponsored over the past three years by Justerini & Brooks (J & B Rare Whisky), who have financed important projects administered by the Trust in Scotland and on the continent of Europe.

The direct and indirect costs of running the Trust are mainly funded by investment income. It is an important objective of the Council of Management to ensure that investment income will continue to be maintained at a level which will sustain these direct and indirect expenditures in the future as well as in the present. With that aim, periodic discussions are held with the Trust's investment managers to ensure that any necessary changes are made in the investment portfolio whenever market conditions so indicate.

REVIEW OF THE YEAR

Despite the economic recession and a resultant reduction in general donations, the work of the Trust has continued much as last year but with an ever increasing involvement in special projects. Those matters which deserve special mention are set out below.

Annual Postal Fishing Auction

This continues to be a great success and raised £34,500 for the Trust (1991: £33,200) in conjunction with the Tweed and Wye Owners, for whom the Trust continued to act as agents.

Special Projects

As a result of the Trust's continued involvement in a greater number of projects during the year, the gross expenditures increased substantially to £59,200, compared to £45,100 for the previous year. Sponsorship finance utilised during the year amounted to £41,200 (1991: £25,400) and thereby reduced the net project costs to £18,000 for the year ended 30 June 1992 (1991: £19,700). In particular, John Webb's investigation into the interaction of farmed and

wild salmon continued throughout the year and is expected to do so for the major part of the current financial year ending 30 June 1993. This work is of immense importance to all those interested in the future of wild salmon.

Other long term projects include a study into sea trout improvement prospects in Loch Morar, a project carried out in conjunction with the Scottish Hydro-Electric plc and the Morar District Fishery Board.

Operational Results

Including covenanted donations, the operational surplus for the year ended 30 June 1992 amounted to £3,261, after providing £5,805 for depreciation of the tangible fixed assets. This compares with an operational surplus of £15,100 for the previous year, a reduction of £11,839. The decrease arises from a shortfall of £7,000 in total operational income, coupled with an overall increase in operational expenditures of £4,800. The total operational expenditures included, however, a non-recurring item of £3,300 for legal fees on the successful value added tax appeal against H.M. Customs and Excise contention that the proceeds from the Postal Fishing Auction were chargeable to VAT. The operational surplus for the year would otherwise have amounted to £6,576.

The Trust was delighted with the successful outcome of the VAT appeal and are grateful to the Director and to their legal advisers for the considerable efforts that were made in eventually convincing H.M. Customs and Excise to withdraw from the Tribunal hearing. It would be difficult to estimate precisely the potential cost of an unsuccessful appeal because of the additional interest and penalty charges in such cases but it is reasonable to assume that the total financial burden on the Trust would not have been less that £30,000. This would obviously have had a serious impact on the Trust's financial resources and would additionally have significantly reduced future revenues from the Postal Fishing Auction activity.

In June 1992, the Trust shared in the sponsorship of the Fourth International Atlantic Salmon Symposium which was held on this occasion in St. Andrews, New Brunswick, Canada. The Trust's share of the delegates and administrative costs amounted to £10,900. As each Symposium is held every four years or so, the cost of the 1992 Symposium is shown as an exceptional item in the Income and Expenditure Account, ie not as part of the operational expenditures.

A change of accounting policy for quoted shares and securities was introduced during the year ended 30 June 1992, whereby the Trust's investment portfolio has been brought into the accounts at total market values instead of (as previously) at historical cost. At 30 June 1992 the total market values exceeded historical cost by £139,100 and has effectively been treated as part of total capital employed through the creation of an Investment Valuation Reserve of an equivalent amount.

Future Projects Policy

In my Chairman's Report on the 30 June 1991 accounts, I referred to the Trust's change in

policy to give effect to the serious decline in salmon stocks worldwide and to the uncertainty as to the cause. The discussions with Government Ministers and other fishery organisations mentioned in my previous report are currently taking place and firm decisions as to the nature and scale of the relevant projects which the Council of Management consider suitable to the Trust's resources will then be announced.

