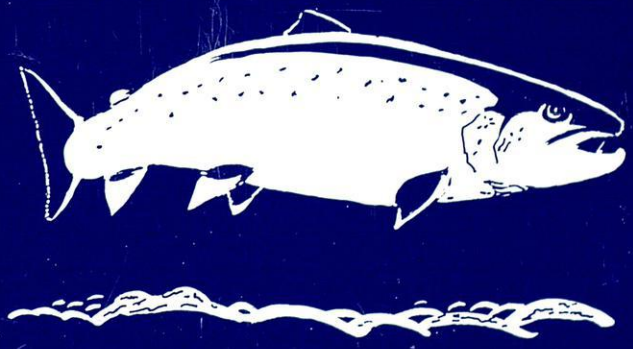
ATLANTIC SALMON TRUST

# PROGRESS REPORT

(including Audited Accounts)

December 1994



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| Patron: | HRH The Prince of Wales |

## COUNCIL OF MANAGEMENT

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| President: | The Duke of Wellington |
| Vice Presidents: | Vice-Admiral Sir Hugh Mackenzie |
| | Mr. David Clarke |
| | Sir Ernest Woodroofe |
| | Dr. Wilfred M. Carter |
| Director: | Rear Admiral D. J. Mackenzie |
| Deputy Director/ Secretary: | Mr. J. B. D. Read |
| Treasurer: | Mr. P. J. Tomlin |

## ELECTED MEMBERS

| | |
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| Chairman: | The Lord Nickson |
| Vice Chairman: | The Lord Moran |
| Chairman of HSAP | Dr. D. H. Mills |
| | Col. H.F.O. Bewsher |
| | Mr. G. Bielby |
| | Lt. Col. R. A. Campbell |
| | Mr. Colin Carnie |
| | Mr. J. A. G. Coates |
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| | Maj.Gen. J. Hopkinson |
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| | Mr. M. D. Martin |
| | Mr. I. Mitchell |
| | Mr. Moc Morgan |
| | Mrs. J. Nicol |
| | The Rt. Hon Sir Cranley Onslow, MP |
| | The Hon. C.A. Pearson |
| | Mr. C. Robinson |
| | Dr. David Solomon |
| | Mr. H. Straker |
| | Mr. C. S. R. Stroyan |
| | Mr. D. Turner |
| | Mr. O. Vigfusson |
| | Mr. A. Wallace |
| | Dr. K. Whelan |
| | Mrs. Margit Worsham |

## INVITED REPRESENTATIVES OF OTHER ORGANISATIONS

| | |
|---|---|
| ASF (USA) | Mr. J. F. Cullman 3rd |
| ASF (CANADA) | Mr. L. G. Rolland |
| AIDSA | Ambassador Claude Batault |
| RASA | Mr. Richard Buck |
| BFSS | (A Representative) |
| ASDSFB | Mr. Robert Clerk |
| SPEY TRUST | (A Representative) |
| FISHMONGERS | The Rt. Hon. Viscount Leverhulme |
| | Mr. John Bennett |
| S&TA | Mr. T. A. F. Barnes |

## HONORARY SCIENTIFIC ADVISORY PANEL

D. H. Mills, M.Sc., Ph.D., F.I.F.M., F.L.S. (Institute of Ecology and Resource Management, Edinburgh University) Chairman
W. J. Ayton, B.Sc., M.Sc. (Welsh, National Rivers Authority)
J. Browne, M.Sc. (Department of the Marine, Dublin)
M. M. Halliday, Ph.D. (Joseph Johnston & Sons Ltd.)
G. Harris, Ph.D. (Welsh Water plc.)
G. J. A. Kennedy, B.Sc., D. Phil. (Department of Agriculture for Northern Ireland)
E. D. Le Cren, M.A., M.S., F.I.Biol., F.I.F.M.
J. Solbé, D.Sc., B.Sc., C.Biol., F.I.F.M., M.I.Biol. (Unilever Research)
D. Solomon, B.Sc., Ph.D., M.I.Biol., M.I.F.M.
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)

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

## INTERNATIONAL CONSERVATION ORGANISATIONS WITH WHICH THE TRUST IS IN CONTACT

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

Registered Charity No. 252742

# INDEX

## CHAIRMAN'S FOREWORD

The Trust's policy on spring salmon, which was adopted at the Council of Management meeting on November 29th is reproduced in this Report. It contains advice to all those involved in the management of salmon. It also defines clearly the Trust's views on commercial fishing by all methods as well as on angling exploitation. I hope you will read it and that it will be widely welcomed.

As everyone knows there have been particular problems with the spring run on the Aberdeenshire Dee and the Dee Proprietors are to be congratulated on their agreement to conservation measures.

There are continuing moves to persuade the Government to speed up the phase out of the North East drift nets. Orri Vigfusson recently lead a delegation with representation from this Trust as well as the Salmon & Trout Association to meet Mr. Waldegrave. We shall continue to take all steps we feel are appropriate to play our part in achieving the end of this fishery.

The progress report of NASF(UK) is also printed in this Report and I am glad to say that the Fund is on its way to raising the necessary money in the UK for the second year of the Greenland/Faroese buyout. As you will see, it is the Trust's policy to achieve a permanent end to these interceptory fisheries.

I am delighted to welcome to our Council of Management the following new members who were elected at the AGM on 29th November:

Jamie McGrigor
Judith Nicol
The Hon. Charles Pearson
Hugo Straker
Donald Turner

John Douglas Menzies retired and we thank him most sincerely for his contribution to the work of the Council.

Nickson

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## DIRECTOR'S REPORT

1994 has been a year with very mixed weather patterns. Fishing-wise it can be summed up as where there was water, fishing was good. In the north of Scotland there was a cold spell in February/March/early April with some areas having an unusual covering of snow for much of the period. This meant that the river waters were very cold and some say this probably deterred the fish from entering the rivers. Certainly the spring fishing was not as promising in the north as the previous year. However, there were reports from all over the country of larger, good condition fish entering the rivers. The grilse run was very varied, again, probably due to water conditions. There were good autumn runs in some rivers.

The Dee in Aberdeenshire has been the subject of much discussion during the year. I reproduce a copy of their Press Release in this Report. Sampling of two of the main tributaries has revealed a low but nevertheless larger than expected number of fish entering to spawn. This led to a further examination of the counter results and the realisation that a gravel bank had built up below the counter. It is possible that this is causing a backing up of water which has distorted the counter readings at high flows as some fish are swimming past the counter without registering. There is, however, still concern regarding the required number of fish spawning.

The Auction catalogues have all gone out and I hope that it will be a success again this year. There are slightly fewer lots as the Dee proprietors have withdrawn in view of the problems.

It is always sad when a friend and mentor passes away, but when it is someone who has been a Council member and a strong supporter of the Trust it is especially so. Derek Mills has written an obituary of Neil Graesser which appears later in the Report. Several of our supporters have died during the year and the Trust has benefitted from collections made in memory as follows: Sir Robin Napier £3,027; Nick Byrne £704 and James Scudamore Oakes £490. We are very grateful to all those that gave so generously.

I hope you all have a very Happy New Year and good fishing in 1995. Don't forget to read the Trust's Policy on spring fish which I hope points the way forward.

D.J. Mackenzie

**Stop Press**

Robin Ade has produced a superb coloured poster entitled "Salmon, a Fisherman's Guide to Recognition". The AST has had this published with help from Fishmongers' Company, Scottish Hydro Electric and The Salmon & Trout Association. It is available from the AST office at £3 plus £1 p&p. It will be on sale at the Game Fairs from the caravan. It is reproduced in black and white at the back of this Report.

