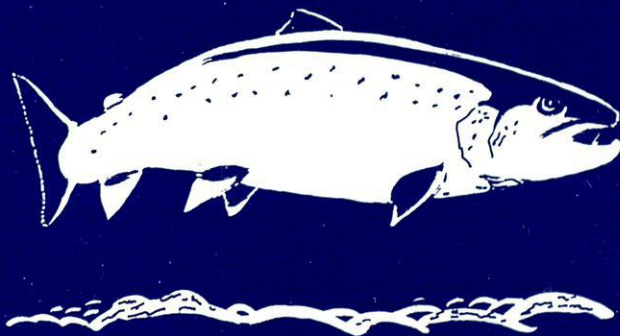




ATLANTIC SALMON TRUST

PROGRESS REPORT

December 1998



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HRH The Prince of Wales

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W.J. Ayton, M.Sc., F.I.F.M.
J. Browne, M.Sc. (Department of the Marine, Dublin)
M.M. Halliday, B.Sc., Ph.D. (Joseph Johnston & Sons Ltd.)
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.
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D. Solomon, B.Sc., Ph.D., M.I.Biol., M.I.F.M.
J.L. Webster, B.Sc., Ph.D., C.Biol., M.I.Biol. (Scottish Salmon Growers Association)
K. Whelan, B.Sc., Ph.D. (Salmon Research Agency of Ireland, Inc.)
Professor Noel P. Wilkins (Department of Zoology, National University of Ireland)
John Webb, MSc. (AST Biologist)

Observers:

N. Milner, B.Sc., Ph.D. (Environment Agency)
A representative of the Scottish Office Agriculture, Environment & Fisheries Department
E.C.E. Potter, B.A., M.A. (The Centre for Environment, Fisheries & Aquaculture Science)
A. Wallace (Salmon Fisheries Co-ordinator)

INTERNATIONAL CONSERVATION ORGANISATIONS WITH WHICH THE TRUST IS IN CONTACT

France:	Association Internationale de Défense 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 INTRODUCTION

The wetter than usual spring and summer with consequent high water resulted in greatly improved summer grilse runs in many rivers, especially those on the East coast and in the North. Unfortunately, the same cannot be said for the spring run which was again very poor, with a dearth of MSW fish, underlining the continuing severe decline in that crucial component of the stock.

The situation on the West Coast of Scotland is particularly serious where sea lice infestation from fish farms has been a major contributory factor to the total collapse of salmon and sea trout stocks. So serious indeed is the situation that the Trust, in conjunction with the ASDSFB and the AWCFT, has initiated a joint approach to SOAEFD with a proposal to set in hand as a matter of urgency measures to rebuild stocks. Such measures if/when implemented will of course take many years to bear fruit. Nevertheless, the Trust has impressed upon the Scottish Office the gravity of the situation and the need to implement measures now before it becomes irreversible. A response from SOAEFD is expected early in the New Year.

The outbreak of infectious salmon anaemia (ISA) in the fish farming industry continues to worsen and is a cause of the gravest concern to all wild salmon interests. At the time of writing 25 farms have been affected, with 10 farms being confirmed as having ISA and their stocks destroyed. Of particular concern have been the escapes, some 17 tonnes (17,000 harvestable fish) from an Argyllshire farm on the "suspected" list, and another from a Shetland farm in a surveillance area. Scottish Office scientists have advised that, from the limited research so far undertaken, the wild fish appear to be more resistant to the ISA virus and none of those examined showed signs of ISA. Nevertheless, until proved otherwise ISA must remain a very real threat to the wild species.

On a more general note, the SOAEFD published its consultative documents on Fish Farm Planning Guidance. Principal among several shortcomings the proposed guidance failed to deal with (1) the key issue of regulation of all aspects of fish farming operations, (2) effective measures to deal with sea lice and the control of disease, and (3) a procedure for re-assessing existing sites which had been approved before the development of more rigorous assessment criteria. In commenting on these important omissions, the Trust also took the opportunity to re-state its long held view that a proper regulatory body with appropriate powers should be set up to regulate, control and supervise all aspects of fish farming in future. The present ISA outbreak alone clearly presents an opportunity for a serious re-think by SOAEFD.

The Trust submitted its views to the Review Group examining Freshwater Fisheries in England and Wales in September. The submission was based on the International Atlantic Salmon Accord and identified all the critical issues relating to sustaining wild salmon stocks. Subsequently, in October the Trust gave oral evidence; a number of further meetings have been scheduled by the Group, in some of which the Trust will participate, dependent on the subject matter being considered. The Review Group is due to publish its report in the autumn of 1999.

The Environment Agency (EA), which is responsible for the management of fisheries in England and Wales, has published its consultative proposals for the protection of spring fish. While, from a conservation point of view, the Trust has given general support to the proposed

measures, it is aware that they have not been well received in some quarters where the principle of allowing river and catchment areas voluntarily to manage appropriate measures on a river by river basis is preferred. The EA, however, appears to be adamant that the matter can only be dealt with by the introduction of bye-laws as, apart from providing it with the necessary legal powers to deal with infringements, it believes it would also send a clear signal to other North Atlantic countries that the UK had set in hand measures to conserve early running fish. Whatever the eventual outcome, which will not be known until the spring, the Trust hopes that the principle of sparing the maximum numbers of spring fish to spawn will emerge successfully from the current consultation process.

The situation in Scotland is very different, many of the measures proposed for England and Wales have been in place in some parts of Scotland since 1962. At a meeting with Lord Sewell, the Scottish Office Fisheries Minister, on 9th October, both the Trust and the ASDSFB urged the Minister (1) to give a commitment to take the earliest possible opportunity to secure additional powers for DSFBs, as had been proposed by The Salmon Strategy Task Force, (2) to endorse the actions already instituted by many Boards to restrain exploitation by both rods and nets, and (3) to urge some Boards to re-examine the position on their river systems and to follow the lead being taken by many in encouraging catch and release and imposing further restrictions on fishing measures. While welcoming and giving support to the endeavours being undertaken by many Boards, Lord Sewell indicated that prime legislation would be required to give extra powers to Boards and this would have to await the formation of the Scottish Parliament.

It is with great regret that I have to report the sudden death of our esteemed Vice-President, David Clarke. For more than 30 years in the various offices he held, David has been at the centre of the Trust's affairs and right up to the time of his unexpected death continued to take a keen interest in all its activities. We shall miss his experience and wise guidance very much. A tribute appears elsewhere in these pages.

The following new members were elected to the Council at the Annual General Meeting at Fishmongers' Hall on 2nd December:

Mr. Jonathan Bulmer
Lord Guernsey

The following were also re-elected after one year's absence:

Mrs. Llin Golding, MP
Mr. Michael Martin
Dr. Derek Mills

The following members retired, having served for six years:

Lt. Col. R. A. Campbell
Mr. Colin Carnie
The Lord Onslow of Woking
Mr. C. S. R. Stroyan
Mr. O. Vigfusson

I should like to thank them all for the considerable contribution they have made to the affairs of the Trust over the years.

Rear Admiral John Mackenzie was also elected to be a Vice-President at the AGM.

Our Honorary Treasurer, Peter Tomlin, regretfully felt it necessary to tender his resignation at the AGM due to illness. Peter has looked after all the Trust's financial affairs for more than 13 years in an impeccable manner and he leaves with our warmest good wishes for a speedy recovery. He has been succeeded by John Gray, formerly the Group Finance Director of Scottish Hydro Electric.

Finally, after a busier than normal year, I should like to thank our Director, Deputy Director, and our secretary, Jenny Sample, for all their untiring endeavours in taking forward with commendable efficiency and good humour the many and varied aspects of the Trust's business. I am greatly indebted to all of them.

May I wish you all a very Happy and successful New Year.

H F O BEWSHER

DIRECTOR'S REMARKS

In his introduction, the Chairman has highlighted major subjects that have been occupying the attention of the Trust during the last six months. As always, we have been active in a wide spectrum of other fields, and it is appropriate to mention some of these. Several are covered more fully in the body of the Report.

We are continuing to work to further the whole range of principles for salmon conservation set out in the International Atlantic Salmon Accord, which was described in the last Report. It has received a welcome from Ministers, although not surprisingly some of the recommendations are less acceptable than others. We have asked for meetings to take up these points of difference. It is encouraging that the Accord is beginning to be quoted in policy papers issued both by official and voluntary organisations.

The Workshop on Problems Facing Salmon in the Sea, planned as a result of the 1997 International Salmon Symposium in Galway, took place in November. It was stimulating and enlightening, bringing together a comprehensive group of contributors covering the whole range of aspects capable of affecting the salmon's survival at sea. A brief report by Dr Peter Hutchinson appears on Page 16, and the full proceedings will be published during the course of this year.

The practice of Catch and Release is a very live subject at the time of going to press, and I have therefore invited our Biologist, John Webb, to summarise current evidence on the survival of released fish, in addition to providing the customary report on the range of his work. In his article, he mentions the production of a video which demonstrates the techniques needed for successful handling and release, for which he was technical adviser. This video was produced by Fisheries Research Scotland with support from the Environment Agency, as well as from the Trust and other organisations. It is receiving wide endorsement, and will be generally available in the spring once sufficient copies have been produced. Announcements will appear in the Press. Still on this subject, it has been recognised that there is a need for a simple method of marking released fish in order to reduce the likelihood of their being killed if they are caught again. We have been told that experiments with a possible tag are taking place, and results will be reported.

Readers who are users of the Internet will wish to know that the Moulin office can now be reached by E-mail. The address is *Atlanticsalmontrust@compuserve.com*. The Trust's computing capability has been notably enhanced by a very generous donation from Mr Stewart Proctor of Computacenter in Aberdeen. Thanks to him, John Webb and Tim Hoggarth now have "laptop" portables to help their work when away from their desks, while my own antediluvian desktop machine has been replaced by a much more capable model.

During the coming year the English/Welsh Salmon and Freshwater Fisheries Review Group will complete its work and report, while the advent of the Scottish Parliament is likely to provide an as yet unknown dimension to fisheries legislation and policy north of the Border. We look like being victims of the old Chinese curse "May you live in interesting times!" – we certainly do not anticipate a quiet year. Among other issues which we will be pursuing, we plan to return anew to the problems of predation.

The provisional 1999 programme for our display caravan is:

8-9 May	Chatsworth Angling Fair
19-20 June	Welsh Game Fair, Llandeilo
3-4 July	Game Conservancy Scottish Fair, Scone
30 July-1 August	CLA Game Fair, Harewood House
6-7 August	Highland Field Sports Fair, Moy

We look forward to meeting supporters of the Trust at these events.

J B D READ

ERRATUM

The article "Constant Monitoring of Water Quality" on pages 36 and 37 of the June 1998 Progress Report was wrongly attributed to Dr Chris Puhr. Callum Sinclair and Jamie Ribbens, both of the West Galloway Fisheries Trust, should have been credited as the authors. The error is regretted.

DAVID CLARKE

The *Daily Telegraph*, in an obituary published on 21 December, fittingly described David Clarke as a “Pillar of the Atlantic Salmon Trust” and paid justified tribute to his many achievements, particularly in placing the Trust on a sound financial footing. The news of his sudden death was all the more of a shock, since his vigour and enthusiasm in support of the Trust had shown no signs of abating.

Having chaired the Appeal Committee in an outstanding manner – he was responsible for raising over £500,000 between 1979 and 1983 – he succeeded Vice Admiral Sir Hugh (“Rufus”) Mackenzie as Chairman of the Trust in 1983, and served until December 1988. On retiring as Chairman he was elected a Vice-President, and he remained an active, purposeful and influential member of the Council of Management and of the Finance Committee. He was unfailingly kind and generous, and the Trust’s display caravan, which is still going strong at angling and game fairs, was a gift from him. We have learned that he left his extensive collection of fishing books to the Trust, together with substantial funding towards its appropriate display; arrangements for ensuring this are in hand.

He was also a long-serving member of the Board of the Atlantic Salmon Federation. Wilfred Carter, its President Emeritus and one of our Vice-Presidents, has written to express the Federation’s sadness, and to emphasise how instrumental David was in forging lasting bonds between AST and ASF. His letter ends: “His many achievements as AST Chairman will serve as a permanent tribute and memorial to his dedication and leadership”. This widely echoed sentiment is exemplified in Jean Cormack’s personal memoir:

“I first met David in 1978. He was then on the Committee of Management of The Atlantic Salmon Research Trust (as it was then known) and I had just been interviewed for the position of Appeal Secretary for the national appeal that was to be launched in 1979. During the run-up to the Launch, there was great difficulty in finding someone willing to take on the Chairmanship of the Appeal Committee and it is to David’s lasting credit that, at the 11th hour, he agreed to take it on. From the Trust’s point of view, it could not have been a better decision. David worked tirelessly, giving unstintingly of his time, resources and energy to make the Appeal a resounding success.

From my point of view, I could not have had a better or more encouraging Chairman with which to work. His kindness, good humour and patient understanding of the difficulties that inevitably cropped up from time to time were truly inspirational. Following the end of the Appeal and my departure from London to live in Wales, I only saw David at Council meetings, but I always felt that we had a good and lasting friendship. I also greatly respected his Chairmanship of the AST when he took over from Rufus Mackenzie. They both guided the Trust to the eminent international position it holds today.