STAFF

There have been no changes in staff during the year and I wish to pay tribute to their hard work and dedication. Finally, I wish to thank all our subscribers and donors for their support during the year, with once again special mention of Justerini & Brooks for their generous sponsorship contribution. The Trust has since received a further contribution of £27,000 from J & B for the current financial year ending 30 June 1992.

DAVID NICKSON
Chairman

THE ATLANTIC SALMON TRUST LIMITED

A COMPANY LIMITED BY GUARANTEE

AND

A REGISTERED CHARITY

FINANCIAL STATEMENTS

30 JUNE 1992

THE ATLANTIC SALMON TRUST LIMITED

BALANCE SHEET AT 30 JUNE 1992

1991 (Restated)					Note
		FIXED ASSETS			
		Tangible fixed assets			
41,831		Scottish Headquarters: freehold property at cost	41,831		
17,689		Other tangible fixed assets at net book values	12,882		
	59,520			54,718	1
		Investments			
648,994		Quoted shares and securities at valuation	748,218		2
106,393		Investment deposit account	49,878		
	755,387			798,096	
	814,907			852,814	
		NET CURRENT ASSETS (LIABILITIES)			
443		Stocks of promotional items at cost	425		
12,154		Debtors and prepaid expenditures	9,881		3
1,093		Deferred expenditures	-		
5,011		Bank and cash balances: operational funds	1,153		
18,701			11,459		
		Deduct:			
		Creditors and accrued expenditures:			
15,168		Amounts falling due within one year	29,406		4
	3,533	Net current assets (liabilities)		(17,947)	
	£818,440	TOTAL NET ASSETS		£834,867	
		CAPITAL AND RESERVES			
	673,182	ACCUMULATED FUND		662,240	5
		RESERVES			
18,785		Investment reserve	32,464		
119,581		Investment valuation reserve	139,063		
	138,366			171,527	6
	811,548			833,767	
	6,892	DEFERRED PROJECT CONTRIBUTION		1,100	7
	£818,440	TOTAL CAPITAL EMPLOYED		£834,867	

Approved by the Council of Management on 1 December 19[illegible]

SIR DAVID NICKSON K.B.E., D.L. (CHAIRMAN) .....

REAR ADMIRAL D.J. MACKENZIE C.B. (DIRECTOR) .....

P. J. TOMLIN F.C.A. (TREASURER) .....

THE ATLANTIC SALMON TRUST LIMITED

SUMMARY INCOME AND EXPENDITURE ACCOUNT

YEAR ENDED 30 JUNE 1992

1991 (Restated)					Note
	127,166	Operational income		120,164	
		Deduct:			
106,149		Operational expenditures	111,098		
5,917		Depreciation of tangible fixed assets	5,805		
	112,066			116,903	
	15,100	OPERATIONAL SURPLUS PER DETAILED INCOME AND EXPENDITURE ACCOUNT		3,261	
		Add:			
		Net gains on quoted shares and securities:			
3,784		Realised on disposals during the year	10,418		
29,235		Unrealised: increase in market value over historical cost	19,482		
	33,019			29,900	
	48,119			33,161	
		Deduct:			
	-	Exceptional item: Fourth International Atlantic Salmon Symposium		10,942	
	48,119	SURPLUS FOR THE YEAR BEFORE TRANSFERS TO RESERVES		22,219	
		Deduct: Transfers to Reserves			
18,785		Investment reserve	13,679		6
29,234		Investment valuation reserve	19,482		6
	48,019			33,161	
£	100	DEFICIT (SURPLUS 1991) TRANSFERRED TO ACCUMULATED FUND		£(10,942)	5

REPORT OF THE AUDITORS TO THE MEMBERS OF THE ATLANTIC SALMON TRUST LIMITED

(A COMPANY LIMITED BY GUARANTEE)

We have audited the financial statements on pages 1 to 8 in accordance with Auditing Standards. In our opinion the financial statements give a true and fair view of the state of the Trust's affairs as at 30 June 1992 and of its deficit for the year then ended and have been properly prepared in accordance with the Companies Act 1985.