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## NEIL GRAESSER

With the death of Neil Graesser on 29th September, Scotland has lost one of its leading salmon conservationists. He was Chairman of the Association of Scottish Salmon District Fishery Boards for over 20 years and over this time he guided its members through many difficult periods during the creation of new salmon legislation. This unstinting service was recognised with the award of the Order of the British Empire in the New Year's Honours in 1990. He gave equally long service to local government as Chairman of the Highland River Purification Board, and this contribution was marked this year when its new headquarters in Dingwall was named after him. His life's dedication to salmon is evident from his full-time involvement in salmon matters. He was one of the founder members of the Atlantic Salmon Research Trust (now the Atlantic Salmon Trust), was a long-standing member of the Council of Management of the Atlantic Salmon Trust, the Migratory Fish Committee of the Salmon and Trout Association and the government's Salmon Advisory Committee. He also served on his local Kyle of Sutherland Salmon Fishery District Board and was a valued member of the Institute of Fishery Management. Throughout his career with these bodies he never missed an opportunity in and out of committee to stress the deleterious effects land drainage, afforestation and road construction were having on the young salmon's habitat. He was a firm believer, often in the face of strong opposition, that there was a place for the commercial salmon netsman in the day-to-day management of a salmon river and he always put forward sound reasons for this opinion.

Neil was also a full-time fishery consultant, practising throughout the United Kingdom and specialising in salmon and other migratory fish and was involved with the development of many major water abstraction schemes. During the course of this work he gave much valued advice to major developers such as the Central Scotland Water Development Board, the Water Services Division of Grampian Regional Council and to R.H. Cuthbertson, the Edinburgh firm of consultant engineers.

Neil was an ardent angler all his life, catching his first salmon at the age of six. He was brought up on the banks of two of the most famous rivers in Scotland and Wales, namely the Welsh Dee and the Cassley which is only a good cast from his lovely home at Rosehall. We are fortunate in having the benefit of his experience as one of the country's foremost salmon anglers in three books he published on the subject: Fly Fishing for salmon; Advanced Salmon Fishing, and The Finer Points of Salmon Fishing. He expresses his views, some of which are impressively controversial, forcibly and, over time, these works will stand on the shelves side by side with other angling classics. He will be sorely missed by many, both in committee and by the riverside.

D.H.M.

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## POLICY FOR SPRING FISH

There is clear evidence that the numbers of spring-running multi sea-winter salmon returning to UK rivers have been declining for some twenty-five years, (see *Annex A*). This conclusion is supported by the Salmon Advisory Committee in their report "Run Timing for Salmon". Scientific evidence now demonstrates that in some rivers these declining stocks are insufficient to maintain survival for early-running fish at current exploitation rates.
The ICES North Atlantic Salmon Working Group 1994 Report states: "For stocks in which spawners were consistently below replacement, spawning stocks generally declined toward the origin. This tendency should be viewed with alarm because it reveals the loss of a run component and, possibly, any genetic attributes that may be associated with a high sea age." This means that stocks are approaching zero.

Spring-running fish, for the purpose of this paper, are regarded as those entering rivers between December and the end of May. The range of possible entry times is reproduced at *Annex B* from the SAC Report.

There are many factors which could have contributed to this decline; among them - naturally-driven changes in the dynamics of maturation and mortality during the marine phase of the salmon's life - the impact of the disease UDN on spring fish from the late 1960's and early 1970's - the growth in the Greenland and Faroese interceptory fisheries during this period - predation by seals and birds - changes in land use - and the effect of high exploitation rates by both nets and rods on declining stocks. In particular the marine phase of the salmon's life at sea remains shrouded in mystery. It will take many years further scientific research on such factors as sea temperatures, ocean currents and food supply before more understanding is achieved. However the massive exploitation by industrial fishing of sandeels and capelin must be having a detrimental effect. The Trust has been pressing strongly for the precautionary principle to be applied; a substantial restriction in industrial fishing is essential before it is too late.

Among all the other potential factors described above, only the exploitation of stocks can be addressed immediately. That is the main theme of this paper, which considers the measures that can be taken to control the exploitation of spring fish.

### 2. The Stock

The value of the multi-sea winter (MSW) spring component to the stock is well known. These fish are in superb condition and are much prized by the angler who is prepared to pay premium prices to fish for them. They are therefore of great economic benefit. A high percentage of these fish is female. They make a contribution towards egg deposition out of proportion to their numbers, as their eggs are large and thus produce larger progeny. They are more likely to breed fish which will in turn become spring-running salmon. While three and four sea-winter salmon are now rare and therefore particularly vulnerable, the threat applies to all MSW fish, and thus significantly affects two sea-winter salmon.

## 3. Commercial Fishing - the Trust Policy.

### 3.1 Interceptory Fisheries

The Trust reaffirms its opposition to all interceptory fisheries that take salmon of mixed stock, and confirms its belief that such fishing at sea should be banned by international Agreement.

### 3.2 High Seas

The Trust continues to support fully the arrangements that have been made for the suspension of the Greenland and Faroese commercial salmon fisheries, allowing many MSW salmon to escape to their home waters. It is important that it should be consolidated by the permanent closure of these fisheries.

Illegal fishing has been greatly reduced, but the Trust will continue to seek effective arrangements to ban all salmon fisheries on the High Seas.

### 3.3 Home Waters

All drift net salmon fisheries off the English, Welsh and Irish coasts should be closed. Until total closure can be achieved, the season must be reduced in order to preserve spring-running fish.

Commercial nets are still operating round the UK coastline and in estuaries. Freshwater netting is now rare. Those fisheries operating on the coast intercept mixed stocks, and contravene the accepted management practice, recommended by the Hunter Committee, that exploitation should be confined to within rivers. Although estuarine and freshwater nets are targeted to a greater extent on specific stocks, the netting seasons at present start too early and put spring salmon at risk.

In the short term, the Trust's policy is that no commercial netting for salmon should commence before the end of May each year, unless it is agreed locally that an earlier date will not threaten spring stocks. In many rivers, this has been achieved either by compensating netsmen to delay the start of their netting operations or by buying out the net fisheries and not operating them. The Trust recommends strongly that the National Rivers Authority and Scottish District Salmon Fishery Boards should implement their powers to restrict the opening of the netting season.

In the medium term - say by the year 2000 - the Trust's policy will be to encourage government and non-government bodies to close down coastal and freshwater net fisheries. At the same time, the Trust will continue to support moves to buy out commercial estuarine nets. Any future estuarine netting should then be carried out under the control of the local fisheries authority for salmon stock management purposes.

## 4. Angling - the Trust's Policy

4.1 It has become increasingly clear that exploitation by rod and line of early-running fish is currently much heavier in certain rivers than the previously estimated figure of 10 to 15%, which was based on tag returns for summer salmon and grilse. The advent of counters has enabled more accurate estimations to be made. These show that exploitation rates of 50% or even higher are possible for depleted early-running stock, and this is clearly not sustainable.

4.2 The Atlantic Salmon Trust strongly encourages all involved in the ownership, management or control of salmon fisheries with a spring MSW stock to consider all the following options and to adopt a policy suitable to their own fisheries. They should endeavour to agree such policies on a river catchment basis.

4.3 Closure of the River or Restriction of the Season

Closing the river for angling would be the most drastic and effective measure, but it is probably unrealistic to consider. In England and Wales, the NRA can introduce bye-laws restricting the season, and in Scotland, District Salmon Fishery Boards can apply to the Secretary of State for change of season. It is attractive to delay the opening of the season as the spring fish are less likely to be caught after they have been in the river a few weeks. However, fish which have entered the river as springers are vulnerable throughout the remainder of the fishing season, especially in the autumn.

4.4 Catch and Release/Bag Limits

Although catch and release is widespread in North America, and has been practised in some rivers in the UK, there are some doubts about its real effectiveness when applied in this country to spring fish. The season in the UK is much longer than in North America, and fish are going to spend a long time in the river before spawning, up to a year in some cases; with high angling exploitation they may be caught again. These fish are very tender when they enter the river, and can easily be damaged. The Scottish Anglers' National Association has produced a good pamphlet showing how to release fish. The Trust's view is that anglers should be encouraged to restrict the number of fish that they keep in the spring, and to return hens as a matter of course, and ideally all fish, late in the season. The actual imposition of bag limits can only be achieved by the action of individual proprietors.

4.5 Fishing Methods

Restrictions such as the imposition of a "fly only" rule would greatly reduce the catch on some rivers in the spring. The NRA has powers to regulate fishing methods locally by bye-law and is using them on such rivers as the Wye, and the Trust would wish to see more local power given to District Fishery Boards to enable them similarly to control fishing methods. In the meantime, the Trust advocates that proprietors should consider imposing appropriate measures.