The AST owes him a debt of gratitude that can never be repaid.”

TED HUGHES, O.M., O.B.E
(Michael Martin)

The November sun is sinking below the Eildon Hills. The majestic river is flowing strongly through her courses as the colours fade. Crouching in the reeds one is watching the figure of a big man wading and casting to the great autumn fish moving there in the twilight. Whether through imagination or by a trick of the light the figure grows larger and larger in stature until it dominates the whole river landscape. Poet, high priest of nature, lover of all things wild and beautiful, Ted Hughes is in his element as darkness falls on Tweed. He fished and loved rivers all his life and all over the World from the dales of Yorkshire to the Dart, the Exe, Troridge and Taw in the West – to Alaska and Canada with his son Nicholas. To the Dee, Thurso, Tay, Spey, Tweed and Grimersta in Scotland with his innumerable friends. One has the pleasing vision of the Poet on his annual visit to Queen Elizabeth the Queen Mother at Birkhall reading to her in that great deep comforting voice and then going out to catch a Dee fish for her table. He was passionately anxious about man's destruction of the natural world as demonstrated by the decline of fish in rivers lakes and oceans. He was a friend and supporter of Orri Vigfusson to whom he once said ' the fish wars are yet to begin'.

Ted was a polymath, with a profound understanding not only of literature but medicine, science, religions and human nature. He foresaw the disastrous effects of intensive and heavily subsidised farming and industrial acid rain on rivers and lakes. His poem Tarka Trail savagely describes the 'good' riparian corn farmer and his lively wife who are destroying the River Taw in order to educate their children. Some of us find his poems, many about Salmon, difficult and inaccessible. They repay working at and study as so much of their meaning and dark beauty takes time to reach out and into us.

Ted was a full supporter of the Atlantic Salmon Trust and read the Progress Reports with interest and insight. He was delighted when the A.S.T. helped the establishment of the West Country Rivers Trust of which he was the inspiration, a founding Trustee and first President.

The Poet, sometimes known as the Laureate or the Rhymer, for all his pessimism and despair was also extremely amusing in conversation. Many will recall the story of his fishing on the Torridge with his friend Sir Michael Horden. The great actor had fished all day and caught nothing. To his chagrin he came upon the Poet, his rod bent into a fish. 'Come and play it' said Ted – 'it will be your first West Country salmon'. Horden eagerly took the rod and played the salmon in the heavy water for a few moments. When it was netted it was found to be a large fish recently removed from Ted's deep freeze! His salmon casting was eccentric and possibly unique. He looked back at each cast before hurling the line across the stream. 'Its like throwing a javelin' he would rumble. Certainly his salmon casts went yards beyond those of ordinary mortals.

He treated everybody exactly the same and his kindness and generosity of spirit extended to all he met. When he was talking to you, he was concentrating on you and made you feel that you were very important to him whether you were a Queen or a Tweed boatman. Ted's influence on the world of salmon, rivers, lakes and oceans and the way in which we are beginning to see the vital importance of looking after them has been profound and will be lasting. He was much loved by his friends. Everyone who came into contact with this great figure of our time feels his loss and lives in a diminished world.

CATCH AND RELEASE

Behaviour and Survival: Summary of Research Findings

(John Webb)

Many readers will be aware of increasing concerns about the decline in the numbers of spring salmon returning to UK rivers and of the range of measures that government agencies, District Salmon Fishery Boards and fishery managers are using to protect and enhance stocks of these valuable early-running fish.

Increasingly, spring salmon management focuses on minimising fishing mortality in an attempt to ensure that adequate numbers of fish survive to spawning. In the past, spring salmon have been taken by nets and rods. However, nowadays, contrary to popular belief, angling is the main fishery – taking over 90% of the total reported UK catch of spring salmon. Increasingly, catch and release by anglers is seen as an important conservation measure which may be used to protect dwindling stocks.

Catch and release has been extensively researched on salmon and other fish in the USA, Canada and Iceland. However, despite this work, some anglers and fishery managers in the UK remain concerned that many of the fish played on rod and line, handled and released will not survive. To investigate this, and allay such fears, the AST has been involved in a number of studies on the effects of catch and release and the survival and behaviour of salmon returned by anglers. The work is aimed at refining both the practice of catch and release and future management policy to the maximum benefit of the UK fisheries that depend upon them. Some of the main research findings are summarised below:

Survival and behaviour after release – radio-tracking studies

In 1996, a study on the survival of catch and released salmon was conducted on the Aberdeenshire Dee. In a joint project between the AST and Fisheries Research Scotland (FRS), a total of 25 spring and early summer fish were tagged and released between March and early June. In the ensuing months, two of the released fish were reported as having been recaptured by anglers fishing later in the season. One was killed, and another was returned to the river for a second time. One fish was found dead and contact was lost with two others.

The remaining twenty fish (80%) survived to spawning. They were located in the autumn in spawning areas within the main river and its tributaries. Where observed, behaviour at spawning appeared normal, suggesting that they had not been adversely affected, and a number of the fish were recovered from the river after spawning as kelts.

In another study conducted on the Dee in 1996, rod caught fish were used to investigate the behaviour of late running fish returning to the river. Twenty-eight fresh run grilse and 2SW salmon were radio-tagged and released during the first two weeks of October 1996. Tracking was continued through the winter to the following spring. Survival to spawning (within the Dee) was estimated to have been approximately 75%. Two fish were 'lost', and a further four were recorded as leaving the river prior to spawning. One of these fish was later recaptured by bailiffs collecting brood stock below Morphie Dyke on the River North Esk. The recaptured fish was noted to have been in good condition and was stripped as normal.

Within Scotland research has also been conducted on the River Tummel, an upper tributary of the River Tay. Between March and July 1995, thirty-nine salmon captured by anglers fishing beats below Pitlochry dam were radio-tagged and released. Over the following weeks, 29 of the tagged fish (74%) were subsequently monitored moving upstream to the dam whereupon they successfully negotiated the fish ladder and entered Loch Faskally. Of the remaining fish, two were recorded to have approached the dam later in the year and 34 fish were reported recaptured by anglers (7.6% of total released). The remaining 5 fish (13%) were not recorded in the vicinity of the dam over the duration of the monitoring period.

In England and Wales, the Environment Agency (and its predecessor, the NRA) has studied the survival of rod caught salmon returned to the Wye. In 1995, 21 fish were tagged and released – of which 40% survived to spawning. Between 1991 to 1993, another study involving 51 fish were caught and released in the River Test. Survival was estimated to be at least 80% with more than 50% of the fish being observed during the spawning period.

Rates of recapture among fish returned by anglers

The studies detailed above suggest that rates of recapture of fish caught and returned by anglers vary between 6 and 10%. This is broadly consistent with the findings of a larger ongoing study that is being conducted on the River Dee. Since 1996, over 350 angled salmon and grilse have been caught and released carrying conventional Fly tags. Recapture rates have varied between 3.8 to 4.9% annually, with an overall average of 4.5%.

Catch returns are one of the main sources of data available to managers to determine the status of salmon stocks and the performance of different fisheries. Information on the numbers of fish caught and released is now being collected. The wide scale implementation of catch and release as a management measure may have a significant effect on the quality of data received via annual returns submitted to the Environmental Agency and Scottish Office by proprietors and anglers. Given the range of rates of recapture generated by these preliminary studies, further research may be necessary to examine the range of variation of survival and recapture in different kinds of rivers in different years.

Some of the fish released in the Dee have been recaptured at the FRS's fish traps on two of the river's upper tributaries. At the Baddoch, a large 3SW male was recaptured in the autumn of 1996. It had been tagged and released on the Birse water as a clean fish near Aboyne earlier in the spring. At the Girnock, two spring-run 2SW females have been recaptured. The first was a fish that had been radio-tagged and released in late May 1996 (as a coloured fish) at Sluie near Banchory. The second fish was the first female to enter the Girnock trap this past autumn – a fish that had been released at the Dee Castle beat at Glen Tanar in early May. Upon recapture, all three fish were found to be in good condition and ready to spawn.

Recent research findings and experience from rivers outside the UK

During the past decade there have been a number of different studies on the catch and release of Atlantic salmon in rivers outside the UK. Much of this work has focused on the physiological effects of exhaustive exercise together with more practical aspects related to successful catch and release such as handling and hooking mortality. Experiments carried out

on rivers in eastern Canada suggest that water temperature and fishing and handling practices are likely to be two of the main factors which influence survival. These studies have indicated that fish returned to rivers by anglers when water temperatures are 20C or above tend to be more susceptible to both immediate and delayed mortality. Handling and release procedures have also been found to be very important. In particular, exposure to air will tend to increase the probability of the fish dying. Keeping the fish fully immersed in the water while it is being unhooked is therefore a very important part of the catch and release technique. Other factors such as water flow, season, time of day, fish sex and size and water chemistry have shown more variable effects, depending upon local circumstances.

Conclusions

There is a growing body of evidence to suggest that catch and release can be an effective and cost efficient conservation measure. However, where catch and release is practised, it is important to ensure that anglers are fully aware of the need to minimise stress and physical damage caused to fish. **Proper handling of fish is crucial.** If salmon are not handled correctly, then other factors that might cause losses may become irrelevant and higher mortalities may occur regardless. Managers should therefore take steps to ensure that anglers have the correct equipment and are aware of best practise in this area.

Sources of information:

Webb, J.H. 1998. Catch and release: the survival and behaviour of Atlantic salmon angled and returned to the Aberdeenshire Dee, in spring and early summer. Scottish Fisheries Research Report No. 62/1998. ISSN 0308 8022.

Smith, G.W. et al., 1998. The movements and estimated spawning positions of late-running adult Atlantic salmon (*Salmo salar* L.) returning to the Aberdeenshire Dee. Scottish Research Services Report No. 3/98.

Dee Salmon Fishery Board 1997 Annual Report and Accounts

Dempson, J., Reddin, D. and O'Connell, M. To what extent does catch and release contribute to mortality in Atlantic salmon? Canadian Stock Assessment Secretariat Research Document. 98/99.

THE SALMON AND FRESHWATER FISHERIES REVIEW GROUP

(Deputy Director)

On 8th April 1998 Jack Cunningham, the then Agriculture Minister, announced the Government's intention to set up a small independent body to review all aspects of existing legislation on salmon and freshwater fisheries in England and Wales. This was to be known as *The Salmon and Freshwater Fisheries Review Group*. He appointed Professor Lynda Warren, Professor of Environmental Law at the University of Wales, as its Chairman. Whilst she professes to have no detailed knowledge of fishing, she has a background as a zoologist specialising in marine biology, including experience working at Scott Base in Antarctica with a team from Auckland University. This was prior to a career change in 1989, which led her into environmental law where she is well known as the author of a number of publications addressing subjects within that discipline.

Members of the Review Group were appointed in an independent capacity on the basis of their individual knowledge and expertise of fisheries and related conservation issues. The aim appeared to be one of representing all interests, including game, still water, coarse, eels and netting. The initial list of 16 names included John Golding, and Jean Howman, both well known to the Atlantic Salmon Trust, and was then augmented with additional experts, for example Ted Potter of the Centre for Fisheries and Aquaculture Science, Lowestoft. The secretariat and executive support were to be provided from Fisheries Division II of the Ministry of Agriculture, Fisheries and Food (MAFF) with Ivor Llewelyn, the Head of Fisheries II, as the nominated Secretary.

The terms of reference were: *To review existing policies and legislation in England and Wales concerning the management and conservation of salmon, trout, eels and freshwater fish and make recommendations. The review and recommendations were to take particular account of the need:*

To maintain, and where appropriate enhance, bio-diversity.

To maximise the economic, social and recreational benefits derived from salmon and freshwater fisheries, taking account both of the interests of local communities and local factors and traditions.

For management of fisheries to be on a fully sustainable basis, taking account of the precautionary approach.

The review was also to *consider other factors that might affect the development and sustainability of fisheries*. Finally, it was also required to *examine the institutional arrangements for the regulation and management of fisheries including the role of the public sector, the need to involve all interested parties, arrangements in tidal and coastal waters and how best such arrangements could be funded*.

The following detailed schedule of meetings was published, with a request for interested bodies, institutions and individuals to submit written evidence in advance with the possibility of offering verbal amplification if required:

19 - 20 October 1998	Salmon, sea trout and wild brown trout fisheries
16 November	Introductions and transfers of fish
10 - 11 December	Factors affecting habitats
11 - 12 January 1999	Coarse, still water trout and eel fisheries
8 - 9 February	Factors affecting fish populations
8 - 9 March	Fisheries and recreation
21 - 22 April	Institutional arrangements for the management and regulation of fisheries; fisheries funding.

Subsequently a series of regional meetings were announced which were designed to offer a further opportunity for interested parties to put their views directly to the Group. Unlike the main evidence taking sessions, which were directed at single specific issues, these would address the four main topic areas collectively, namely:

Coarse fish, trout and eels.
 Salmon and sea trout
 Environmental or other issues
 Finance and administration.

The dates and locations are to be:

25 January 1999	The Quality Hotel George, Nottingham
29 January	Lymm Hotel, Lymm, Cheshire
12 February	The County Thistle Hotel, Newcastle upon Tyne
16 February	The Southgate Hotel, Exeter
19 March	Belle Vue Royal Hotel, Aberystwyth
23 April	Fishmongers' Hall London.