15a Lesbourne Road
Reigate
Surrey RH2 7JP

1 December 1992

DAVIES WATSON
CHARTERED ACCOUNTANTS
REGISTERED AUDITOR

THE ATLANTIC SALMON TRUST LIMITED

DETAILED INCOME AND EXPENDITURE ACCOUNT: YEAR ENDED 30 JUNE 1992

1991 (Restated)						Note
	OPERATIONAL INCOME					
	Investment income:					
33,867	On quoted shares and securities, including tax recoverable			45,826		
19,401	On investment and bank deposit accounts			6,841		
53,268					52,667	
	Donations:					
21,988	Covenanted donations, including tax recoverable			18,739		
18,157	General and pledged donations			14,079		
40,145					32,818	
33,268	Postal fishing auction: share of proceeds, less direct costs				34,553	
485	Miscellaneous income				126	
£ 127,166	TOTAL OPERATIONAL INCOME				£120,164	
	OPERATIONAL EXPENDITURES					
41,311	Costs of promoting salmon conservation and enhancement			44,685		
30,739	Administration costs			32,105		
72,050					76,790	
5,919	Progress Reports				6,441	
1,738	Trust publications: costs less sales proceeds				1,319	
	Special projects:	Costs	Contributions	Net		
	Sponsored by other organisations:					
4,967	Justerini & Brooks Limited	29,904	(27,000)	2,904		8
-	Other sponsored projects	14,259	(14,259)	-		
4,967		£44,163	£(41,259)	2,904		
14,687	Financed by The Atlantic Salmon Trust			15,083		9
19,654	Total net project expenditures				17,987	
2,550	Donations and support grants to other Associations				964	
5,500	Treasurer's remuneration			6,000		
5,000	Less: contribution by Worshipful Company of Fishmongers			5,000		
500					1,000	
632	Legal fees: value added tax appeal				3,315	
3,106	Investment management fee				3,282	
£106,149	TOTAL OPERATIONAL EXPENDITURES				£111,098	
21,017	OPERATIONAL SURPLUS FOR THE YEAR BEFORE DEPRECIATION				9,066	
(5,917)	Depreciation of tangible fixed assets				(5,805)	1
£ 15,100	OPERATIONAL SURPLUS AFTER DEPRECIATION				£ 3,261	

THE ATLANTIC SALMON TRUST LIMITED

ACCOUNTING POLICIES

1. Convention

The Financial Statements for the year ended 30 June 1992 have been prepared under the historical cost convention, as modified by the inclusion of quoted investments at market value and in accordance with the Accounting Standards Committee Statement of Recommended Practice No. 2 (SORP 2) for registered charities.

2. Depreciation of tangible fixed assets

(i) Depreciation is provided on a straight line basis to write off the cost of tangible fixed assets (excluding the freehold property) over their estimated useful lives, ranging from four to ten years.

(ii) Contrary to the requirements of the Statement of Standard Accounting Practice No. 12 (SSAP 12), depreciation is not provided on the freehold premises. The Trust is of the opinion that the cumulative depreciation and the annual charge are not material.

3. Quoted investments: change in accounting policy

(i) Up to and including the accounting period ended 30 June 1991, quoted shares and securities were stated at historical cost, with a note of their total market value at each balance sheet date. For the year ended 30 June 1992, quoted investments are stated at total market value (mid market prices), based on a report by the Trust's investment advisers as at the balance sheet date. It is intended that this valuation method will be consistently applied to future accounting periods.

(ii) The excess of market value of quoted investments over their historical cost at 30 June 1992 gives rise to the creation of an investment valuation reserve to which future annual increases (decreases) of market value versus historical cost will be added (subtracted).