4.6 Sale of Fish

In order to reinforce the other measures outlined above, the Trust's view is that anglers should be encouraged not to sell rod-caught fish.

## 5. Poaching

The Trust welcomes the efforts that the NRA has made to tackle the problem, but thinks it essential that the NRA should take more effective measures to reduce the illegal taking of fish. As these measures are enforcing the law of the land, they should, in the Trust's view, be paid for from public funds. The same applies in Scotland, where possible limitations on assessment income may prejudice the financing of adequate bailiffing.

It is particularly important that fish should be protected at spawning time, when they are highly vulnerable.

## 6. Summary

6.1 All high seas fishing should be discontinued permanently.

6.2 All drift net and fixed net coastal fisheries for salmon should be phased out. Until this this is achieved, they should not operate while spring fish are within the fishery.

6.3 In-river nets should not operate on a commercial basis until the spring run has entered fresh water.

6.4 All freshwater nets should be phased out.

6.5 Owners and managers of fisheries should introduce appropriate restrictions for their particular fisheries in order to protect and enhance their spring-running MSW stock. Individual river catchment strategies should be agreed.

6.6 Anglers should respect such restrictions where they are imposed, and should exercise great restraint over the exploitation of spring fish; they should consider a catch and release policy.

6.7 Policing should not be cut back. It is especially necessary at spawning time.

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## THE NORTH ATLANTIC SALMON FUND (UK)

In its first year of operations, which finished at the end of August 1994, the Fund succeeded in its aim of arranging for the payment of £180,000 to the International Fund in Iceland. The origins of contributions were widely varied. Scottish District Salmon Fishery Boards, who had been set the target of £146,000 for this first year, have donated over £120,000. The appeal to River and Angling Associations in England and Wales could not be launched until well into the year; it nevertheless had raised nearly £15,000 by the end of October. Public contributions received directly by the Fund, including the proceeds from the sale of car stickers produced by *Trout & Salmon* magazine, totalled over £39,000. The generosity of individual donors has complemented the responsible action of proprietors, with the overall result that the Fund has started its second year with a reserve towards the continuing need to raise the UK share of the compensation payments.

Has closing Greenland and Faroes fisheries had the effect of improving our runs? The estimate was that over 20,000 extra multi sea winter fish would return to UK waters in this first year, with numbers increasing as spawning stocks build up. There is no absolute way to confirm this - catch figures are not yet complete, and are not an exact measure of stocks - nor could one year's experience be final, for this project looks to the future. The main point is that there have certainly been more big fish in many rivers. Dr. David Solomon, as the Fund's scientific adviser, is confident that the continued closure of these fisheries is an effective and significant action in tackling the decline of spring runs. The NASF(UK) Committee is equally confident, and the campaign is now under way to raise another £180,000 for 1995 - not much in relation to the value of multi sea winter salmon, but we have to find it if we are to keep the high seas fisheries out of action.

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## NATIONAL RIVERS AUTHORITY - RESEARCH AND DEVELOPMENT REVIEW

(Jeremy Read)

A review of the NRA's Fisheries Research and Development programme, which I attended as the representative of the Atlantic Salmon Trust, was held on 1 November. In the event, I felt somewhat superfluous; the Trust was already very strongly in evidence. Two major items on the programme were under the charge of stalwart supporters. David Le Cren presented the results of a review that he had undertaken for the NRA of its past projects, with the lessons learned and recommendations for future safeguards, and David Solomon chaired the afternoon discussion period.

Professor Ron Edwards opened the proceedings with a typically robust assertion of two personal causes. He suggested that fisheries research was too fish-centred, and that it needed to take account of the environment and, particularly, of the human, social and economic aspects of fisheries management. He also felt that too much research had a short term "tactical" base, and there was a need for more complementary longer-looking strategic approach.

Viscount Mills, who is the Commissioner for the Fisheries element of the NRA's R&D programme, described the three topics under which it is framed. These are:

Monitoring of the Fisheries resource
(*How the NRA assesses the level of stocks*)

Assessing and Modelling Biological and Environmental Factors
(*What is affecting these stocks*)

Fisheries Management (*How to improve it*)

He described the principles employed for selecting research projects, and gave a number of examples of work with both short and long term potential results.

Dr. Nigel Milner spoke on the development of an integrated science programme. He acknowledged the distinction between developing the application of current best practice, in operational support of day-to-day management, and the need for research to improve techniques, but he emphasised that there were many common elements. He explained that most operational work was done in-house, whereas the longer term R&D tended to be contracted out. He foresaw a growth in the number of studies carried out on a collaborative basis (which offers opportunity for the involvement of the Trust).

David Le Cren outlined the results of his detailed examination of projects conducted by the NRA. He drew a number of lessons, which included:

Projects should not be too ambitious.
Their objectives must be well defined.

Contractor experience needs very careful assessment, especially in their ability to draw conclusions from their work.

He questioned a number of points:

Was fisheries science too isolated?

Did not the high expenditure on enforcement justify more R&D support?

Was the R&D proportion of the budget (5%) adequate?

This was followed by a presentation on a typical project, in which the methods of assessment of fish stocks had been examined. This had shown ways in which selection of the frequency and methods of stock survey could produce a clearer indication of trends, at a lower cost in the deployment of fish counting teams.

David Jordan, Head of Fisheries, then set out a robust assessment of the relationship between the research function and those whom it supports. He compared the integral need for research, with the requirement for it to be practical, in all timescales. In the future, he looked to improvements in the setting of priorities, and in the overall content of the programme, including better integration of local operational work carried out by regions. He maintained the need for the NRA to support a measure of basic research, and confirmed the approach to more collaborative work, and more interaction and co-operation with fisheries science in Europe.

A lively discussion period, in which time ran out before the enthusiasm of the participants, ranged over a variety of subjects. These included the need for:

assessments of adequate stock levels to take account of recreational fishing requirements.

methods of wider public involvement in the development and implementation of the research programme.

better understanding of economic aspects.

Analysis of the impact of land use and the effect of government improvement programmes.

better use of catch statistics

and, significantly, better exploitation of the results of research - "selling the product".

The meeting served a thoroughly worthwhile purpose in explaining to a diverse audience the principles and conduct of the NRA fisheries research programme, and in exposing the managers to the reactions of a broad group of people with scientific, management and sporting fishery interests. It should be a regular event.

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**South Western Region**

The principal event was the decision to merge the South West and Wessex Regions into new South Western Region and to reorganise the structure. For fisheries, this means that a small Regional team will deal with policies, strategic planning and co-ordination, with four areas each having teams dedicated to local operations at the catchment level.

Monitoring, catchment improvement activities and enforcement have all continued. A survey of the River Yeo in Somerset showed a considerable improvement in fish stocks over a previous survey as a result of habitat improvement. The big-boom electrofishing boat was used satisfactorily on the River Bristol Avon but on the River Frome survey problems were experienced due to high flows. Juvenile stock assessment using observations by a diver was tested on the River Piddle and studies on fish habitat preferences using the IFIM technique also took place on that river. Gravel cleaning and habitat improvement work was carried out on the Rivers Fal, Tamar, Taw, Torridge, Dart, Teign, Piddle, Allen and Hampshire Avon. An unconventional tidal flap was installed on the River Averill to allow the upstream migration of sea trout on rising tides.

Salmon stocks on the River Hampshire Avon continue to be low. Work was done to introduce measures to limit exploitation from 1994 onwards, and an agreement was reached with the Wessex Salmon Association for it to carry out limited artificial rearing in support of the NRA's measures to improve habitat.

A High Court decision in August 1993 that multimonofilament nets for salmon fishing were illegal resulted in an agreement on phasing out such material for the beginning of the 1995 season.

Fisheries investigations at Roadford, a major water resource development scheme, included radio-tracking salmon in the Rivers Tamar, Tavy, Taw and Torridge as well as assessments of redd and juvenile densities in the River Lyd, a tributary of the River Tamar.

Investigations to assess the effect of low flows were undertaken with the objective of recommending alleviation measures on the Rivers Tavy, Taw, Bray and Meavy.