Professor Warren has said that she has every intention of ensuring that the impartiality of the Review Group will be maintained throughout its deliberations. MAFF would be used purely in support of the Review. This approach was also confirmed during a speech she made during the Salmon and Trout Association's annual dinner in Fishmongers' Hall on Thursday 3rd December. She said, variously:

Fish and fishing were a part of our society.
Her Review Group would be impartial, with no bias.
She would be reporting her findings to ministers in September 1999.
There was a need for the report to be acted upon; in this regard she saw this as being the responsibility of the Review Group.

The Trust's approach to the Review Group has been co-ordinated by a sub-committee under the Vice-Chairman, John Hopkinson. This was established after the July Council Meeting in Edinburgh, and met in Fishmongers' Hall on 6th August to identify the best way to present evidence to the Review Group. It was decided to offer a single paper to cover collectively the seven topic areas forming the core of the Group's work. Thereafter the Trust would present its views through the Moran Committee, which was originally set up to co-ordinate the input of the angling organisation, and of which I am a member. The submission was drafted, refined

and re-honed during September and presented to the Council Meeting on 21st September. After a frenetic few days of final polishing, the paper was submitted to the Group before its meeting in Cardiff where it was to consider salmon, sea trout and wild brown trout fisheries. The main points of the Trust's submission were:

Salmon, sea trout and wild brown trout fisheries: comments on in-river production, hydropower and dam interventions, fish passes and screens, water quality and flow, habitat restoration and enhancement and finally catchment, salmon management and enhancement policies.

The impact of aquaculture: addressing sea cages in estuaries and the regulation of fish farms.

Factors affecting fish populations: in particular, predation, planning for the effects of major disasters, interceptory fisheries and their removal as a matter of urgency, estuarial nets, net limitation orders, the regulation of sale of fish, and the problems associated with low marine survival (majoring on the requirements for research).

Fisheries and recreation: in particular, the need to control recreations other than angling in order to ensure the maintenance of sustainable fish populations.

Institutional arrangements for the management and regulation of fisheries: together with the need for appropriate funding.

The Vice-Chairman and I were due to attend to give oral evidence. In the event John Hopkinson was unable to be present, and so I represented the Trust and also formed part of the Moran Committee team, giving evidence on 19th and 20th October.

This was conducted in a very daunting atmosphere with more than 24 panel members sitting in an open horse shoe arrangement, with those giving evidence placed in the centre. Poor acoustics did not help, making it difficult both to hear and to assess comments made during the proceedings. The meeting was recorded, and manuscript notes were taken by the secretariat. Lord Moran introduced the representatives of his Committee: himself, Chris Poupard, Mark Hatcher, Moc Morgan and myself. Thereafter we were subjected to questions, loosely based on a listed presented to us by the Review Group in advance, but with many supplementaries. We were not invited to make any statements as such, although at the end, as it had been missed, I was able to raise the issue of the marine phase in relation to predation, nets and co-ordinated international research requirements. In addition to the evidence submitted in writing the main questions raised by the Review Group addressed:

- Spawning targets
- Control and levels of exploitation including surpluses
- Management and assessment of stocks and populations
- Sea trout
- Exploitation by nets
- Illegal fishing
- Control of the sale of wild salmon, including its banning
- Carcass tagging
- Poaching control

Co-ordination of research and management
The Precautionary Approach
Catch & Release, including John Webb's work and the Trust's video initiative

The subsequent session covered evidence from Mr Deas from the National Federation of Fishermen's Organisations, representing estuarial netmen. He addressed a number of issues, primarily defending the position of the netmen and opposing proposals for further regulation (eg, by quota) or reduction of their activity, although he claimed that "balanced" conservation measures would be accepted. He cast doubt on the effectiveness and enforceability of catch and release.

The EA gave evidence the following day. They covered a wide range of topics, emphasising the effects of restrictions on their funding, and defending the approach of setting minimum spawning escapement targets, although they acknowledged that there was much yet to be learned on this subject. They were concerned at deficiencies in knowledge of stock levels, and would wish to increase counting and trapping facilities if finance were available. They discussed the potential and problems of hatchery enhancement, concluding that where possible it was better to treat fishery symptoms rather than just to introduce more fish.

Control of the number of fish killed could only be achieved by Net Limitation Orders and by Byelaws, which would need to be enforced. Asked about their priorities for legislative improvements, they cited options including carcass tagging, better control of illegal fishing, and disease control. They recognised the problems facing salmon at sea, and given unlimited funding they would major on habitat improvement, restoration of spring runs in order to allow more spring fish to be taken, better enforcement and closure of the Irish Drift Nets. Interestingly, the North East nets were not mentioned. In discussing desirable improvements to the Environment Agency itself, they quoted the need for a mandatory review of the conduct of its business, as well as for the encouragement of development, including partnerships and support for trusts and associations, the attraction of EU support, and most importantly, adequate Government funding.

The final group to appear was the National Federation of Welsh Netsmen and fishermen's Organisations of Wales, who gave a dramatic presentation which clearly attracted attention. Their message was that for 2,000 years they had been neglected as a group and had had a succession of unacceptable restrictions placed upon them. They fished for a living, and consequently opposed any restrictions; they did not take spring fish and in any case challenged the view that there was a decline in salmon stocks.

Subsequently, the Review Group has heard evidence on the introductions and transfers of fish and on factors affecting habitats. The latter subject is of particular interest to the Trust, and a comprehensive paper representing the Moran Committee's position, including inputs by the AST, was submitted by Mark Hatcher to the Group prior to the formal hearing in London on 10th and 11th December. On the day, the main questions raised by Group members included:

- An assessment of the major habitat problems facing fisheries
- Those habitat issues considered to be both the most difficult to address
- Cost effectiveness
- Primary and existing fisheries legislation
- Abstraction

Water quality, flows and associated improvements
Responsibilities of riparian owners
The effects of abstraction to support navigation requirements
Proposals for Special Fishery Protection Areas under the EC Habitats Directive

As described at the beginning of this report, future meetings of the Review Group of major significance to migratory fish are due to be held in the spring of 1999. These will address fish populations, fisheries and recreation and – probably the most important issue of all – institutional arrangements for the management and regulation of fisheries and their funding. These meetings will be covered in the next issue of the Progress Report.

Thereafter, it will be for the Chairman and her Review Group to present their findings to the Minister in September 1999. Inevitably, there will be a delay before they reach the public. We hope that the recommendations will be constructive and balanced; Professor Warren has said publicly that she intends to follow them up, to ensure they are not sidelined or shelved, and we must wish her well.

PROBLEMS FACING SALMON IN THE SEA

Report on an Atlantic Salmon Trust Workshop
held on 18/19 November 1998
Freshwater Fisheries Laboratory, Pitlochry

(Dr. Peter Hutchinson)

In recent years increasing concern has been expressed about the apparent decline of the wild Atlantic salmon. Described by some as a “salmon crisis”, the decline has been attributed to factors in the marine environment. The decision of the Atlantic Salmon Trust to hold a two-day workshop to explore those factors likely to affect growth and survival of salmon in the sea, to consider approaches for predicting future abundance and to formulate proposals for further research and collaboration in this field was, therefore, most timely.

At the opening of the Workshop, the following message from HRH The Prince of Wales, Patron of the Atlantic Salmon Trust, which captures the nature of the problem and the challenges facing the Workshop, was read out:

“The problems that face salmon in the sea have come to increasing prominence in recent years, in countries all around the North Atlantic. As Patron of the Atlantic Salmon Trust, and as a salmon fisherman myself, I was therefore glad to learn that this group, with such a wide range of experience, is being brought together to find why fewer fish are getting back to their native rivers. Putting this information to practical use, particularly in developing predictions of salmon abundance to support knowledgeable fisheries management, is vitally important. I wish you every success in your discussions, and look forward to hearing of the results”.

The complexity of the task before the Workshop was outlined by its Chairman, Dr Derek Mills, who highlighted the many factors which could influence the survival and growth of salmon at sea. He referred to the need for improved communication between climatologists, planktologists, oceanographers, hydrographers and, of course, salmon biologists, all of whom were represented at the Workshop, and for improved integration of research. The Workshop represented the first steps in this important process.

Studies of salmon returns have shown coherence in trends over wide geographic areas, leading scientists to conclude that common events in the ocean are driving salmon populations. Information from a small number of monitored rivers around the North Atlantic shows that:

- in North American rivers marine survival in recent years has remained low relative to historic levels, despite reduced levels of exploitation, although freshwater production rates are thought to have been maintained;
- in the rivers of the North-East Atlantic area there appears to have been a widespread and sudden decline in marine survival of 1SW stocks at the end of the 1980s and survival has remained low for some, but not all, of these stocks. For 2SW stocks there has been a more gradual decline which has been underway for at least 25 years.

Information was presented for the North Esk (Scotland) and Western Arm Brook (Canada) which showed that marine survival had fallen by a factor of two in recent years compared to the 1970s and 1980s. This situation is not, however, reflected in all monitored rivers, and scientists and managers were cautioned against focusing exclusively on the marine environment. For example, in the River Bush in Northern Ireland survival of smolts to homewaters has remained around 30% since the mid 1980s, while egg-to-smolt survival has declined by a factor of three as a result of habitat degradation. Effects in freshwater can also have an important influence on subsequent performance in the sea. For example, in acidified rivers in southern Norway, accumulation of aluminium during the freshwater phase affects the ability of smolts to osmoregulate and therefore to adjust to conditions in the sea. Such effects would be manifested as a reduction in marine survival but the problem is clearly linked to the condition of the smolts entering the sea. Reference was also made to a recent hypothesis (the "Hypothesis from Hell") which suggests that the decline of both Pacific and Atlantic salmon may be linked to elevated levels of UV radiation experienced by juvenile salmon in freshwaters.

Many examples were presented at the Workshop of the effects of the physical marine environment (such as temperature and salinity) on the growth, recruitment and mortality of fish stocks and their distribution and catchability. The pre-fishery abundance of North American origin (potential 2SW) salmon has been shown to be correlated with a temperature-based ocean habitat index. This thermal habitat index has declined since the 1970s although it has increased since 1996, reaching a value in 1998 as high as those experienced in the 1970s. The relationship between thermal habitat and pre-fishery abundance is used to provide catch advice for the West Greenland fishery and is one of the few examples where environmental information is used to predict abundance for assessment and management purposes. The view was expressed, however, that this relationship may be about to break down. While this could have implications for current salmon management systems, it was stated that much can be learned about the underlying mechanisms when these relationships break down. Quantitative

thermal habitat concepts have also been applied to European salmon. Again, the period 1970-1975 was a period of large habitat area (and salmon abundance) but this declined to low values in the period 1985-1990.

Why, then, has the environment in the North Atlantic become less productive for salmon? A major cause of changes in ocean climate and circulation in the North Atlantic is the North Atlantic Oscillation (NAO). The NAO Index, defined as the winter sea surface pressure at the Azores minus that at Iceland, has exhibited considerable long-term variability. In the 1960s, there was a protracted and extreme negative phase of the index while in the 1980s and early 1990s the index was in its most protracted and extreme positive phase, although there is inter-annual variation in the index. Associated with these changes are a range of physical and biological responses including effects on wind speed, ocean circulation, sea surface temperature and ocean productivity. For example, fifty years of data from the Continuous Plankton Recorder Survey has shown substantial and widespread long-term changes in plankton communities associated with substantial changes in the circulation and climate of the North Atlantic. It was reported that, while Atlantic salmon from European rivers might have experienced warmer conditions in freshwater and homewaters during years of high NAO index, they would have experienced cooler conditions in middle and distant waters. In these years, when the thermal habitat is low, salmon abundance also appears to be low. Ocean climate has also been linked to life history traits. In the mid-1980s it was hypothesised that in periods when there were warmer sub-arctic temperatures, salmon would move further north, away from the more productive frontal regions, consuming more energy in the process, leading to later maturation and return to homewaters as MSW fish. Conversely, colder sub-arctic temperatures would lead to increased numbers of grilse (1SW). In recent years, there has been a marked increase in the proportion of grilse in North America, which is consistent with this hypothesis. However, it was noted that other studies have failed to find a link between sea-age at maturity and sea surface temperature.

Given the link between climatic variables and salmon abundance, there is inevitably concern about the implications for Atlantic salmon of climate change due to enhanced global warming over the next century. There is uncertainty about the actual rate at which greenhouse gases will increase in the atmosphere but it is anticipated that global temperatures will increase by 1-2°C by the middle of the next century. While the North Atlantic is one of the world's most climatically sensitive regions, model predictions suggest that the temperature impact in this region may be less than elsewhere. Land surface temperatures around the North Atlantic rim are expected to warm more in winter than in summer, with enhanced precipitation in winter but a decline in summer. These changes will have implications for the salmon. For example, it was reported that lack of snow melt water in the Gironck Burn has resulted in elevated water temperatures in the spring, and earlier migration of the smolts, possibly with consequences for subsequent survival. It seems likely that one major potential change linked to the predicted warming will be loss of salmon populations at the southern limit of their range, with a possible extension of salmon-producing rivers into the Arctic. It is also possible that there will be an increase in productive sub-polar waters for salmon to feed in during their marine phase, although the view was expressed that migration to these areas might become more difficult because of changes to coastal currents. However, the optimistic view was expressed that the salmon will most likely adjust to the coming climate changes, and the challenge will be for management of the resource to be as flexible as the salmon.