(iii) To effect a realistic comparison of the change in accounting policy with the previous year, the appropriate comparative figures for the year ended 30 June 1991 have been restated to include quoted investments at their total market value on that date, with a corresponding investment valuation reserve adjustment to reflect the excess value over historical cost as at 30 June 1991 (Balance Sheet) and the increase in value (Income and Expenditure Account) during that year.

4. Cash flow statement

The Trust has taken advantage of the exemption from the preparation of a cash flow statement, on the grounds that it qualifies as a small company.

THE ATLANTIC SALMON TRUST LIMITED

NOTES FORMING PART OF THE FINANCIAL STATEMENTS

YEAR ENDED 30 JUNE 1992

1. TANGIBLE FIXED ASSETS

	Freehold property	Office equipment	Motor car	Publicity caravan	Tracking equipment	Total
Cost or valuation:						
At 30 June 1991	£1,831	£11,753	£13,790	£3,000	£8,865	£79,239
Additions	-	1,440	-	-	-	1,440
At 30 June 1992	£41,831	£13,193	£13,790	£3,000	£8,865	£80,679
Provision for depreciation:						
At 30 June 1991	-	5,484	4,307	1,500	8,428	19,719
Provided during the year	-	2,058	3,447	300	437	6,242
At 30 June 1992	£ -	£ 7,542	£ 7,754	£1,800	£8,865	£25,961
Net book values:						
At 30 June 1992	£41,831	£ 5,651	£ 6,036	£1,200	-	£54,718
At 30 June 1991	£41,831	£ 6,269	£ 9,483	£1,500	£ 437	£59,520

Depreciation charge for the year	1992	1991
Income and Expenditure Account	5,805	5,917
Direct project costs: tracking equipment	437	1,774
	£6,242	£7,691

2. QUOTED SHARES AND SECURITIES

The quoted shares and securities are valued at mid market prices, based on a report prepared by the investment advisers to the Trust.

3. DEBTORS AND PREPAID EXPENDITURES

	1992	1991
Fourth International Atlantic Salmon Symposium	3,667	-
Tax recoverable: dividends and covenants	3,663	4,219
Postal fishing auction: proceeds receivable	-	1,450
Sponsored project: contributions receivable	-	2,500
General donations receivable	40	4,002
Other debtors and prepayments	2,511	983
	£9,881	£13,154

4. CREDITORS AND ACCRUED EXPENDITURES

	1992	1991
Postal fishing auction: proceeds payable	1,710	1,378
Progress report: June 1992 (1991) costs	2,961	2,927
Investment management fee	3,282	3,107
Salaries: PAYE and NIC accrued	1,949	2,523
Fourth International Atlantic Salmon Symposium	5,391	-
Special projects: contributions payable for financial year	10,400	-
Other creditors and accrued expenditures	3,713	5,183
	£29,406	£15,168

8. ACCUMULATED FUND

Balance at 30 June 1991	673,182
Deduct:	
Deficit for the year transferred from Income and Expenditure Account	10,942
Balance at 30 June 1992	£662,240

9. RESERVES

(i) Summary

	Investment Reserve	Investment Valuation Reserve	Total Reserves
Balances at 30 June 1991	18,785	119,581	138,366
Add:			
Transfers from Income and Expenditure Account	13,679	19,482	33,161
Balances at 30 June 1992	£32,464	£139,063	£171,527

(ii) Investment Valuation Reserve

As a result of the change in accounting policy to include quoted shares and securities at market value (item 3 of the Accounting Policies statement refers), the Balance Sheet and Income and Expenditure Account for the previous year ended 30 June 1991 have been restated to indicate the comparative position for that year, as follows:

	Market value	Historical cost	Valuation Reserve
At 30 June 1990	522,000	(431,654)	90,346
Increases: year ended 30 June 1991	126,993	(97,758)	29,235
At 30 June 1991	648,993	(529,412)	119,581
Increases: year ended 30 June 1992	99,225	(79,743)	19,482
At 30 June 1992	£748,218	£(609,155)	£139,063

10. DEFERRED PROJECT CONTRIBUTION

The deferred contribution at 30 June 1992 related to monies received from a sponsoring organisation during that year in connection with a project which commenced on 1 July 1992.