A fish counter was installed at Restormel on the River Fowey and work commenced on validation of data from the counter at Gunnislake on the River Tamar.

### Thames

Progress has continued in a number of important areas of the Thames Salmon Rehabilitation Scheme. The regular run, established since the early 1980's, has been maintained with the record return in 1993 being an estimated 500 fish.

The first phase of the fish pass construction programme has the aim of providing fish pass facilities downstream of Reading. Seventeen passes have now been constructed with the remaining five due to be completed by 1996.

The rehabilitation scheme has now been underway for fifteen years and a review of progress and potential future strategy is currently being undertaken.

### Northumbria and Yorkshire

1993/94 has resulted in the installation of four fish counters in the Region, two on the River Coquet which became operational in June and August 1993, providing very encouraging results after the first year of operation. Two further counters on the River Wear, at Stanhope and Durham, have also been installed. The counter at Stanhope became operational in April 1994 and the one at Durham is currently undergoing validation trials.

In addition, the inclusion of a fish counter in the pass on the Tees Barrage should provide some invaluable information in the coming years as the fishery improves.

Smolt traps have been run on the Rivers Coquet, Wear and Esk in 1994, with very encouraging numbers of smolts being caught and microtagged. The River Wear trap recorded the highest number of salmon smolts in its ten year history being caught this year with in excess of 15,000 tagged.

Large numbers of big salmon have been observed in the Esk this year towards the end of the season. A number of fish have also been taken and returned in the River Wharfe, a tributary of the River Ouse.

### Welsh Region

The exploitation of salmon and sea trout by nets and fixed engines in tidal waters is currently under review. The majority of these instruments are regulated by Net Limitation Orders which determine the number and location of instruments that are authorised to fish in the public fishery, ie. coastal waters. Under statute the Orders must be reviewed at least every ten years.

Key points in the current review include:

- recommendations based on the objective of better fisheries management, including the conservation of fisheries;

- mixed stock fisheries will be phased out at the earliest opportunity consistent with minimising hardship to existing licence holders;

- uncommon or unique forms of fishing will receive due consideration;

- the use of socio-economic values of the rod and net fisheries have not been taken into account.

For the first time in England and Wales the assessment of salmon spawning targets is being used alongside more traditional data to guide exploitation levels.

The NRA's proposals may be subject to a public inquiry and it is anticipated that comprehensive new regulations will come into operation for the 1996 fishing season.

The Region's three spring salmon fisheries, the Wye, Usk and Dee, have experienced a dramatic downturn in catches over the last two decades in common with many other fisheries in the UK.

An ameliorative report on this issue was published by the Region in 1992, entitled "A Review of Factors Affecting the Abundance and Catch of Spring Salmon from the River Wye and Elsewhere, and Proposals for Stock Maintenance and Enforcement". As a result of this report a number of comprehensive measures are in hand. One of the principal measures proposed and partially confirmed by the Secretary of State for Wales is a package of restrictions to reduce exploitation by the rod and net fisheries. Thus, the use of lures and baits will be restricted from 1st January next year and the season has been reduced on the Usk and Dee. The use of the gaff will be prohibited. Confirmation of restrictions on some net fisheries is awaited.

The rock tunnel on the left bank of the Conwy housing the pool and traverse fish pass has now been completed. In this first season 53 fish to date have been logged by the fish counter installed in the pass. At 50 metres, it is believed to be the longest of its kind in Britain and its completion opens up an extra 40% of the catchment which is projected to increase the run of salmon by 700.

Most recently, the development has received the British Construction Industries Award acknowledging the fact that this "green project" was undertaken in an environmentally sensitive area, ie. a SSSI situated in the Snowdonia National Park.
Chester Weir at the head of tide on the Welsh Dee has for thirty years been a site where attempts to monitor the runs of migratory fish have taken place. The site has a pool and traverse fish pass which formerly was monitored by a bank of resistivity fish counters. The site in recent years has been substantially revamped and now incorporates a traditional in-scale fish trap. Details of the Dee Stock Assessment Programme (DSAP) to date are reported in the third annual report, published in March 1994. The comprehensive programme incorporates trapping and floy tagging, microtagging, juvenile monitoring and the operation of an angler log book system.

It is now possible to generate run size estimates and exploitation rates by the rod and net fisheries for both salmon and sea trout.

The objective is to provide a "monitored river" generating long term data comparable to other North Atlantic monitored rivers.

The generation of "clean" energy has been fostered by the Energy Act 1989 in support of the Non Fossil Fuel obligation. The impact of generating hydropower at more than 200 sites in England and Wales is being investigated. Over thirty applications have been made for Wales.

Many of the schemes involve lengths of rivers accessible to migratory fish and it is essential therefore that flow regimes allow both upstream and downstream movement. Schemes are being assessed through the planning procedures of Local Authorities and the NRA's own system of authorisation of abstraction and impoundment licences. Models are now available which are capable of assessing the loss of wetted area as a consequence of decreased run off at various residual flows. Since salmon and sea trout are territorial an estimate of the expected decrease in fish population can be obtained from this figure.

The Wye Acoustic Counter is a current R&D programme which commenced in April and has the following objectives:

- to produce reliable data for stock management;
- to provide data on the impact of water resource schemes on the abundance and behaviour of salmon.

The programme is budgeted at £300K over a three year period and is based at Redbrook on the lower Wye.

The equipment has the potential to:

- enumerate upstream and downstream migrants;
- estimate size;
- provide patterns of daily/seasonal movements;
- provide behavioural data, swimming depth and speed;
- count smolts.

Despite the increased runs of salmon to Welsh rivers this season, an Abergavenny man ws prosecuted earlier this year for poaching on the River Tweed. The incident involved three men, two of whom escaped, leaving forty-one salmon worth £900, sixteen nets, a radio and a dingy. The Welshman's van, worth £4000, was confiscated and he was fined £500 by Sheriff James Paterson. There was extensive liaison between colleagues on the Tweed and Welsh Region. The defendant had previously been successfully prosecuted by the NRA.

This incident epitomises the need for effective intelligence on the hard core of the professional poachers operating throughout the UK. In consequence, the Region is in the second year of a national NRA trial, developing a computer based criminal intelligence system. This initiative emulates that of police forces and it is intended to assist the crime management approach adopted by many of them. Targeting increasingly scarce resources and the identification of the key activists and their means of disposal of poached fish is becoming essential.

**Severn Trent**

Whilst the catch from net and fixed engine fisheries on the River Severn was the lowest since records began, the rod fishery showed a slight improvement. The results from scale analysis indicated that, although grilse continue to dominate the catch there has been a slight upturn in the proportion of multi-sea winter fish in recent years. The vast majority of scales were supplied by the netsmen on the Severn Estuary and are not considered to be a representative sample. The number of scales being returned from rod fishermen has declined significantly in recent years with less than 10% of the total coming from anglers in 1993. In order to more fully understand the composition of the annual catch, the NRA would ask all anglers to return scales from as many fish caught as possible.

Two fish passes have been constructed over the last twelve months - one at Newnham on the River Rea and the other at Stokesay on the River Onny. These should open an additional 35km of spawning grounds in the Upper Severn and Teme catchments.

A fish pass, incorporating a trap is being constructed at Upper Lode in the lower reaches of the Severn. This is being constructed as part of investigations into the effects of inter-catchment water transfers on the estuary. As well as improving upstream migration during low flows, the trapping facilities will provide valuable data on the age composition of returning adults and on downstream migration of tagged smolts.

On the River Trent, a feasibility study is currently under way, investigating the opportunity for re-introducing salmon. The studies will be evaluating the use of tributaries in the River Dove catchment as spawning grounds, the degree of obstruction from the numerous weirs in the main river and the suitability of water quality for migrating adults.

**North West**

The current indications are that adult salmon return rates to the major salmonid rivers in the North West region of the NRA are very encouraging, the River Eden catchment being particularly productive. This season has seen the best documented spring run on record for the Eden. The River Caldew, which is one of the main tributaries of the Eden, is continuing to demonstrate an expanding salmon run. By the construction of fish passes on three weirs the river was re-opened to migratory fish in 1987 and the run, which is mainly of salmon, has increased progressively ever since. The results from the Holmehead trap show the largest salmon run to date with individual weights up to 23lb. This is particularly significant in view

of the fact that the major part of the run in the Caldew normally occurs during November to December.