In his Opening Address at the Fourth International Atlantic Salmon Symposium held in 1992, the Chairman of the AST, Lord Nickson, indicated that "Lost at Sea" seemed to be the tragic epitaph for so many of our salmon stocks, and that something was happening that we didn't understand. It became clear at the Workshop that many factors could be contributing to the higher levels of mortality at sea. Survival of salmon in the marine environment is thought to be heavily influenced by events during the first few months at sea, linked to growth-related predation pressures. Certainly, information was presented at the Workshop indicating that there can be heavy predation on smolts by cod, pollack, seals and sea birds. Tracking of smolts has provided valuable information on migratory routes and possible sources of mortality. For example, concern was expressed that sea lice may be adversely affecting salmon smolts in areas where migration routes pass fish farm cages. The cages may also attract predators to the area. Tracking studies on smolts are continuing in a number of countries. Studies in Newfoundland suggest that inshore sea surface temperatures may be related to post-smolt survival and ultimately to the number of salmon produced.

Factors later in the marine phase may also play an important role. Salmon returning to Scottish homewaters in 1997 showed significantly greater occurrence of summer growth checks on their scales than had previously been recorded. The checks all occurred during the first marine growing season for 1SW salmon and during the second marine growing season for 2SW salmon, i.e. in 1996. The extent to which the checks occurred was found to vary both with month and sea-age at return, suggesting that different groups of returning salmon may have been exposed to the causal event to different degrees, perhaps because of different migratory patterns. These checks may indicate periods of reduced growth opportunity which may, in turn, affect survival at sea. However, information obtained from research cruises in the Norwegian Sea and at Faroes suggests that food is not limiting and that the only fish observed to be in poor condition were recovering kelts, although feeding of salmon in the Faroese zone was less intense in samples taken in the autumn than in the winter. A recent hypothesis developed in relation to natural regulation of coho salmon in the Pacific proposes that mortality occurs at two stages. In the first stage, immediately after entry to salt water, mortality is predation-based. The second stage occurs in the autumn and winter of the first year at sea when juveniles that are not of a critical size are unable to maintain minimum metabolic requirements, leading to death. Given the link between climatic events in the Atlantic and those in the Pacific, and the problems facing salmon in both oceans, there may be benefits from collaboration between salmon biologists in both oceans.

Reference was made to the apparent "spontaneous generation" of salmon in wet years such as 1998. Could the problem lie closer to home and be exacerbated when the fish are delayed from entering rivers? Seal populations have increased markedly in the North Atlantic region in recent years and it was reported that a study in the Pacific suggests that seal predation may be having an impact on the larger, spring-running fish.

Another view expressed was that salmon might be experiencing difficulties in migrating back to homewaters. Could the salmon literally be lost at sea? Reference was made to the complexity of gyres and the presence of eddies within them.

There have been major reductions in exploitation in directed salmon fisheries throughout the North Atlantic in recent years, but concern was expressed about the possible by-catch of salmon post-smolts in pelagic fisheries in the Norwegian Sea, particularly those for mackerel.

Recent studies based on limited samples have shown that salmon do not appear to occur as a by-catch in the Scottish East Coast sandeel fishery.

A report of cataracts in wild post-smolts sampled by research vessels is also of interest and deserves further study. The view was expressed that these may be linked to water quality problems. In this regard, a Water Quality Status Report being prepared for the Oslo-Paris Commission for the year 2000 will be of considerable interest.

While the causal factors of the increased marine mortality remain a mystery, much progress has been made in our understanding of salmon at sea. The techniques are now well established for sampling post-smolts by research fishing, and this and tagging studies have greatly increased our knowledge of the distribution of salmon at sea. Further studies of distribution will be needed to facilitate a clearer understanding of the factors influencing marine survival and life history. Advances in tracking and telemetry techniques allow the movements of salmon post-smolts between the estuary and the open ocean to be monitored, and data storage tags are beginning to be used to collect information about geographical position, behaviour of salmon and the environmental conditions they experience. These tags are presently too large to be applied to smolts but have been applied to kelts and could be applied to larger salmon caught at sea. Use of these tags, of course, requires their retrieval, and concern was expressed that, with reduction in exploitation in recent years, both in homewater and distant water fisheries, there could be problems in recovering tags. A further complication is that the recovered tags are from surviving fish whereas information is required from those fish that die. In this regard, "pop-up" tags might provide valuable information. One possibility which was raised was a study involving simultaneous releases of tagged smolts from both sides of the Atlantic with a large collaborative effort at tracking post-smolts at sea. Such a study might be facilitated through developing links with the military. However, tracking of post-smolts at sea is expensive and there is, therefore, a need for careful cost-benefit analysis of each methodology to determine which would be most practicable.

A number of important points emerged from the Workshop which might guide future research in this field and these are summarised below:

- Monitored rivers provide invaluable information and there is a need for a long-term commitment to these sites. Additional monitored sites, particularly in rivers with multi-sea-winter stocks, should be considered.
- There is, however, a need for caution in generalising on the basis of a limited number of monitored stocks.
- Studies on wild smolts are desirable although there are considerable resource implications.
- Studies of survival and growth throughout the entire life-cycle are needed. In this regard, studies of growth patterns in historical scale collections could provide valuable information about the relationship between growth, ocean climate and freshwater conditions. Such collections exist for Scottish rivers (back to 1963) and for the River Wye (back to 1910).

- Much progress has been made in our knowledge of salmon at sea, particularly with regard to the links between oceanographic changes and salmon production. However, there is a need for studies designed to identify the factors responsible for the reduction in marine survival. The desirability of integrating oceanographic and plankton data into salmon assessments was recognised.
- Research on the marine phase of salmon is expensive and full use must be made of all relevant data. Future research needs to be carefully planned, with full use being made of advances in technology.
- There are likely to be considerable benefits from improved international cooperation through joint research projects and from cooperation with biologists working on Pacific salmon species.
- There is a need for information on the level of by-catch of Atlantic salmon in pelagic fisheries, particularly those for mackerel, in the Norwegian Sea. This could be achieved through placing observers on the vessels to sample the catch.

In summing up the meeting, Professor Tony Hawkins concluded that the Workshop showed the rapid progress being made in understanding the problems facing salmon in the sea, particularly our understanding of the physical factors affecting salmon. Despite the expense, much effort is going into addressing the problem, and he stressed that it will be particularly important to proceed through cooperation between the different disciplines represented at the Workshop. He congratulated the Atlantic Salmon Trust on their foresight in arranging the meeting.

The challenge now is to build on the progress to date in order to identify the factors responsible for the reduced survival at sea and to increase our understanding of how these are linked to changes in the ocean environment. As has been described, a number of fields for research work to address this challenge were identified during the Workshop. These may take time to bear fruit; however, there are positive prospects from the bringing together of the different scientific disciplines. The workshop made all participants aware of the availability of much new information and a range of new techniques. It is hoped to be able to use these in developing better forecasts of how conditions are likely to affect salmon abundance, including returns to home waters in subsequent seasons. The need for this capability was acknowledged – the potential benefits are obvious.

AST BIOLOGIST'S REPORT

(John Webb)

DNA Fingerprinting studies

Lifetime fitness among spring salmon and early running grilse

Monitoring of the spring salmon population in the Baddoch burn is continuing. This year, sampling began in early September with the arrival of the first autumn parr to the fish trap. To date, 550 parr have been trapped, adipose clipped, micro-tagged, sampled for scales, measured and released. Typically, daily catches consist of a mixture of immature parr both males and females, and sexually mature males ('precocious' parr). The majority of migrants are 2+ or 3+ years old – with only a few 4-year old fish. Sampling will continue up to the end of the migration period in December.

Like many areas of the upper Dee, the Baddoch burn produces 2 and 3SW spring salmon and a few early running grilse. Because of the decline in early running fish, evident in many rivers there is a lot of interest in the numbers of adults returning to monitored tributaries like the Baddoch, which are viewed as indicators of spring salmon populations generally. Recently, the numbers of adults returning to the Baddoch has declined, and egg deposition (as measured by the number of females that return to spawn) has fallen to a level below the minimum required to replenish the available juvenile rearing habitat. This autumn, 49 salmon and grilse have been captured in the adult trap. Among this group, 7 were female salmon (2 and 3 SW) and 3 were female grilse (1SW). This total corresponds to 20-25% of the numbers of females that are estimated to be required to stock the burn fully under natural conditions. If this trend continues, current knowledge suggests that the numbers of migrant parr and smolts produced will also decline. The work being conducted at the Baddoch is therefore also investigating ways of maximising juvenile fish production from the limited number of adult spawners in a biologically and economically sustainable way.

The Baddoch project involves following the fate of progeny of spring run salmon and their contribution to future generations. Scale reading is an essential part of this process. Scales from each adult spawner can be used to determine the period of freshwater life and the numbers of years spent feeding at sea. This allows biologists to assign returning adults to particular spawning years. For example, a grilse returning to the burn to spawn in the autumn of 1998 which had spent two years in freshwater before smolting, and then a year at sea would have an age denoted 2.1+. This means that it was spawned in the autumn of 1994, and hatched in the spring of 1995. It then spent two years in the river before entering the sea in the spring of 1997.

None of the male and female grilse caught at the Baddoch trap this autumn were derived from the first year work on the AST/FRS project, ie. Fish with an age of 2.1+. This is not surprising because, in the past, two year old smolts were comparatively rare, consisting of less than 5% of the run. Most Baddoch smolts enter the sea as either 3 or 4-year old fish. It is therefore anticipated that it will be the autumn of 1999 before the first grilse derived from the first year of egg planting (spring 1995) return to the burn. These will be 3.2+ fish. The first group of 2SW spring salmon will return in 2000, aged 3.2.

Catch and Release

A video on how to Catch and Release salmon has been produced by Fisheries Research Services (FRS) in Scotland. The project was jointly funded by FRS, the Environment Agency, the Salmon and Trout Association, The Association of District Salmon Fishery Boards (Scotland) and The Atlantic Salmon Trust. The main aim of the video is to demonstrate the handling techniques and equipment that should be used to maximise the chances of survival of fish being returned. Paul Young of the BBC's 'Hooked on Scotland' is the main presenter with additional contributions by Chris Poupard, Director of the Salmon and Trout Association (S&TA) and myself as the Atlantic Salmon Trust's biologist.

Filming was completed over four days in late October and editing began in mid-November. The video will be available for distribution in the spring. Further details can be obtained from the EA, S&TA or the AST office at Moulin.

A Fisheries Research Report entitled 'Catch and release: the survival and behaviour of Atlantic salmon angled and returned to the Aberdeenshire Dee, in spring and early summer' has been published (Report Number 62/1998, ISSN 0308 8022). Free copies are now available from the FRS Marine Laboratory, Aberdeen, and the Freshwater Fisheries Laboratory, Pitlochry.

Meetings and Presentations

In July, I spent two days assisting Dr. David Summers and his team with their annual electro-fishing surveys on the River Piddle (Dorset) and the River Wylye (Wiltshire) as part of the Game Conservancy's ongoing chalk stream habitat management projects.

In early September, I made a presentation on the 'Management of Spring Salmon in Scotland' at a meeting hosted by the Salmon Research Agency and the Central Fisheries Board in Dublin. The presentation focused on management options currently being exercised by District Salmon Fishery Boards in Scotland, arguments in favour and against catch and release, and the results of recent research into the behaviour and survival of fish released by anglers. Later in the month I attended a meeting in Inverness on 'The contribution of native woodlands to land management'.

In addition, in early December I gave a short presentation on catch and release to members of the Tay District Salmon Fishery Board and Tay proprietors at their AGM in Perth.

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SALMON a fisherman's guide

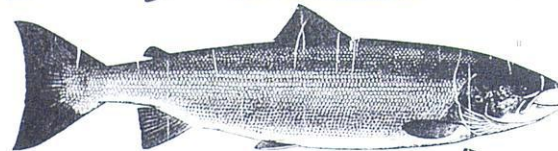
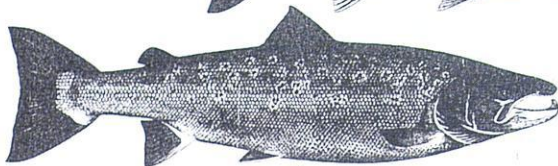
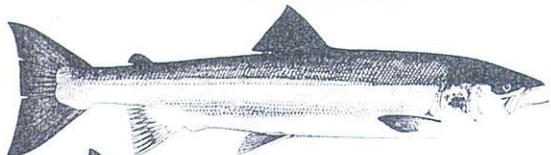
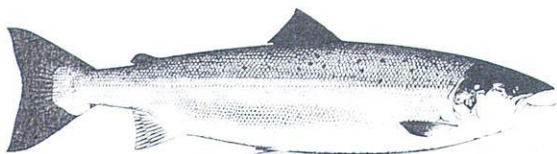
RECOGNITION

FRESHWATER SALMON

Recognised by the presence of a dark, iridescent sheen, which extends from gill to gill. Freshwater salmon make the best eating.

KEEL

Keels are scales which have appeared. Usually associated by the fish with a dark spot and prominent 'gold-rings' on the side and gill. However, they are often encountered by anglers in waters where they figure a natural age and size can be mistaken for high water. Spawning fish may be returned unharmed to the water.