8. SPECIAL PROJECTS SPONSORED BY OTHER ORGANISATIONS

	Project costs	Sponsorship contribution	Net costs
(i) Justerini & Brooks Limited			
Interaction of farmed and wild salmon	17,904	(15,000)	2,904
Rehabilitation of Spanish rivers	6,000	(6,000)	-
Rehabilitation of French hatchery	6,000	(6,000)	-
	£29,904	£(27,000)	£2,904
(ii) Other			
Catch and release: P.V. van Vlissengen	5,000	(5,000)	-
Sea lice burden on sea trout: Scottish Salmon Growers Association	2,011	(2,011)	-
Loch Morar sea trout improvement: Scottish Hydro Electric plc and Morar District Fishery Board	7,248	(7,248)	-
	£14,259	£(14,259)	£ -
Total net sponsored project costs	£44,163	£(41,259)	£2,904

9. SPECIAL PROJECTS FINANCED BY THE ATLANTIC SALMON TRUST

Sea trout studies:	
National Rivers Authority: Welsh Region	2,000
Sea Trout Action Group: Salmon Research Agency of Ireland	3,000
Impact study on Donegal salmon populations: Belfast University	1,500
Spawning of precocious male salmon parr: Leicester University	2,000
Miscellaneous projects: West Galloway Fisheries Trust	5,000
Bensinger-Liddell Fellowship: student research	1,583
Total AST financed project costs	£15,083

10. OPERATIONAL SURPLUS

	1992	1991
The operational surplus for the year is after charging:		
Depreciation of tangible fixed assets (Note 1)	£ 6,242	£ 7,691
Directors' emoluments	£42,352	£31,900
Auditor's remuneration	£ 1,591	£ 764

11. STAFF COSTS INCLUDING PROJECT PERSONNEL

	1992	1991
Salaries	69,842	57,257
Social Security costs	7,071	5,780
	£76,913	£63,037

12. DIRECTORS' EMOLUMENTS

	1992	1991
Services as directors	£42,352	£31,900

13. STAFF NUMBERS

The average number of persons employed by the Trust during the year (including project personnel) amounted to 6 (1991: 5).

14. DEEDS OF COVENANT

At the current basic rate of income tax (25%), the gross equivalent of the net covenants unexpired at 30 June 1992 (260 covenants) is estimated at £49,000 (1991: £37,000), as under:

Years ending 30 June:

1993	14,400
1994	11,000
1995	7,200
1966 and later years	16,400
	£49,000

15. FUTURE COMMITMENTS

The Trust has agreed to the following future commitments in connection with existing self financed projects:

		1993	1994
(i)	National Rivers Authority: Welsh Region: Sea trout studies (2nd payment)	2,000	-
(ii)	Queens University of Belfast: Impact study on Donegal salmon populations (3rd payment)	1,500	-
(iii)	Institute of Freshwater Ecology: Model for predicting sea trout growth	5,000	5,000
		£8,500	£5,000

16. CONTINGENT LIABILITY

Note 13 to the 30 June 1991 accounts (page 7) referred to a potential liability to value added tax on a claim by H.M. Customs and Excise that the postal fishing auction constituted a business activity. Customs and Excise have since accepted the Trust's legal representations that the activity did not constitute a taxable supply for VAT purposes. The contingent liability therefore no longer arises.

DEED OF COVENANT

TO THE ATLANTIC SALMON TRUST LIMITED

(Registered Charity No. 252742)

I promise to pay you for ..... years, or during my lifetime, if shorter, such a sum as after deduction of income tax at the basic rate amounts to £..... each month/quarter/half year/year from the date shown below.

Signed and delivered .....

Date .....

Full Name (**BLOCK CAPITALS**) .....

Address (**BLOCK CAPITALS**) .....

..... Post Code .....