The River Lune has produced one of this season's biggest rod and line captures, a 33lb salmon.

A resistivity fish counter has recently been installed and is currently being validated on the River Ribble at Waddow. The initial results indicate a counting efficiency of 95% for salmonids over 45cm in length. A trapping programme has also been initiated at this site.

**Southern**

The total adult salmon counts in 1994 are 44% lower on the Test and 62% lower on the Itchen compared to 1993. The year started with higher counts of multi-sea winter fish, but a very poor grilse run was evident.

Adult Fish Counter Results to end September

| | NURSING MILL | | LITTLE TEST | | GATERS MILL | |
|---|---|---|---|---|---|---|
| | Up | Down | Up | Down | Up | Down |
| Mar | 2 | 8 | 2 | 0 | 2 | 0 |
| April | 12 | 14 | 5 | 2 | 2 | 0 |
| May | 23 | 5 | 4 | 1 | 7 | 0 |
| June | 111 | 21 | 12 | 6 | 29 | 1 |
| July | 77 | 27 | 33 | 9 | 58 | 0 |
| August | 26 | 19 | 56 | 43 | 32 | 1 |
| Sept | 71 | 12 | 28 | 7 | 18 | 2 |
| TOTAL | 322 | 106 | 140 | 68 | 148 | 4 |

Catches

About 230 salmon are reported taken from the Test. Many of these fish have been taken below the counters. After an encouraging start with multi-sea winter fish, catches reflected a poor grilse run and poor angling conditions in July.
About 170 salmon have been taken on the Itchen, but again catches and counts follow a similar pattern to the Test.

Apart from the legally required individual licence holders' returns to be made centrally, a local collation of catches will be made in November after the end of the sea trout season. This collation will take note of those fish retained for brood stock and returned alive to the river.

Radio Tracking

Woodmill Pool on the River Itchen was regularly netted for scientific purposes by the NRA. All were returned alive, and 41 salmon have been radio-tagged and released. 12 fish were tagged on the Test, 3 in the tideway.

Stocking

Approximately 40,000 reared parr have been microtagged at Lower Brook. All of these fish have now been stocked to the river. The Region is undertaking post-stocking monitoring throughout the winter.

Salmon have been transported live to Lower Brook where they are being held for broodstock, having been captured on rod and line. There were some mortalities, probably due to the stress of capture and transfer, but currently 61 have survived.

Enforcement

There have been numerous reports of estuary netting, which have been investigated, together with frequent shore and boat patrols. The netsmen inspected have been fishing legally for sea fish and have not infringed legislation which the NRA can enforce, apart from one incident involving an illegally placed fixed net. The lack of evidence of salmon captures strongly suggests that there are few grilse in the estuaries waiting to enter the rivers.

There have been no reported snatching incidents.

Cormorants

NRA Southern are monitoring cormorant roosts with a view to quantifying the number of microtags occurring in cormorant droppings. The data will give vital information on the predation of the stocked parr.

* * * * *

## DEE SALMON CONSERVATION MEASURES AGREED

The Dee District Salmon Fishery Board met on November 22nd to finalise fishing regimes for the coming season and beyond.

Commenting after the meeting Lt.Col. Robert Campbell said: "The board heard from scientists at the SOAFD Freshwater Fisheries Laboratory that the numbers of salmon entering the Girnock and Baddoch burns - the research tributaries of the Dee - had been better than it was feared would be the case from the fish counts at the Whitley fish counter.

"They are however still at a sub-optimal level, which means that conservation measures are still essential. The increased numbers are probably due to a lower than anticipated count accuracy, but were also helped by the voluntary restraint of anglers putting back all coloured fish caught in the latter part of last season, as requested by the board.

"This encouraging news does not alter the seriousness of the situation in relation to stocks of early running spring salmon and fishing mortality must continue to be reduced.

"To achieve statutorily enforceable restrictions of both season and fishing methods requires lengthy consultation and official appraisal and includes a mandatory 28-day period of advertising the proposed conservation measures.

"This means that the widely-agreed measures are unlikely to be statutorily enforceable in time for the start of the 1995 season and the board is therefore looking to all proprietors and fishermen to ensure that the scientifically-endorsed proposals, essential for the recovery of spring salmon, are rigorously supported and applied by all."

The proposals for which applications are being processed are as follows:

- Rod season to start on March 1, 1966, instead of February 1
- Rod season below Banchory to end on October 15, instead of September 30.
- All baits and lures apart from fly-fishing flies and lures to be banned. A dispensation will be sought for certified disabled anglers.
- Curtailment of the netting season, date to be finalised.

The following additional important conservation measures, already agreed by 90% of the rod proprietors, are being voluntarily applied in the 1995 season.

Above, or west, of Aboyne Bridge

- Rod season to start on March 1.
- Fly-fishing only to be permitted throughout the season.
- From opening of the season to June 30, one fish per rod/week only may be killed, but no fish longer than 33 inches may be killed (that is three sea winter salmon).
- From July 1 to end of season, in addition to one fish per rod/week, any clean/silver grilse of less than 24 inches (61 cms) may be killed.
- No red or coloured fish may be killed.

From Aboyne Bridge down to the estuary:

- Rod season to start on March 1
- Fly fishing only permitted throughout the season
- From opening of the season to June 30 only one fish per rod/week may be killed, but no fish longer than 33 inches (84cms) may be killed.
- From July 1 to end of season any number of clean silver fish and of any size may be killed.
- No red or coloured fish may be killed.

It should be noted the size limit of 33 inches (84cms) is designed to protect stocks of large three sea winter salmon, which are even more threatened than two sea winter fish.

"The above measures have been scientifically endorsed as measures contributing to the conservation of spring salmon in the Dee, without curtailing angling unnecessarily," explained Col. Campbell. "No measure that has not been evaluated as beneficial has been included, which is why there are separate proposals for the upper and lower parts of the river."

For the Dee Salmon Fishing Improvement Association, Michael Bruce commented: "While the fact that the numbers are greater is certainly heartening, it is important to note that the numbers of spring fish spawning are still inadequate to maximise smolt production from the river. This is the principal aim of the Dee Salmon Action Plan which was launched earlier this year.

"It is therefore as important as ever that the conservation measures are made to work. Indeed the better than anticipated spawning holds out some hope of speeding up the recovery of the spring stock - but only if everyone works to protect the fish that return to the river next spring."

Urging anglers to adopt the code, Andrew Bradford of the Dee Salmon Fishng Improvement Association, said he believes that catch-and-release is the way to go in the future.. "In view of the dwindling spring stocks in many of our rivers I firmly believe that catch-and-release is the way forward," he says. The importance is underlined by the fact that, for every spring run hen salmon that this policy saves, there is potential for it to reach the spawning grounds and produce as many as 5,000 eggs.

"Returning the fish to the river shouldn't interfere with the pleasure of fishing. The pleasure comes from the total experience and the reasonable expectation of catching a fish. Actually killing the salmon surely can't be the main pleasure? The experience of Canadian and American rivers and the Little Gruinard in the Highlands suggests that catch-and-release is popular with those who genuinely enjoy fishing and that they take pride in returning their fish to the wild."

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## ATLANTIC SALMON POPULATION MANAGEMENT: MAXIMISING PROGENY NUMBERS FROM NATURAL AND ARTIFICIAL SPAWNING

(John Webb, Marine Laboratory, Aberdeen)

In June (1994) Progress Report, I reported on the progress of the new study being conducted into the management of salmon populations. Eggs had been incubated *in situ* in a new, cheap and low technology system within a headwater spawning stream of the Aberdeenshire Dee. The eggs were then subsequently stocked out in late April of this year. Thirty-three thousand eggs were stocked out in family groups of ca. 3,000 throughout a 4km length of the upper reaches of the tributary - in an area currently unused by adult salmon at spawning. Family groups of eggs were placed in especially designed baskets, at intervals of 500-600m along the length of the study area. The eggs began to hatch in late May, and by late June the first of the young fry began to emerge and disperse. Inspection of the hatching baskets for dead eggs in early July suggested a mortality rate of less than 1% between the time of stocking and hatch. Consequently, overall mortality from fertilisation in November 1993 to hatch in May of this year has been estimated at being ca. 2.5% - an exceptionally low figure.