MATING OF KEEL FISH

I Keel: Recognised by the iridescent sheen, which extends from gill to gill. Freshwater salmon make the best eating.

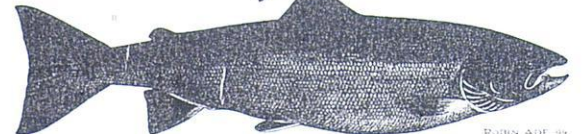
II Keel: This is usually first noticed when a fish is taken up. It is a sign of a fish which has been in the water for some time. It is a sign of a fish which has been in the water for some time. It is a sign of a fish which has been in the water for some time.

COCK & HEN IN BREEDING DRESS

I Cock: The combination of 'dark' and 'gold-rings' on the side and gill. However, they are often encountered by anglers in waters where they figure a natural age and size can be mistaken for high water. Spawning fish may be returned unharmed to the water.



II Hen: This is a salmon which has been in the water for some time. It is a sign of a fish which has been in the water for some time. It is a sign of a fish which has been in the water for some time.



SALMON'S SKA DROTT
The salmon's ska drott is a small, dark, iridescent spot on the side of the fish. It is a sign of a fish which has been in the water for some time. It is a sign of a fish which has been in the water for some time.

GRIM SALMON
The grim salmon is a small, dark, iridescent spot on the side of the fish. It is a sign of a fish which has been in the water for some time. It is a sign of a fish which has been in the water for some time.

SALMON'S TROUT PEE
The salmon's trout pee is a small, dark, iridescent spot on the side of the fish. It is a sign of a fish which has been in the water for some time. It is a sign of a fish which has been in the water for some time.



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ICES ANNUAL SCIENCE CONFERENCE, CASCAIS, PORTUGAL

86th Statutory Meeting, 16-19 September 1998

(Derek Mills)

Well over 500 fisheries scientists attended the Annual Science Conference of the International Council for the Exploration of the Sea (ICES), held in Portugal in September. Twenty seven countries were represented with a number from the Southern Hemisphere including Argentina, Australia, South Africa and Tahiti.

ICES is being gradually restructured and the need for strategic planning of the organisation has never been greater as a result of a heightened concern about the health and sustainability of marine ecosystems which demands more comprehensive and integrated scientific knowledge and advice. The Council of ICES recognises that with this demand the need for ICES to reinforce its role and its influence as a leading international science organisation and independent scientific adviser. This requires a strategic restructuring plan.

At the General Assembly delegates were presented with both an ICES Vision and an ICES Mission. The former states: "An international scientific enterprise that is relevant, responsive, respected and right, relative to marine ecosystems, and the implications of natural change." The Mission is: "To lead the way by mobilising scientific assets to advance capacity to understand and advise on the impact of human activity on marine ecosystems, and the implications of natural change."

One of the strategic goals is to make ICES the most appealing and credible scientific organisation it can be. To this end it is necessary to widen the appeal of the Annual Science Conference; to make it more open to non-governmental scientists world-wide; develop a plan for stimulating symposia; encourage diversity (such as in terms of gender, race, ethnicity) in the ICES community, and to initiate new partnerships to broaden the ICES scientific horizons and address emerging issues.

Over the course of the Conference there were 18 theme sessions. One of particular interest was "Management under a Precautionary Approach : Ecological, Social, and Economic Consequences." There has been a rapid evolution in the definition and implementation of the "precautionary approach" worldwide. Precautionary approaches to management are often seen as first protecting the biological resource, and the prime focus to date has been on the development of biological reference points. The session was aimed at stimulating discussion of social and economic, as well as ecological aspects and consequences of the precautionary approach. There are inevitably some trade-offs between biological safety on the one hand and social and economic considerations on the other. Much of the discussion centre around this statement and whether it was the responsibility of ICES to consider the social and economic considerations. Some felt that the responsibility of ICES ended with advice purely on the biological aspects and that it was up to individual countries, on receiving the scientific advice, to consider the social and economic aspects which may, in turn, whether one likes it or not, be overruled by political decisions.

The theme session most relevant to salmonid interests was on "The Ecology of Diadromous Fishes during the Early Marine Phase." There were presentations on eels, sturgeon and striped bass as well as on salmon and sea trout. The early marine phase of many diadromous

fishes has frequently been referred to as a 'black box' in recognition of our lack of understanding and knowledge of this important life stage. This theme session, then, was aimed at opening the black box. A paper of particular interest was on the distribution of post-smolts which had been traced through surveys by Norwegian and Scottish research vessels. It was noted that the distribution of post-smolts closely coincided with areas where there were fisheries for mackerel and coal fish and concern was expressed over the likelihood of a by-catch of post-smolts by these fisheries. I pointed out that a recommendation had been made at the Annual meeting of NASCO in 1997 by the Atlantic Salmon Trust that these fisheries should be monitored by placing observers on a proportion of the vessels to inspect the catch for the presence of post-smolts. At the end of this Theme Session delegates were asked to put forward recommendations. I again stressed the need for monitoring these fisheries and urged ICES to draw this to the attention of those countries participating in the fisheries and to allow observers on a proportion of the fishing fleet. My recommendation was worded as follows:

'The concern arose during the Theme Session on "Ecology of Diadromous Fishes during the Early Marine Phase" that the spatial and temporal overlap of post-smolts of Atlantic salmon and fisheries for coal fish and mackerel, and possibly other pelagic species, could lead to a by-catch problem. There is an urgent need for information on the level of by-catch of Atlantic salmon and other diadromous fish. It is suggested that ICES consider developing recommendations for the sampling of catches for the presence of Atlantic salmon through the placement of observers on a proportion of the vessels participating in the fisheries.'

Anyone who would like a list of the papers presented at the two theme sessions mentioned, with a view to borrowing them, should write to the Trust.

"THE TAY SALMON FISHERIES SINCE THE 18TH CENTURY"

(John Mackenzie)

In this well researched book Iain Robertson has succeeded in making what many may think a dull story into a most readable and interesting book. He has done an amazing amount of research and each chapter has pages of notes at the end which are fascinating to read. I must declare an interest as my father, grandfather, and possibly great-grandfather, were all Clerks to the Tay District Salmon Fishery Board or its predecessors!

The story of the growth of salmon netting which, until very recently, has been predominant on the Tay, is a tale of power struggles from the start. The formation of the Tay Salmon Fisheries Company around the turn of the last century was an effort to avoid over exploitation by nets. This was a laudable concept but it was not many years before, to quote, "in 1912 the policy of the Company changed and it is now purely a money-making concern with a fine dividend record". (excerpt from a letter written in 1929 to the Clerks to the Tay Board from a member of the Coates family).

Many of the concerns over fish stocks in this book are reflected today. The major difference is that thanks to the efforts of the Tay Foundation there is no more netting on the Tay. On the other hand, the rod fishing effort has increased dramatically.

There are many useful graphs showing catches of fish and their value. The book is a valuable addition to anyone interested in the "King of Fish". The arguments of nets versus rods have waxed and waned over the years. The growth of the salmon farming industry has made large scale netting for salmon uneconomic and this has allowed the purchase of netting rights with the aim of ceasing fishing.

I commend this book to you, and congratulate Mr. Robertson for his efforts.

Note. The book may be obtained at a price of £20 from: Cruithne Press
197 Great Western Road
Glasgow G4 9EB
(0141 353 2308)

WOODLAND GRANTS BENEFIT FISHERIES

Scottish Native Woods is a charity dedicated to the sustainable management and regeneration of native woodlands, that is those comprising species which recolonised Scotland after the last Ice Age, such as birch, oak, alder and Scots pine. Our remit does not include conifers and introduced broadleaves such as sycamore and beech. The organisation operates Area Initiatives, throughout most of Scotland, which specialise in giving advice to the owners and occupiers of native woodlands.

The organisation has always maintained a keen interest in riverside, or riparian woodlands. These woodlands are especially important for wildlife conservation, landscape and shelter. They may also have excellent potential for timber production. Moreover, in many parts of the Highlands, riparian woodlands are often the only woods in an otherwise treeless landscape.

Of special significance is the value of native woodlands in helping to maintain the health and productivity of freshwater ecosystems. Riparian woodlands contribute to the well-being of fresh waters in several ways. Firstly, trees provide a valuable food source for fish. Insects fall from overhanging vegetation into the water, while leaf litter feeds a complex food chain of aquatic invertebrates. The seasonality of these food supplies ensures that the fish's larder is never empty.

Tree root systems stabilise river-banks, preventing erosion and the silting-up of river beds and spawning grounds. The roots also provide shelter for young fish from spates and predators, and the leaf canopy moderates fluctuations in water temperature.

Unfortunately, much of our native woodland resource has been lost. As a consequence, on many river systems the complex relationship between woodland and fresh waters has broken down. Poor management of bank vegetation has almost certainly contributed to the widely reported decline in salmonid populations in many rivers.

The most frequent problem in woodlands is high grazing pressure, mainly from sheep and deer. Grazing in the riparian zone is particularly damaging because livestock trample bankside vegetation and cause the poaching and erosion of riverbanks.

Many riparian woodlands would benefit from a reduction in grazing. This would allow the regeneration of young trees to secure the woodland's future. Fencing valley woodlands can also make gathering livestock much easier and, where the ground is steep or broken, this may reduce losses of livestock resulting from falls and injury.

Scottish Native Woods has advised a number of riparian landholders and Fishery Boards, and assisted them to prepare management plans and applications for forestry grants. The organisation concentrates mainly on the management and regeneration of existing native woodlands, rather than planting schemes.

Scottish Native Woods assists all kinds of land-holders with free advice, but has become increasingly involved with schemes for crofting and agricultural tenants. Recent changes in forestry grants have made this option particularly attractive to landlords and tenants alike.

With funding from the European Union (through Objective 1 and 5b) and Millennium Forest for Scotland Trust, SNW is now focusing much of its attention specifically on riparian woodlands. A number of demonstration woodlands have been selected to illustrate various aspects of riparian management. In the coming year, it will be organising visits to sites on the rivers Findhorn, Nairn and Garry. These visits will provide an opportunity for riparian owners and managers as well as foresters to discuss some of the practical aspects of management, including identifying sources of funding.

In 1996, SEPA part-funded Scottish Native Woods' publication of a colourful booklet about these uniquely important woodlands. The booklet, entitled *Why Manage Riparian Woodlands?*, will be complemented this year with a leaflet outlining some of the practical management issues and details of the grant aid available for riparian schemes.

If you would like a free copy of these publications, or if you would like to know more about SNW's demonstration sites or other activities please contact:

*John Parrott, Project Manager (North Highland), Scottish Native Woods, The Old School,
Errorie, Inverness-shire IV2 6UH
tel/fax 01456 486426 Email: nhmw-snw@btinternet.com*

SCOTTISH HYDRO-ELECTRIC AND FISHERIES

(Dr. Alastair Stephens)

Introduction

Since the North of Scotland Hydro-Electric Board (NSHEB) was formed in 1943 there has been an almost incessant debate about the pros and cons of hydro development. At its inception fisheries matters were addressed by a committee established by Government and known as the Fisheries Committee. It was the job of this committee to review each hydro scheme and agree on issues such as the provision of fish passes, quantifying the amount of compensation and freshet water required, screening of power station intakes to prevent ingress of smolts, and the building and operation of fish hatcheries to provide a supply of young salmon. The decisions arrived at by the Fisheries Committee were incorporated into each legally binding Parliamentary Act required to establish every hydro electric development.

It became apparent that some decisions relating to the salmon and trout fisheries were being made from a position of incomplete knowledge. To address this shortfall the Secretary of State for Scotland established a new committee to investigate the factors affecting the growth and size of Scottish brown trout with the aim of producing measures to improve the stocks. The NSHEB provided accommodation adjacent to Loch Faskally and this facility became known as the Brown Trout Research Laboratory, now known as the Freshwater Fisheries Laboratory.

In 1956 the remit was expanded to investigate issues related to salmon, and the Salmon Research Committee started work on the River Conon, based at the Salmon Research Laboratory in Contin. The main reason chosen for its location was to investigate the behaviour and ecology of salmon on a river extensively used in the production of hydro power. The work continued at this research facility until about 1968. Much fundamental research on the life cycle and behaviour of Atlantic Salmon emanated from this work.

From the outset the NSHEB employed a fisheries adviser, John Menzies, who had previously been the Salmon Inspector for Scotland. Following John Menzies, Dr John Berry was appointed as adviser to the Hydro Board, and worked closely with Morton Boyd who was a general ecological adviser. John Berry was followed by Dr Derek Mills, who started his career working at the Contin research facility on the Conon. Dr Mills was contracted on a consultancy basis, and was retained by Scottish Hydro-Electric, following privatisation in 1990.

In 1995 Scottish Hydro-Electric reviewed its fisheries responsibilities and decided that because of the continuing increase in interest in the Scottish aquatic environment in general, and fish stocks in particular, it was time to employ an in-house biologist to assist the company with its key environmental responsibilities. I was appointed as Fisheries Biologist in 1996 to work closely with the generation side of the company, with a wide remit to advise internally in fishery issues and liaise with external organisations, with the aim of establishing better working relationships with those responsible for the management and enhancement of fish stocks.