Witnessed by:

Signed .....

Full Name .....

Address .....

..... Post Code .....

THE ATLANTIC SALMON TRUST LIMITED

BANKER'S ORDER

Subscriber's Bank

To ..... Bank plc

Branch Address .....

.....

..... Post Code .....

Please pay to MIDLAND BANK plc, 20 Eastcheap, London EC3M 1ED (40-02-31) for the credit of THE ATLANTIC SALMON TRUST LIMITED, account No. 41013874 the sum of £ ..... (..... pounds) on the (i) ..... day of ..... 19... and a like amount on the same day each (ii) month/quarter/half year/year for a total period of (iii) ..... years. Total number of payments .....

Signed ..... Date ..... 19...

Name (**BLOCK CAPITALS**) ..... A/C No. .....

Address (**BLOCK CAPITALS**) .....

..... Post Code .....

(i) This date must be the same as or later than the date on which the covenant is signed.

(ii) Please delete as appropriate.

(iii) Insert number of years (minimum four years).

PLEASE RETURN THIS DOCUMENT TO THE ATLANTIC SALMON TRUST, MOULIN, PITLOCHRY, PERTHSHIRE PH16 5JQ

ATLANTIC SALMON TRUST PUBLICATIONS

		£
Atlantic Salmon: Planning for the Future (Proceedings of the 3rd International Atlantic Salmon Symposium, Biarritz, 1986)	edited by D. Mills and D. Piggins	45.00
The Biology of the Sea Trout (Summary of a Symposium held at Plas Menai, 24-26 October, 1984)	by E.D. Le Cren	1.50
Salmon Stocks: A Genetic Perspective	by N.P. Wilkins	1.50
Report of a Workshop on Salmon Stock Enhancement	by E.D. Le Cren	1.50
Salmonid Enhancement in North America	by D.J. Solomon	2.00
Salmon in Iceland	by Thor Gudjonsson and Derek Mills	1.00
A Report on a Visit to the Faroes	by Derek Mills and Noel Smart	1.00
Problems and Solutions in the Management of Open Seas Fisheries for Atlantic Salmon	by Derek Mills	1.00
Atlantic Salmon Facts	by Derek Mills and Gerald Hadoke	0.50
The Atlantic Salmon in Spain (Out of print)	by C.G. de Leaniz, Tony Hawkins, David Hay and J.J. Martinez	1.50
Salmon in Norway (Out of print)	by L. Hansen and G. Bielby	1.50
Water Quality for Salmon and Trout	by John Solbe	2.50
The Automatic Counter - A Tool for the Management of Salmon Fisheries (Report of a Workshop held at Montrose, 15-16 September, 1987)	by A. Holden	1.50
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Water Schemes - Safeguarding of Fisheries (Report of Lancaster Workshop)	by J. Gregory	2.50
Genetics and the Management of the Atlantic Salmon	by T. Cross	2.50
Fish Movement in Relation to Freshwater Flow and Quality	by N.J. Milner	2.50

Acidification of Freshwaters: The Threat and its Mitigation	by R. North	3.00
Strategies for the Rehabilitation of Salmon Rivers (Proceedings of a Joint Conference held at the Linnean Society in November 1990)	by D. Mills	5.00
Salmon Fisheries in Scotland	by R. Williamson	3.00
The Measurement and Evaluation of the Exploitation of Atlantic Salmon	by D.J. Solomon and E.C.E. Potter	3.00

FILMS AND VIDEO CASSETTES AVAILABLE FOR HIRE

"Will There Be a Salmon Tomorrow"	- 16 mm film
"Salar's Last Leap"	- 16 mm film
"The Salmon People"	- Video (VHS)
"Irish Salmon Harvest"	- Video (VHS)
"Managing Ireland's Salmon"	- Video (VHS)
"Salmon Tracking in the River Dee"	- Video (VHS)

Films and videos may be obtained from the Trust for private showing by Clubs, Fishery Managers, etc. A donation to AST funds is required in return.

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