In contrast to the upper reaches of the study burn, spawning salmon have free and unrestricted access to the lower reaches. However, within the area utilised by the 26 females released above a permanent trap situated near the stream's mouth, the distribution of spawning was uneven (as shown by redd-counting) - with some areas of the stream being understocked with eggs. Consequently, the ca. 17,000 excess eggs that had not been used as part of the experimental stocking experiment further upstream were used to 'fill' the remaining spaces in the juvenile rearing habitat in the lower reaches.

Two electrofishing surveys have since been carried out. The first was conducted in mid-July. This brief survey indicated that the fry were well distributed throughout the available habitat - over distances downstream of up to 600m from their respective stocking sites. Migration upstream was, however, more limited with movements of less than 50m being typical. A second and more detailed study was undertaken in September. Fry were found in nearly all the areas surveyed with densities in some areas being as high as 1 per square metre of the stream bed. Growth among the stocked fish appeared to be excellent - a result of the rich feeding in the burn (due to limestone being naturally present) and the lack of competition from other classes of parr.

These provisional results suggest that the development and use of a cheap and low technology in situ incubation system can be used effectively in the management of a high altitude tributary population (1,000-2,000ft). During the course of this new research project, the techniques used have probably increased the juvenile rearing capacity of the stream by 30-50% of normal - by effectively extending the range of the habitat usage by young salmon throughout the stream's watercourse. Further, by aritifically filling the 'gaps' in the lower area of the burn used by adult spawners, we have attempted to promote a more efficient use of available rearing habitat throughout the whole burn.

**DNA studies: interfamily performance of salmon fry in their first summer of growth and distribution**

During the course of the electrofishing surveys carried out this autumn, samples were taken for DNA analysis. Laboratory screening of the sampled material will begin this winter. It is hoped that by using the latest DNA techniques, we will for the first time be able to identify each fry - and their corresponding mother and father. And by knowing the stocking point of each family of eggs within the stream we hope to look at the patterns of dispersal of different families of fish. This will, in turn, allow us to compare the performance (ie. prevalence, growth and distribution) of under-yearling fish (0-group) derived from different families at the end of their first summers growth.

The first results of this new work should be available for the next Progress Report - to be published in June of next year.

**Publications and Presentations**

In early October, I presented a paper entitled 'The behaviour of adult salmon in the Aberdeenshire Dee: Patterns of migration, distribution and spawning' at a one day conference organised by the Aberdeen Research Consortium and the Dee Salmon Improvement Association. The theme of the meeting was 'Salmon in the Dee catchment - a scientific basis for management' and was held at Glen Tanar house near Aboyne.

Later that month, I presented a short lecture entitled 'Escaped farmed salmon in Scottish waters' at the annual Scottish Marine Group meeting at Stirling University.

A paper entitled 'Escaped Farmed Salmon in Commercial Net catches in Scottish Coastal waters: Identification and Prevalence' has recently been published in *The Salmon Net Magazine* (Number XXV), September 1994, pages 28-32.

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## AQUATIC PREDATORS AND THEIR PREY

International Conference Report
(by John Webb, Marine Laboratory, Aberdeen)

An International meeting on aquatic predators and their prey organised by The Royal Society of Edinburgh and the SOAFD Marine Laboratory, was held over three days at the University of Aberdeen. The conference was well attended, with over 120 delegates from all over the world. The meeting was sponsored in part by SOAFD, The European Commission Programme AIR, The Joint Nature Conservation Committee, The Scottish Association for Marine Science, The Atlantic Salmon Trust, Scottish Natural Heritage, The National Rivers Authority, The Trout and Salmon Association and the World Wide Fund for Nature.

The meeting was divided up into three main theme sessions. These were: Behavioural strategies of predators and prey, The role of predators in ecosystem structure and finally, Predators, prey and man.

A summary of some of those presentations that would perhaps be of most interest to readers of this Progress Report is as follows:

The first morning session of the meeting saw a detailed presentation by Dr. Kruuk of the Institute of Terrestrial Ecology on the costs and benefits of the feeding behaviour of otters. Though much of Dr, Kruuk's presentation concerned modelling, some interesting observations about otter feeding behaviour did emerge. Otters are now very common in Scotland - particularly on Deeside and the surrounding area. As aquatic predators, otters take mainly bottom feeding species, usually concentrating on prey items ranging from 7-10cm in length.

Feeding rate and average meal size is very dependent upon prevailing water temperatures - with maximum hunting activity being associated with the autumn and winter months. Interestingly, even quite small changes in prey availability can have very significant consequences for otters. Natural mortality is often highest in the spring, with levels as high as 42% being recorded in some years. Dr. Kruuk suggested that otters only take large adult salmon during special conditions - particularly when spawners move into shallow spawning streams in the autumn and winter months - a time when cold water temperatures necessitate a larger food intake by the predator.

The meeting also saw four papers on behaviour of the two species of seals found in UK waters. The first paper by Bernie McConnell was based on studies carried out by scientists of the Sea Mammal Research unit, Cambridge. The research has focused on the behaviour of radio-tagged grey seals that live on the Farne Islands of the NE coast of Northumbria. Most of the movements recorded away from the islands were relatively small scale excursions of 20-30km, with some longer range movements - particularly to the NE. Larger movements away from the colony were more variable in both the maximum distance covered and length of time that seals remained away from their 'home' islands. Movements to other well known colonies in the Moray Firth and off St. Andrews in the Firth of Forth were also recorded.

Feeding studies indicated that the principal prey items in the diet of Farne Island seals were sandeels (at 50%) and gadoids (fish from the cod family at 50%). Foraging locations were clustered in areas between 50 and 80m deep with deep sand containing 5-30% gravel - areas preferred by sandeels.

The second presentation on seals from the Cambridge unit was given by Dr. D. Thompson who described the swimming and foraging behaviour of grey and harbour (Common) seals. The research was carried out in coastal waters in Scotland and at Froan in Norway.

Current estimates for the UK populations of these two species are about 100,000 grey seals (half the world population) and 30-50,000 commons. The grey seal is typically the larger of the two species, with males reaching 300kg and females 150kg in weight. The smaller, common seals are usually about half these sizes. Dr. Thompson described the very detailed studies that had been undertaken using radio and acoustic tracking on the behaviour of members of both species. Individual prey capture events were recorded by the ingenious use of stomach temperature monitoring - the temperature falling for a time after ingestion. All the tracked individuals foraged benthically (ie. near or on the sea-bed) throughout the duration of the study. Foraging location was, however, highly variable in both species, ranging from near-shore kelp beds to off-shore areas.

Grey seals were only seen to forage in relatively shallow water ($<70$m) and not at depths greater than 100m. Grey seals showed a particularly pronounced 'spiked' diving profile - interspersed with periods of normal swimming at speeds of 1.2-2m sec-1. When foraging, however, Grey seals change their behaviour - shifting to longer dives and slower swimming speeds. They may also often remain stationary often for periods of 10-20 minutes - a type of behaviour often associated with 'ambush' tactics.

In contrast, common seals despite usually diving to greater depths than grey seals, tend to remain submerged for shorter periods and swim more rapidly (up to 3.8m sec-1) nearly all of the time.

The differences in the diving behaviour and swimming speeds of the two species may have been linked to the prey availability.

On the subject of diet, Dr. Thompson suggested that both species take a wide range of prey species - and are very opportunistic by nature. Indeed, there may in fact be a great deal of overlap in the diets of members of both groups and therefore potential for competition.

In another presentation, Dr. P. Thompson of the University of Aberdeen described some of the results of a joint study with scientists at the SOAFD Marine Laboratory on the diet and behaviour of common seals in the Moray Firth (Scotland). These seals were described as 'catholic' in their prey preferences. Changes in the availability of various prey species results in the seals switching their diets accordingly.