There are three main issues on which Scottish Hydro-Electric concentrate effort, as far as fisheries management is concerned, and these are the same issues that have been so

HYDRO GENERATION

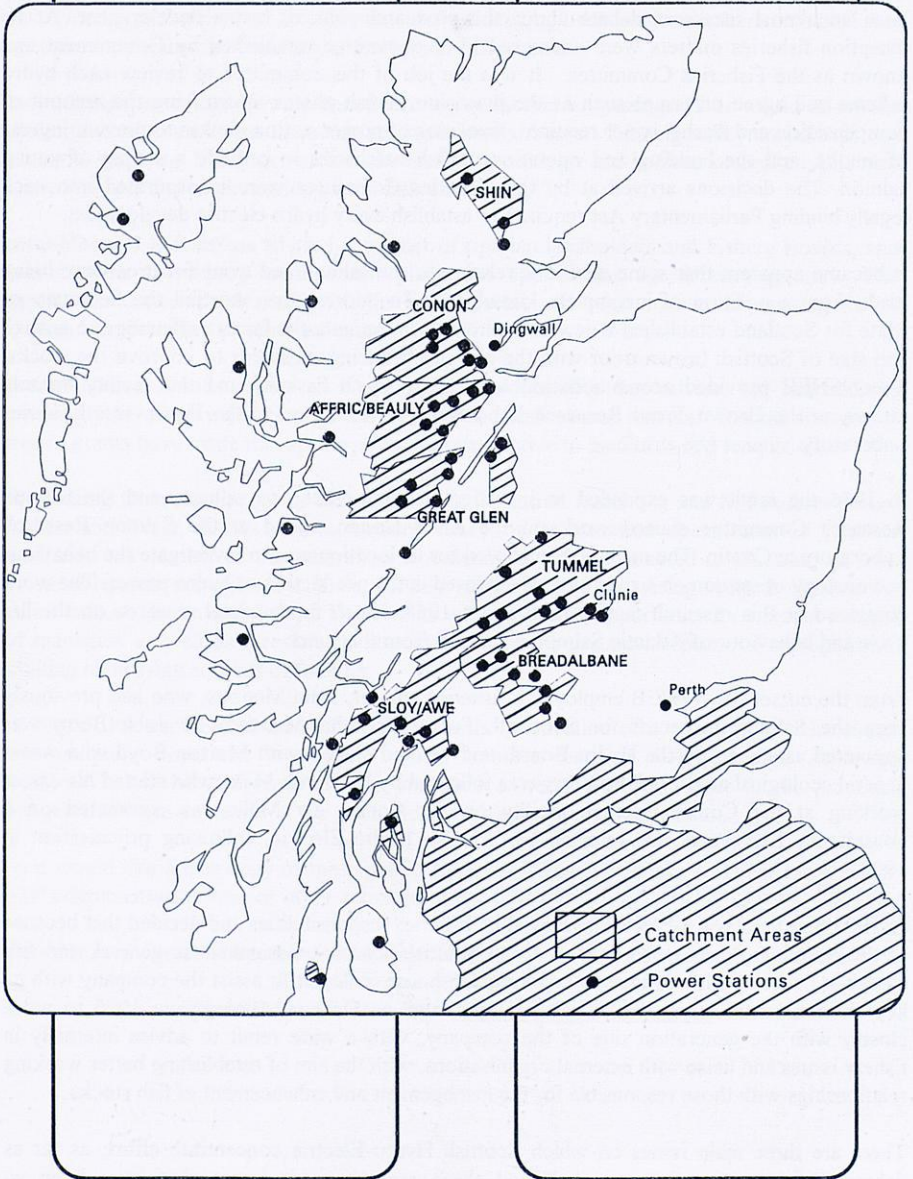


FIGURE 1

contentious in the past. Namely, the upstream migration of adult salmon and sea trout past hydro facilities, the downstream movement of smolts and parr during their migration to the sea either past or through hydro facilities and the maintenance of appropriate compensation flows downstream of intakes, weirs, dams and power stations. In addition to these three major issues questions relating to stock enhancement and the provision of appropriate hatchery facilities is another time consuming issue in certain locations.

Scottish Hydro-Electric recognise the importance of the fisheries, especially the salmon fisheries to Northern Scotland and equally acknowledge the influence the company has over many of the major river systems in the area. One look at the map (Figure 1) shows where the 76 power stations that make up Scottish Hydro-Electric's network are located and the catchments affected. The rivers most influenced include the Shin, Conon, Beaully, Ness, Lochy, Morar, Awe, and Tay.

Liaison between Scottish Hydro-Electric and the relevant District Salmon Fisheries Boards (DSFB) is regarded as a principal pre-requisite for sensible management of the fish stocks within the rivers where the company has an influence. Regular meetings take place between representatives of the DSFBs and Scottish Hydro-Electric to review issues that continually arise. Continued dialogue has been viewed by all concerned as positive, and co-operation between the DSFBs and Scottish Hydro-Electric has led to many potentially beneficial jointly managed fisheries projects.

To fully understand the impacts of some of Scottish Hydro-Electric's procedures concerned with fisheries and water management, in-depth investigations are required to answer the relevant questions. On occasions the skills required to address such questions do not exist within Scottish Hydro-Electric, and so research conducted in a collaborative manner with other organisations is the sensible approach to adopt. In the field of fisheries the type of organisations that the company is currently working closely with include the Scottish Office Freshwater Fisheries Lab in Pitlochry, Fisheries Research Services in Aberdeen, Scottish Natural Heritage and the University of Durham, in addition to the different DSFBs.

Review of current Projects

There is insufficient space available here to go into the individual projects in any detail, but I hope the following will give a flavour of the work under way.

Issue 1 : Upstream migration of Adult salmon

Project 1 : Andrew Gowans has just been awarded his PhD with the title "Movements of adult Atlantic salmon in relation to hydroelectric schemes in Scotland". This extensive body of work was fully sponsored by Scottish Hydro-Electric and supervised jointly by staff at the Freshwater Fisheries Laboratory and Aberdeen University. The project involved radio tracking salmon in the vicinity of a number of Scottish Hydro-Electric's facilities on the Rivers Tay and Conon. The results of the project will no doubt be available in future progress reports.

Project 2 : Heather Forbes has been appointed as a research officer with the Atlantic Salmon Trust, over a three year period, to investigate the upstream movements of salmon in the Kilmorack Borland Lift on the River Beauly. This work which is jointly funded and managed by Scottish Hydro-Electric, Fisheries Research Services and the Beauly DSFB, aims to investigate how the salmon use the lift under different flow conditions throughout the year, using a series of underwater cameras and video equipment. At the end of the work it is hoped to produce a protocol for fine tuning the performance of the lifts, whether they are located on the Beauly or elsewhere. So far Heather has produced a great deal of information which is being analysed back in Aberdeen. Filming during the summer of 1998 has produced a huge amount of data because of the substantial run of grilse recorded. Due to the work load involved in analysis, Iain Thompson, a post graduate has been appointed on a short contract to help up until the New Year. This post was funded by Scottish Hydro-Electric.

Project 3 : A set of cameras has been installed in the Borland Lift at Lairg in the River Shin system, to attempt to answer questions about the efficiency of the lift and the counter. This work, which is being undertaken by Heather Forbes, is again a joint initiative between the Fisheries Research Services, Scottish Hydro-Electric and the Kyle of Sutherland DSFB. It is too early to give a full account of the results but the overall conclusions were that the lift was successful in passing fish and the counter picked up most of them, although because of its awkward position, wave action causes inaccuracies at times.

Project 4 : In conjunction with the Morar DSFB and the Lochaber & District Fisheries Trust, Scottish Hydro-Electric are investigating the efficiency of the Vaki "Riverwatcher" counter in the Morar Power Station fish pass. The reason this location was chosen for this test was that there are likely to be large numbers of small fish moving up and down the pass, as sea trout make up a high proportion of the migratory run. Initial indications show that as long as the flow over the counter is kept as smooth as possible the images produced by fish moving through the infra red arrays are excellent, and fish down to 20cms are being picked up and counted effectively.

Project 5 : On the River Conon, Scottish Hydro-Electric, along with the Local Enterprise Company and the Atlantic Salmon Trust are sponsoring a project run by the Conon DSFB and the Freshwater Fisheries Laboratory, involving the evaluating the use of Passive Integrated Transponder (PIT) tags in tracking the movements of smolts on their way to the sea and again once they have returned as adults. There are many very interesting and important applications to which this technique could be applied, once it has been fully tested. At present the work is still very much in the experimental stages but early results suggest a promising future for PIT tagging in certain areas of fishery management.

Issue 2 : Downstream migration of smolts

Project 1 : Acoustic screening, as a non physical alternative to conventional screening arrangements, has been investigated on the Tummel system. The experiment showed that, at this particular location, the acoustic barrier did not work well enough to allow for the removal of the physical screens. At present Scottish Hydro-Electric's position on smolt screening remains that unless the alternatives to physical screening can be demonstrated to be as efficient as the physical screens themselves, the company will not consider alternatives.

Project 2 : At a number of sites within Scottish Hydro-Electric's area there are no smolt screening arrangements, because they were not considered necessary by the Fisheries Committee when the schemes were first established. A number of theoretical analyses on fish survival/mortality associated with turbine passage have been conducted using various models and at a number of unscreened locations. This work has followed on from initial live fish studies conducted in the 1950s and early 1960s. Induction of the fish into the turbines and collection of the fish subsequently downstream in the tailrace was a problem. Recently a new technique has emerged from the USA which involves inducing fish through the turbines one at a time. Each fish has a special tag (Heisey Balloon Tag) attached along with a radio tag. As the fish emerges into the tailrace the tag inflates bringing the fish to the surface where with the help of the radio tag the fish is recovered by teams in boats. The fish is then returned to a recovery area and observed for three days to assess any post passage mortality. Scottish Hydro-Electric have experimented with the technique and have employed the team from the USA and Ireland to test survival at one site. Under the generation regime in operation, which was not the usual or optimal, the survival rate was over 91%. The advantages of the technique are that one can test survival rates under different operating regimes and prove the most effective regime for maximising survival during the smolt run.

Project 3 : As part of the original scheme agreement on the River Conon it was agreed to open up the River Bran as a salmon producing tributary for the first time. Unfortunately, when the scheme was built, the fish pass at the bottom of Loch Luichart (required by the smolts to successfully migrate to sea) was found to be unsuitable for downstream passage of smolts because they could not locate it, positioned as it is well away from the dam itself. In recent years the Conon DSFB have recommenced stocking of salmon eggs and fry into the headwaters of the River Bran, and now thousands of smolts are successfully produced annually. These fish are now caught in a purpose built smolt trap designed and built by Scottish Hydro-Electric at Achanalt in 1993/4. This enables the Conon DSFB staff to transfer the smolts downstream for release in the River Conon itself.

Issue 3 : Maintenance of Compensation Flow and the release of Freshets

Project 1 : In recent years the engineers involved in water flow management have introduced, in all the most vulnerable locations, a system of auto-compensation restoration, which means that if for some reason the compensation flow stops (e.g. lightning strike) this is detected on site and an alternative method of passing the water automatically comes into action, protecting the aquatic environment downstream.

Project 2 : Scottish Hydro-Electric's control centre at Clunie Power Station in Pitlochry has the ability to monitor and record reservoir and river levels at all important locations. This is done by means of a network of ultrasonic level indicators. The telemetry involved is extensive but it enables the company to make best and most efficient use of the water resources for generation. It also enables control engineers to ensure that water levels are always kept at the correct heights within the river systems.

Project 3 : On the River Cassley, with the agreement of the Kyle of Sutherland DSFB, Scottish Hydro-Electric are now in charge of freshet releases. The timing of freshet (artificial spates) release was previously the responsibility of the DSFB, but this arrangement never

worked very well, as the water needed for freshets was not always available when the DSFB wanted it. Scottish Hydro-Electric know, from level indication at the Duchally weir in the headwaters of the Cassley, when it is wet enough to produce enough water for a freshet. So now the control engineers tell the DSFB when the water is available and release the water accordingly. This has the distinct advantage of releasing water when it is fresh. A fish counter has been installed by the company at Duchally weir to establish when salmon migrate into the headwaters, and whether they do so as a response to the freshet releases. It is too early to say for certain, but good numbers have been recorded moving through the fish lift during the last two summers.

Project 4 : Working with the Ness DSFB at Garry Dam on the Upper River Garry, Scottish Hydro-Electric have altered the "shape" of the freshets in an attempt to mimic a natural spate. So instead of the old style set volume of water, released by opening the floodgates at the dam in a matter of minutes by a couple of feet, a computer controlled system now opens the gates gradually over a number of hours, bring the spate up to its maximum, holds it for a number of hours and drops the level back over even longer, producing a more natural profile. This has actually saved water, and enabled the Ness DSFB to either request further freshets or an extension to the compensation flows, earlier or later in the season. Unfortunately it has been difficult to assess whether this has helped the fish, because they are so scarce in the area.

Other issues

Brown Trout - Loch Tummel survey. Although the majority of fisheries work undertaken by Scottish Hydro-Electric is concerned with the migratory salmon and sea trout, the company is involved in other projects concerned with other native freshwater fish. Scottish Hydro-Electric has been a joint sponsor of a fishery survey of Loch Tummel during 1997/1998. This primary research was commissioned to give the Loch Tummel Riparian Owners basic information about their resource, and so to allow them to make rational decisions about the management of the fisheries. A report has been produced and the findings are now with the Loch Tummel Riparian Owners.

Scottish Fisheries Co-ordination Centre. One of the major new, long term projects in which Scottish Hydro-Electric are involved is the establishment of the Scottish Fisheries Co-ordination Centre (SFCC). The company have recognised that a basic understanding of the fisheries resource is a fundamental requirement for rational management of that resource. There has also been a recognition that many fisheries organisations (both DSFBs and the newly formed fisheries trusts), have professionalised the way in which they are now managing their rivers. The SFCC has been set up to allow this professional approach to prosper, by making sure data is collected to a common standard and incorporated with other relevant national datasets, to aid in the informed management decision making process. This approach will not only help the DSFBs but will make sure that Scottish Hydro-Electric can target its resources wisely and effectively. The company have funded Dr Chris Puhr, the development officer, for the first two years of the project and are enthusiastic about progress to date.

Summary

I hope readers will see that there is a great deal of work being undertaken by Scottish Hydro-Electric in the fisheries management world in Scotland. This article has given a brief overview of some of the current projects. The majority are still ongoing, and so it is too early to discuss results, but I hope to be able to give updates in future Progress Reports.

THE SCOTTISH FISHERIES CO-ORDINATION CENTRE (adapted from a presentation by Dr Christoph Puhr and Andrew Wallace)

The Partnership

The Scottish Fisheries Co-ordination Centre (SFCC) is an organisation which was formed in partnership by the Awe Fisheries Trust, the Conon District Salmon Fishery Board, the Lochaber and District Fisheries Trust, the Spey Research Trust, the Tay District Salmon Fishery Board with the Tay Foundation, the Tweed Foundation, the Wester Ross Fisheries Trust, the West Galloway Fisheries Trust, the Western Isles Fisheries Trust, the West Sutherland Fisheries Trust, the SOAEFD Freshwater Fisheries Laboratory at Pitlochry, and the Department of Geography at the University of Durham. Since its establishment in July 1997, two more organisations – the Findhorn and the Aberdeenshire Dee District Salmon Fishery Boards – have joined the partnership. Discussion with potential additional partners is under way. The main SFCC base is at the Freshwater Fisheries Laboratory.

Objectives

The primary aim of the SFCC is to serve the organisations in the partnership in three areas:

- a. Creating and maintaining high quality databases on fish and associated aquatic resources.
- b. Providing direct assistance with local fisheries management initiatives, in particular through the provision of appropriate information technology.
- c. Providing a high quality research facility based on an integrated catchment approach.

Management

A working agreement has been signed by all partners. The Management Group consists of representatives of the Trusts and DSFBs, of the Freshwater Fisheries Laboratory, and of Durham University. The staff consists of only one member, Dr Chris Puhr, the Development Officer, who reports to the Management Group. This meets quarterly or as required.

Achievements to date

Data Collection

Early on in SFCC development, the partners recognised the importance of collecting high quality data in furthering fishery causes. Since the establishment of the SFCC its partners have developed juvenile fish sampling and habitat survey methods to ensure that these data are collected to the highest possible standards. The involvement of many of the top fishery scientists in Scotland in the SFCC has ensured that the methods which have been developed based on the latest scientific information. Unlike other fish and habitat survey methods, the SFCC methods were developed specifically for fisheries *management* applications. It is also the first time that juvenile fish and habitat data collection is comparable nationally across Scotland.

The SFCC organises regular training courses to ensure that the partners are indeed applying SFCC standards. This is crucial to the development of high quality national data. Custom databases have been developed in order to store the information collected. The SFCC supports the biologists in the partner organisations in day-to-day management of large quantities of fishery information. The group organises regular scientific workshops to review the methods that have been developed and to take into account the results of the latest research.

Data Integration

SFCC databases are held and managed at the local level by partner biologists; data are then integrated centrally at the SFCC. The aim is to examine the locally collected fish data in the context of other data sets such as water chemistry, information on invertebrate populations and pollution data, in order to achieve a holistic view of fishery resources. This will enable the taking of sensible and more informed management decisions. The SFCC is currently talking with other organisations such as the Scottish Environment Protection Agency (SEPA), Scottish Natural Heritage (SNH), Scottish Hydro-Electric Plc and the Environment Agency (EA) in England and Wales, in order to further this purpose.

The SFCC also aims to integrate fishery data with spatial datasets at the national level, such as information on terrain formations and on land use. It has current access to these aspects through its partnership with the Scottish Office.

Data Delivery

Partners receive products such as databases in which fish data, water chemistry data, invertebrate data, land use data and topographical data are all integrated. Efficient access to such information is of great importance in improved decision making in local management. Desktop Geographical Information systems are developed by the SFCC for its partners to allow simple application of the integrated databases in local situations.

Benefits

Through membership of the SFCC partners are provided with access to a much wider body of information and expertise than would otherwise be available to local management, whilst at the same time retaining the full autonomy of their organisations.

Funding and Future Development

The main sponsor of the SFCC is currently Scottish Hydro-Electric, which has funded the post of Development Officer since July 1997. Additional sponsorship has come from the Freshwater Fisheries Laboratory, the University of Durham, and Anite Systems. The partner organisations currently contribute £500 per year towards running costs. A five-year development and financing plan, which will require additional support, is being worked out at the time of publication of this report.

The main points of this development plan are:

- a. To facilitate the development by SFCC partners of a set of guides to inform managers of best practice in a variety of fishery management situations.
- b. Where appropriate, to establish with SFCC partners practical training courses in the use of these guides.
- c. To develop databases to archive and process fishery information in an organised, cost-effective and secure manner. Agreed examples of information are: stocking, water chemistry, catch per unit effort, and instream and bankside works.

The plan will ensure that existing achievements and procedures are consolidated and evolved. It will identify and assess development priorities, identify staffing needs and examine funding requirements and sources. Strategically, it will examine the issues involved in the early creation of a credible organisation with national coverage.

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A NEW SEA TROUT INFORMATION LEAFLET

(Sally J. Northcott and Alisdair I.M. MacDonald)

Freshwater Fisheries Laboratory, Faskally, Pitlochry, Perthshire, PH16 5LB

This summer, the Atlantic Salmon Trust, Scottish Natural Heritage and the Freshwater Fisheries Laboratory joined forces to produce an information leaflet entitled, "Saving Scottish Sea Trout in the Highlands and Islands". Although most of those with fishing interests in Scotland are well aware of the serious decline in sea trout throughout this region, the general public may be less so. This leaflet has a primary aim of increasing public awareness.

The demise of fish stocks, sea trout included, does not arouse the same passion as the threat to other wildlife of the furry or feathered variety. The small voice of those that *are* deeply concerned about the sea trout in western Scotland just does not have the same impact. The first step to changing public perception of sea trout, is to inform them. First, they need to know what sea trout are and some facts that are indicative of how remarkable they might be.

How many people would imagine that they could live as long as 20 years or that they can grow to a metre in length? It would be helpful to see what they look like because they are

striking fish. It may not be clear why sea trout are important. Although the conservation-minded may understand their ecological importance, the economic value of these fish may not be so obvious to those outside fishing circles. Someone just discovering what sea trout are is unlikely to know what is going wrong for them and where the major areas of concern lie.

Not all potential causes of the decline are entirely man-made, although everything from climate change to increases in sea lice are influenced by our activities, and it is easy to feel some despair at this stage. Having invoked concern for the sea trout, and blamed much of it on ourselves, what can we do about it? Whilst experts and those in authority may be able to make a difference, what can "the public" do? For the more enthusiastic, the West Coast Fisheries Trusts provide the potential for direct involvement either financially or in-kind. The trusts are included in a list of useful contact organisations such as the Freshwater Fisheries Laboratory, The Association of District Salmon Fisheries Boards, the Marine Laboratory, Aberdeen and regional branches of the Scottish Environment Protection Agency.

More direct advice is given to anglers to conserve dwindling stocks by not fishing for sea trout or using catch and release methods, namely, barbless hooks and knotless landing nets and keeping the fish submerged. Fishery owners are encouraged particularly to look after the environment that these fish require for successful spawning and juvenile production. Fish farmers too are reminded to follow advice from their industry's scientists that will reduce sea louse levels on their farmed salmon.

The leaflet will be distributed throughout Scotland with emphasis on the affected West Highlands and Islands region. It will be displayed in Tourist Information Centres, hotels, tackle shops and by those directly involved in assisting the sea trout including, of course, the three sponsors. It is intended to raise the profile of this issue, provide advice on what we can do to help and where to find relevant expertise. Sea trout are part of Scotland's natural heritage and protecting this most important asset is up to us all.

PETER TOMLIN
(by John Mackenzie)

Peter Tomlin, who since 1985 has been the Atlantic Salmon Trust's Accountant and subsequently its Treasurer, retired at the beginning of December. Peter had worked with Price Waterhouse, who were auditors and tax advisers to the Fishmongers' Company, which initially looked after the Trust's accounting, and so he had an involvement with the Atlantic Salmon Trust almost from its inception. After leaving Price Waterhouse, Peter became a tax adviser to one of the major oil companies. He then set up his own part time practice, and Michael O'Brien, at that time Assistant Clerk to the Fishmongers' Company, recommended Peter to the Trust.

All who served on our Finance Committee will have appreciated his meticulous handling of our affairs, and particularly the accounts, painstakingly and beautifully hand-written, that he presented at the meetings. Nothing was ever too much trouble to Peter. I understand that he is now on the road to recovery after an operation, and I am sure that all connected with the Trust will wish him well in his retirement.

THE ATLANTIC SALMON TRUST LIMITED

TRUSTEES ANNUAL REPORT

PART I: OBJECTIVES AND FINANCIAL REVIEW

The Trustees are pleased to present their Annual Report and the audited Financial Statements for the nine months period ended 31 March 1998. This represents a change of accounting date from the previous 30 June year end, whereby future financial statements will be made up to 31 March each year. The 31 March year end date has also been registered by Companies House as the accounting reference date of the Trust for Companies Act reporting purposes.

1. OBJECTIVES AND FUNDING

- (i) The principal objective 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 and problems facing the salmon; it offers advice to Government Ministers and their departments and to the European Union; it finances scientific and biological research, arranges workshops and international conferences and publishes booklets on matters of general and scientific interest about salmon, for the mutual benefit of salmon managers, scientists, biologists and anglers.
- (ii) To raise the requisite funds needed to meet its objectives, the Trust is primarily dependent on donations and wherever possible, on sponsorship or comparable financial support, to finance the costs of scientific studies and the related salmon conservation activities which it continuously undertakes. In particular, during the financial period ended 31 March 1998, the Trust received a further generous contribution of £25,000 from The Robertson Trust towards the costs of its principal scientific research studies into the maximisation of progeny numbers from natural spawning, an important DNA project on which John Webb, the Trust's scientist, has been actively engaged for more than three years. This particular project is referred to in greater detail later on in this Report but the Trustees wish to express their gratitude to The Robertson Trust and to the other sponsors and contributors since the inception of this important project. The ongoing costs require funding of around £23,000 per annum and the Trustees are actively engaged in seeking a further sponsorship to ensure the continuation of the project beyond 31 January 1999.
- (iii) The costs of managing the Trust's varied activities are mainly funded by investment income, by covenanted, pledged and general donations and by an annual fishing auction. As a registered charity, the Trust is entitled to reclaim the tax effectively included in both its covenanted and dividend income; covenanted donations are therefore encouraged, as the tax recoverable over the minimum four year covenanted period is an important factor in the Trust's total

income resources. However, the tax recovery on dividend income for registered charities is to be gradually phased out after 5 April 1999 and replaced by an alternative tax regime specifically related to the charity sector. It is therefore hoped that the impact of the dividend tax credit reduction and its eventual abolition will not have a materially detrimental effect on the Trust's income from this source over the longer term. Apart from covenanted donations, general donations of £250 or more also attract a tax recovery if made under the Inland Revenue Gift Aid Scheme and the Trust also benefited from this particular tax relief during the financial period.

- (iv) A particularly important financial objective of the Trust is to plan for investment income to be maintained at a level sufficient to meet the costs of managing the Trust's activities, both current and future. It is not, however, always possible to ensure that expenditures on major ongoing scientific projects are exactly matched by incoming resources generated within the same financial period in which the project expenditures are incurred. In such circumstances, the policy agreed by the Council of Management is that it would be prudent and realistic to finance any temporary shortfall from capital, so as to avoid any undue delay or restriction to ongoing projects. The utilisation of capital resources in this way has not been necessary for several years and is not, it is emphasised, a long term option under any circumstances.

2. REVIEW OF OPERATIONAL ACTIVITIES

- (i) The operating surplus for the financial period from 1 July 1997 to 31 March 1998 amounted to £101,843 (1997:£78,818). Both financial periods were, however, enhanced by a legacy totalling £165,017 from the Estate of Malcolm Charles Knight deceased, of which £65,000 was received during the year ended 30 June 1997 and the balance of £100,017 during the ensuing period ended 31 March 1998. But for this legacy, the operational surplus for the period ended 31 March 1998 would have amounted to £1,826 (£13,818 for the year ended 30 June 1997). The legacy has been treated as part of the permanent capital of the Trust and invested accordingly so as to generate further operating income.
- (ii) In an overall review of the Trust's principal incoming resources and expenditures, a comparison between the nine months financial period ended 31 March 1998 and the year ended 30 June 1997 is not, in all cases, realistic. In particular, the seasonal aspect of the postal fishing auction and the non-uniformity of investment income receipts on a monthly basis mean that the results for a nine months period do not necessarily pro rate to a normal twelve months period. The following unaudited summary of certain of the major items of income and expenditure for the full year ended 30 June 1998 will therefore give a more realistic view of the annual trend of such items.