Variations in the spatial distribution and abundance of sandeels and cluepeids (fish from the herring family) within different areas of the Firth were reflected in the positions of the main 'haulout' sites used by the seals. Studies undertaken in the winters of 1988, 1989, 1990 and 1993 indicated marked changes in clupeid distribution in the Firth - changes that were followed by the relocation of the haulout positions of harbour seals.

In the question and answer session that followed his presentations, Dr. Thompson was asked whether he thought that salmon constituted a significant proportion of the harbour seals diet in the Moray Firth. Dr. Thompson replied that there was very little evidence to suggest that they did. However, he did comment that although salmon were probably unimportant to the seals, seals may be important to the salmon!

In the final seal orientated paper of the meeting, Sophie des Clers of Imperial College, London described the results of a WWF sponsored research project on seals and fishery interactions on the Firth of Clyde (Scotland). During 1993, the interaction between seals and fisheries was estimated through a study of seal numbers, distribution and diet and the prevalence of the parasitic sealworm among the resident cod stocks.

The research team concluded that the numbers of common seals in the Firth of Clyde have not changed noticeably over the years and may be limited by a lack of suitable hauling out habitat. Predation by seals in the Clyde appears concentrated on prey less than 30cm long and therefore may indeed slightly compete with the commercial herring and cod fisheries in the area. However, most 'competition' is with the by-catches discards from the prawn fishery.

On a different theme, Dr. Peter Wright of the SOAFD Marine Laboratory in Aberdeen presented a talk entitled 'Is there a conflict between sandeel fisheries and seabirds?' In a detailed presentation, Dr. Wright outlined the main concerns about the potential impacts of sandeel harvesting on prey availability to sea-birds and other species and some of the research that has recently been undertaken to address the main issues. The problems of sandeel stock

assessment were highlighted. In some areas of the North sea, the commercial sandeel fishery extracts up to 1600 tonnes of sandeels per square kilometre. This level of exploitation can only be sustained with large scale immigration of fish from other areas. Dr. Wright therefore acknowledged that there were at present serious problems in attempting to interpret local stock levels of sandeels without a better knowledge of immigration processes. Some studies are therefore hindered by a lack of detailed knowledge of sandeel population structure.

When summing up his presentation, Dr. Wright stated that despite there being no evidence that the sandeel fishery was responsible for changes in the availability to seabirds around Shetland, the possibility that sandeel fisheries may effect prey availability to sea-birds (and other species?) in other areas of the North sea, where fishing activity is often more intense, could not be dismissed. A detailed paper by Dr. Wright on this whole area of research can be found in the AST Blue Book published earlier this year entitled "Problems with sea trout and salmon in the Western Highlands". Copies are available in the AST office, price £3.00.

Dr. John Armstrong of the Freshwater Fisheries Laboratory at Pitlochry described some of the field research and modelling that has been carried out on the response of juvenile salmon populations to predation. Existing data concerning the population dynamics of salmon were combined to develop a simple model on the likely impacts of various predators. One group of predators of particular interest are the saw-bill (fish-eating) ducks - principally the red-breasted merganser and goosander.

Recent research carried out on the Aberdeenshire Dee and North Esk rivers has suggested that these avian predators take parr and smolts within a relatively small size range. Parr and smolt size is age related. Consequently, it was proposed that sawbill ducks preferentially select smaller juvenile salmon from particular freshwater age classes returning to a river over the season. The model used suggests that smaller smolts and migratory parr known to generate early running salmon are particularly vulnerable to sawbill predation.

Another common piscivorous bird on rivers and lakes in the UK is the cormorant. Overall in the UK, cormorant numbers have increased from about 37,000 pairs in the mid-1960's to an overwintering population of about 120,000 today.

Mr. John Davis of Liverpool John Moores University described the findings of some recent NRA and Liverpool University funded research into the effect of cormorants on freshwater fisheries. Data was presented on the relationship between cormorant diet and angling catches on the River Ribble in NW England. Increased concern over levels of cormorants predation have coincided with an increase in their population size and rise in the number of birds moving in from coastal to inland sites. On the lower Ribble, studies have shown that among non breeding birds, about 50% of the prey consumed were coarse fish. The remainder were flatfish and eels. Prey size was related to bill length and the median size of prey was between 15 and 22cm in length. It was therefore concluded that cormorants and anglers did take similar sizes of fish and there was grounds for a conflict of interest.

It is perhaps disappointing that a study of this kind was not carried out on a length of the river that sustained a healthy population of salmon and trout.

The meeting also heard presentations on a wide range of other topics, which among others, included - Pike and perch predation in the River Thames, hunting techniques of Norwegian killer whales, oystercatcher predation on mussel beds and the influence of fish farming on grey heron breeding performance.

In his summing up, Professor George Dunnet of Aberdeen University suggested that diet alone was a minimum indicator of the true impact of a predator and proposed that a wholly wider knowledge of the behaviour and an understanding of the natural history of predators was necessary to form a true picture. For example, predator impact may also include damage to numbers of prey that are not actually consumed. Professor Dunnet then touched on the more contentious subject of predator control, and suggested that in some cases it will probably be impossible to provide the level of proof required by those who issue consent for a reduction in predator numbers. Finally, he thanked the organisers and sponsors for their efforts and making the meeting such a success.

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## DEADLIER THAN THE MALE.

### Do women *really* make more successful salmon anglers than men, and can analysis of catch records provide an answer?

(Gordon W. Smith, SOAFD Marine Laboratory, Aberdeen and Robert Laughton, Spey District Fishery Board, Forres)

*The Legacy of Miss Georgina Ballantine*

The 64lb fish caught by Georgina Ballantine on the 7th of October 1922 was the largest recorded Atlantic Salmon (*Salmo salar L.*) taken by rod and line in the UK. Women anglers also hold the record for the largest Atlantic salmon caught on the fly in Britain and the largest spring fish caught by rod and line (Paterson and Behan, 1990). But how are we to interpret the fact that these three records are all held by women? Is their success simply a confirmation of what many women anglers have suspected for a long time ... that female anglers are generally superior to their male counterparts. Or is there no more to this story than an interesting coincidental statistical quirk?

The question has exercised the minds of many over the years, has provided inspiration for books, for articles and letters in both the angling press and newspapers in general. At least one entire television programme has been devoted to an exploration of the subject. In a recent book, Paterson and Behan (1990) outlined one side of the argument most succinctly when they stated that "It is a commonplace that women are good anglers and catch bigger and more salmon than men". However, submitting this proposition to rigorous test is no easy matter.

This article attempts the task using two approaches, each with their own particular strengths and weaknesses,

- analysis of *ad hoc* lists of outstandingly large Atlantic salmon taken by rod and line
- analysis of more detailed records of Atlantic salmon catches kept by the proprietors of a particular estate.

*Ad hoc lists of salmon catches*

The first problem encountered in an analysis of such lists is finding them to analyse in the first place. There appear to be no readily available definitive lists of the largest salmon taken by rod and line. To construct one from the records of District Fishery Boards, or angling press would be a massive undertaking in itself. A more fundamental problem in such an approach, however, is that analysis of already existing, incomplete lists, suggests that such work is unlikely to provide an unambiguous answer to the question of the relative success rates of male and female anglers in any case.

For example, "Where to Fish" (Eaton, 1957) lists some notable British salmon taken by rod and line, all of which weighed over 56lbs (25.2kg). The sex of 15 of the successful anglers could be determined unambiguously from the list, and of these 3 (20%) were women. But this still leaves us with a fundamental problem. To be able to state whether 3 female anglers is an unexpectedly high number to appear on the list, we need some indication of what proportion should be 'expected' assuming no particular bias in angling success. For example, either the proportion of the total angling effort associated with women, or the proportion of the total salmon catch accounted for by women over the period covered by the records is required. In the absence of such data, and given that such data are very unlikely ever to become readily available, it is doubtful whether this approach will ever provide a definitive test for the proposition "that women ... catch bigger and more salmon than men".

*Detailed catch records from individual estates*

An alternative approach is to study in detail the catch records from particular estates. The precise limitations to such an exercise are in part determined by what data have been collected over the years. In addition, being based on the data from a single estate, the extent to which any findings are generally applicable may be open to question.