	<u>1998</u>	<u>1997</u>	Increase (Decrease)
	£	£	£
<u>Incoming resources</u>			
Investment income	66,822	65,473	1,349
Covenanted donations	19,538	18,793	745
General and pledged donations	20,016	25,774	(5,758)
	=====	=====	=====
<u>Resources expended</u>			
Publicity expenditures	8,557	7,784	775
Progress Reports	8,543	6,650	1,893
	=====	=====	=====

The following general comments on the income items shown above for the comparable period ended 30 June 1998 and in the 31 March 1998 accounts may be of interest:

Dividends

There has been an increasing tendency for companies with major overseas earnings to pay UK dividends as foreign income dividends (FIDS), in order to avoid advance corporation tax (ACT) which would otherwise be irrecoverable by the company concerned. In such cases, the associated tax credit is not recoverable by the charity and although the amount of the FID is meant to compensate to some extent for the loss of the tax credit relief, the gross yield is invariably less in practice than from dividends paid from UK profits on which the associated tax credit is recoverable from the Inland Revenue. However, FIDs are to be abolished from 6 April 1999 and dividends from that date will revert to their normal pattern, including (for charities) an associated tax credit of 21% for the tax year 1998/99 under the phasing out procedure referred to in paragraph 1(iii) of this Report.

Covenanted donations

Income from covenanted donations continues to be maintained at a satisfactory level. New covenants often arise from the Trust's presence at Game Fairs and Country Fairs and from the bi-annual issue of the Progress Report. Covenantors are also contacted when their covenants expire and many renew their covenanted donation. The Trustees especially thank those covenantors for their continued financial support, often over a period of many years.

General and pledged donations

These declined quite significantly during the comparable period ended 30 June 1998 (by £5,700). Donations from individuals have remained at a satisfactory level but certain charitable trusts and other organisations with which the Trust has been associated for many years have either reduced their normal annual donation to AST, or have presumably allocated their disposable funds elsewhere.

Postal Fishing Auction

After many successful years, the postal fishing auction continues to attract considerable support and raised £34,591 (1997: £36,240) during the period ended 31 March 1998. The Trustees gratefully acknowledge the ongoing interest in this important fund raising

activity and the generosity of donors of fishing rights. They also wish to record their appreciation of the untiring efforts of the Director and Jenny Sample at the Pitlochry office, without which this significant contribution to the Trust's finances would not be possible.

3. SCIENTIFIC RESEARCH PROJECTS: OTHER ORGANISATIONS

The gross expenditures on scientific research projects sponsored or financed by other organisations during the period ended 31 March 1998 totalled £38,190. The majority of these projects were administered by the Scottish Office Agriculture, Environment and Fisheries Department (SOAEFD), in conjunction with the Freshwater Fisheries Laboratory at Faskally, with the Trust employing the project personnel and handling the payroll. Financial contributions held by the Trust on behalf of other organisations on 1 July 1997 amounted to £24,999, with further contributions of £55,667 received during the period ended 31 March 1998, a total funding of £80,666. Scientific research expenditures on these projects during the same period were £38,190, leaving deferred contributions of £42,476 to be carried forward at 31 March 1998, per Note 6 (page 6) to the Financial Statements.

- (i) As mentioned earlier in this Report, an extremely important long-term project carried over from previous financial years is John Webb's study of the maximisation of progeny numbers from natural spawning. This five year DNA project will continue during the year ending 31 March 1999 and beyond. In the period ended 31 March 1998, the project was financed by a sponsorship grant of £25,000 from The Robertson Trust, who have contributed significantly to John Webb's studies over its present term and to whom the Trustees are extremely grateful. The contribution of £25,000 from The Robertson Trust will cover the costs of the project through to January 1999 and the Trustees are currently seeking a further sponsorship to ensure the continuation of the project for its full five year period.
- (ii) A further important long-term project carried over from 1 July 1997 is the Shieldaig sea trout electro-fishing and habitat survey. During the period ended 31 March 1998, further finance was provided from the SOAEFD Rural Challenge Fund and from Highlands and Islands Enterprise, totalling £11,523.

4. SCIENTIFIC RESEARCH PROJECTS FINANCED BY THE TRUST

The Trust financially supported two major projects during the period ended 31 March 1998, as recommended by the Honorary Scientific Advisory Panel (HSAP), namely a payment of £6000 to the University of Lancaster for studies into the flow dynamics of water in redds and £5000 to the Conon District Fishery Board on the movements growth and mortality of Atlantic salmon. The Trust will again support several projects during the year ending 31 March 1999, as indicated by Note 21 (page 10) to the Financial Statements for the period ended 31 March 1998.

5. OPERATIONAL RESULTS

- (i) The surplus of £101,843 for the period ended 31 March 1998 has already been referred to in paragraph 2(i) of this Report and represents a very satisfactory financial result
- (ii) There were no fundamental changes in the Trust's investment portfolio during the period ended 31 March 1998. The management of the portfolio was transferred to Murray Johnstone Private Investors Limited (from Greig Middleton & Co. Limited) during the period and the Trustees are confident that the portfolio continues to be well managed, with a satisfactory ratio of blue chip equities, fixed interest bonds and cash deposits. The balance of the legacy of £100,017 received during the period from the Estate of Malcolm Charles Knight deceased greatly enhanced the Trust's financial resources and has been held principally as part of the overall cash deposits. These amounted to £130,115 at 31 March 1998 and will continue to be held as such until the Trustees consider it expedient to invest part of the cash resources in blue chip equities and/or fixed interest bonds. Murray Johnston's charges for managing the portfolio during the period amounted to £2,931 and are shown as a specific item in the Statement of Financial Activities (Page 2).
- (iii) Under the market value concept recommended by the Charity Commissioners for England and Wales for accounting purposes, the unrealised gains for the period ended 31 March 1998 amounted to £187,473, basically representing the increase in market value between 1 July 1997 and 31 March 1998, as adjusted for purchases and sales of investments during the period. In accordance with established accounting policy, all unrealised net gains are transferred to reserves and any future fluctuations in market value will be treated for accounting purposes on the same basis. The operational position of the Trust is therefore unaffected. Realised gains on actual disposals of investments during the period amounted to £2,874 under the market value concept, or £21,274 on an historical cost basis.
- (iv) A professional valuation of the Pitlochry office premises was carried out during the period ended 31 March 1998, resulting in a further unrealised gain of £5,500. In line with the Trust's accounting policy, the unrealised gain was transferred to the Property Valuation Reserve account, which indicated a surplus value of £13,169 over historical cost (£41,831) as at 31 March 1998.
- (v) The market value of the investment portfolio (excluding the investment deposit accounts) on 31 March 1998 amounted to £1,361,837. Since 31 March 1998, however, stock markets worldwide have fallen dramatically, with the consequent adverse impact on the Trust's own portfolio. In such a climate, the Trustees' policy of investing in a spread of blue chip equities, government and corporate bonds and cash has mitigated the overall reduction in the value of the portfolio and no major changes are therefore contemplated at the present time. The established policy of transferring both realised and unrealised net gains to a special Investment Reserve account also ensures that any reduction in the value of the portfolio can be met from existing reserves. These reserves (including the Property Valuation Reserve) totalled £698,569 at 31 March 1998 and are therefore likely to be adequate to cover any future reduction in the value of the investment portfolio, due to the volatility of market forces.

- (vi) The basis recommended by the Charity Commissioners for England and Wales for the accounting treatment of both realised and unrealised gains and losses on the disposal of investments and their balance sheet valuation has not been universally accepted by certain of the major charities, on the grounds of undue complexity and administrative cost. In consequence, the Charity Commissioners have appointed a Review Panel to examine this issue and also certain other of the accounting standards initiated by the 1995 Charities SORP and to publish any recommendations for change that it may consider necessary. In the interests of best practice and to ensure accounting uniformity within the charity sector, the Trust will implement such changes in future financial statements, if it is considered appropriate to do so.

6. STAFF

The Trustees wish to express their gratitude to John Mackenzie, as Director until his retirement in September 1997 and to Jeremy Read as his successor, for their untiring efforts in the continuing struggle for salmon conservation. Their professional knowledge and approach to the many problems, coupled with their efficient liaison with other organisations in furthering the Trust's objectives are largely responsible for the high reputation that the Trust continues to enjoy. Tim Hoggarth, in his capacity as Deputy Director since October 1997, has quickly mastered the varied duties of that office and is a valued addition to the Trust's staffing complement.

Signed on behalf of the Trustees (Council of Management)

COLONEL H.F.O. BEWSHER, LVO, OBE (Chairman).....

MAJOR GENERAL J. HOPKINSON, CB (Vice-Chairman).....

M.D. MARTIN (Member of Council).....

2 December 1998

THE ATLANTIC SALMON TRUST LIMITED

SUMMARY FINANCIAL STATEMENTS
PERIOD 1 JULY 1997 TO 31 MARCH 1998

STATEMENT OF FINANCIAL ACTIVITIES

	<u>1998</u>	<u>Year to</u> <u>1997</u>
	<u>£</u>	<u>£</u>
<u>INCOMING RESOURCES</u>		
Investment income	44,582	65,473
Donations	35,028	44,567
Fishmongers' Company	4,500	6,000
Legacy	100,017	65,000
Postal Fishing Auction	34,591	36,240
Raffle of donated fishing rods	-	3,089
Miscellaneous income	1,519	2,663
<u>Total incoming resources</u>	<u>220,237</u>	<u>223,032</u>
<u>RESOURCES EXPENDED</u>		
Promotion of salmon conservation	71,764	107,975
Donations to other organisations	1,226	1,693
Publicity expenditures	7,782	7,219
Fifth International Salmon Symposium	6,724	-
Investment management fee	2,931	-
Management and administration	27,967	27,327
<u>Total resources expended</u>	<u>118,394</u>	<u>144,214</u>
<u>NET INCOMING RESOURCES BEFORE TRANSFERS</u>	<u>101,843</u>	<u>78,818</u>
Net gains on investment assets	195,847	126,026
	297,690	204,844
Transfers to Reserves	(195,847)	(126,026)
Net movement in funds	101,843	78,818
Fund balance at 1 July 1997	715,728	636,910
<u>Fund balance at 31 March 1998</u>	<u>817,571</u>	<u>715,728</u>
<u>BALANCE SHEET</u>		
Tangible fixed assets	67,349	62,921
Investment assets	1,491,952	1,173,499
<u>Total fixed assets</u>	<u>1,559,301</u>	<u>1,236,420</u>
Net current assets (liabilities)	(685)	7,029
<u>TOTAL ASSETS</u>	<u>1,558,616</u>	<u>1,243,449</u>
<u>CAPITAL AND RESERVES</u>		
Accumulated Fund	817,571	715,728
Reserves	698,569	502,722
<u>Total Capital and Reserves</u>	<u>1,516,140</u>	<u>1,218,450</u>
<u>DEFERRED SCIENTIFIC PROJECT CONTRIBUTIONS</u>	<u>42,476</u>	<u>24,999</u>
<u>TOTAL CAPITAL EMPLOYED</u>	<u>1,558,616</u>	<u>1,243,449</u>

ATLANTIC SALMON TRUST PUBLICATIONS

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

Acidification of Freshwaters: The Threat and its Mitigation	R. North	3.00
Strategies for the Rehabilitation of Salmon Rivers (Proceedings of a joint Conference Held at the Linnean Society in November 1990)	D. Mills	5.00
Salmon Fisheries in Scotland	R. Williamson	3.00
The Measurement and Evaluation of the Exploitation of Atlantic Salmon	D.J. Solomon & E.C.E. Potter	3.00
Salmon in the Sea and New Enhancement Strategies (Proceedings of the 4 th International Atlantic Salmon Symposium, St. Andrews, New Brunswick, June 1992)	edited by D. Mills	30.00
Surveying and Tracking Salmon in the Sea	E.C.E. Potter & A. Moore	3.00
Problems with Sea Trout and Salmon in the Western Highlands	edited by R.G.J. Shelton	3.00
Automatic Salmon Counting Technologies - A Contemporary Review	G.A. Fewings	3.50
Salmon in the Dee Catchment: The Scientific Basis for Management (Proceedings of a one day meeting held at Glen Tanar House, 13 October 1994)	A. Youngson	3.50
Spring Salmon	A. Youngson	3.00
Enhancement of Spring Salmon (Proceedings of a one day Conference held at the Linnean Society of London 26 January 1996)	edited by D. Mills	12.00
Water Quality for Salmon and Trout (second, revised edition)	J. Solbé	3.50
Salmon Fisheries in England & Wales	W. Ayton	3.50
The Industrial Fishery for Sandeels	A.D. Hawkins J. Christie & K. Coull	3.00
Fish Counters (Proceedings of an AST/IFM Seminar held in Perth on 4 April 1997)	edited by A.V. Holden & G. Struthers	3.00