Smith and Laughton (1994) analysed the catch records for 22 years from one estate on the River Spey. The names of all anglers catching salmon on each day of the angling season were recorded together with the weight of each fish taken. No record of unsuccessful anglers nor of the number of hours for which each angler fished was available. The analysis did indicate that women anglers accounted for a relatively high proportion of the anglers whose sex could be identified (22.5%). Over the study period 245 salmon which weighed over 9kg (20lb) were taken. The female anglers' share of these fish was no greater than their share of the total catch

of salmon over the study. Restricting the analysis to the 39 fish weighing more than 11.4kg (25lb) similarly gave no indication that female anglers enjoyed a disproportionately high success rate for the largest salmon on record.

*Deadlier than the male?*

Little rigorous analysis of the relative success rates of male and female anglers has been published. The work which does exist, is based on a severely limited number of data sets and includes few of the very largest salmon taken over the years. So far, the results do suggest that there is no evidence that female anglers enjoy a disproportionately higher chance of catching large salmon compared to their male counterparts and that general statements on gender bias in the success of salmon anglers should be treated with caution.

*Acknoweldgements*

We are grateful to Tony Hawkins, Dick Shelton and Alastair Johnstone who all commented on an earlier draft of this article and the typists at the Marine Laboratory who typed the final manuscript.

*References*

Eaton, R.C. (ed.)(1957) Where to Fish 1957-1958. The Field Guide to the Fishing in Rivers and Lakes. Harmsworth Press, London.

Paterson W. & Behan P. (1990). Salmon and Women, the Feminine Angle. H.F. & G. Witherby, London, 176pp.

Smith G.W. & Laughton R. (1993). Relationship between rod catches and the distribution of adult Atlantic salmon, *Salmo salar L.*, during the initial phase of riverine migration. *Aquaculture and Fisheries Management* **24**, 681-683.

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## BLADNOCH SALMON RADIO TRACKING PROGRAM 1994: SUMMARY OF PROVISIONAL RESULTS

(Ewan Campbell-Lendrum, AERC, Lochmaben and Dr. Alastair Stephen, WGFT, Kirkcowan)

Recent work by the West Galloway Fisheries Trust (WGFT) has shown that some of the headwaters of the River Bladnoch, in South West Scotland, undergo acid flushes of considerable duration. The Trust has also shown that the survival rates of eggs and young salmon in these areas are extremely poor. Since these headwaters were thought to be the

chosen spawning areas of the once common but now rare spring salmon these findings were of particular concern.
In response to this concern WGFT and the Applied Environmental Research Centre Ltd. (AERC), who provided the equipment and necessary expertise, instigated a programme to radio tag spring and summer fish. Once fish were tagged it was planned that they would be followed to their chosen spawning beds. It was hoped that by tagging 30 spring and 30 summer salmon/grilse, the areas used by each component of the population could be characterised. Conformation of the main spawning areas for each component is seen as the first step towards understanding whether acidity or habitat degradation (or both) have contributed to their decline in the river. In addition to this primary objective it was hoped that much useful additional information could be obtained (e.g. insights into what triggers salmon on the Bladnoch to migrate, and into exploitation rates).

Unfortunately weather and the current rarity of spring salmon conspired against the project and the first fish were not caught and tagged until 12th May 1994. However, despite this set back 63 salmon had been tagged by the middle of October.

The results obtained to date have been striking. Although salmon were captured and released approximately 5.5 km upstream from the mouth of the river, a high proportion (30%) left the river, without spawning, soon after release. It is assumed that these were strays from neighbouring rivers. Of these fish one was caught in the Net and Coble fishery within the River Cree and a second was detected during a search of the lower reaches of the Cree, using tracking equipment. It is likely that other fish have entered the Cree and the Solway Firth's other salmon rivers. Similar rates of straying into the lower reaches of rivers have been observed in other studies although it is thought that all but a few of these strays eventually find and spawn in their natal rivers.

The most interesting information obtained so far has been on the chosen spawning area of those fish remaining within the river. Approximately 20 km from its mouth the Bladnoch is joined by its major tributary, the Tarff, in which water quality is thought to be better. As of 22nd November 25 salmon had been tracked to the approximate locations of their spawning beds (some tagged fish were observed on the redds). It is thought that 13 salmon spawned in the Tarff and its tributaries, whilst three entered the Upper Bladnoch (above the confluence of the Bladnoch and the Tarff). Two of these fish entered the Barhoise Burn and were captured in and released upstream of the WGFT brood stock trap. The Barhoise Burn enters the Bladnoch approximately 1 km upstream of the Tarff/Bladnoch confluence and is not thought to suffer from poor water quality. The remaining fish seems to have spawned in the Upper Bladnoch.

Of over 25 radio tagged salmon spawning in the Bladnoch system only one is thought to have spawned in the Upper Bladnoch, despite this river accounting for approximately 50% of the catchment and a substantial proportion of the available spawning area. The survival rate of young salmon in the Upper Bladnoch has previously been shown to be extremely poor. Althouggh this tracking project has only followed a small proportion of the fish in the catchment, the results obtained to date appear to indicate that the Upper Bladnoch plays only a minor part in sustaining the salmon populations of the catchment as a whole.

This study shows how information of direct relevance and great value to fisheries managers can be obtained from a radio tracking programme of this size. Similar studies would be of use to fisheries interests on many other rivers and on the basis of AERC's recent experiences radio tagging studies could be extended to cover sea trout and possibly other species. It is hoped that sufficient funds can be obtained to continue the study in 1995 on the River Cree and/or River Bladnoch.

This project would not have been possible without the generosity of the various companies, fisheries owners and other organisations (including the AST) who provided help in kind and all the finance for the study in 1994 and have offered further assistance in 1995. Finally it should be noted that a large amount of the projects success has been due to the impressive efforts to locate fish by Callum Sinclair and Jamie Ribbens and the donation of fish by Michael McNeill.

Much of the data from the project have yet to be analysed and a final report will be produced in early 1995 in which we plan to present more detailed results including analysis of triggers to fish movement and exploitation by various methods. AERC or WGFT would be pleased to discuss these results and the technical aspects of the study with interested individuals and organisations.

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## STOCK TRANSFERS - HOME GROWN IS BEST

(Dr. E. Verspoor)

Stocking of additional eggs or fish is widely used in an attempt to supplement runs of Atlantic salmon. In taking this approach, an important question is where the eggs or fish will come from. The availability and the disease status of potential stock are always given consideration but, in general, any convenient source of stock is considered to be adequate. Beyond this, where choice exists, preference may be given to eggs from a population that shows desirable traits, like large size or early running.

Recent advances in the scientific understanding of how fish grow and develop, and how they are organised into distinct groups of fish, i.e. populations, make it clear that this simple approach to stocking is not likely to be the most productive. Indeed, the success of a stocking programme may be critically dependent on the origin of the fish used. The stocking of fish from an inappropriate source will sometimes prove less than worthwhile and may even harm the existing stock.

What then is the most appropriate source of salmon for a stocking programme? Where there is an existing stock or population, the answer is unequivocal - the best one is the one which is native to the river or tributary to be supplemented. This conclusion derives from the fact that, despite their many similarities, salmon populations inhabiting different rivers and tributaries are inherently different in ways that affect their survival in the local environments that they inhabit.

A salmon possesses in the order of 100,000 different pairs of genes, each with a unique function in the salmon's life. One of each pair of genes is of maternal and one of paternal origin, and both interact with other genes and with the environment to produce an adult salmon. At the same time, each gene of a pair is often different in ways which affect this interaction. When all salmon are considered, there may be anywhere from 2 to, say, 20 different variants of a gene. The result is that every salmon is genetically unique. This fact is easy to appreciate by considering that even with only 20 genes with two variant forms each, there are over 3 billion possible genetic combinations - with 21 genes this becomes over 10 billion, and so on such that the possible combinations for 100, let alone 100,000, genes are astronomical in number.

Just as every individual salmon is genetically unique, the populations formed of local groupings of salmon also differ. This comes about because the genetic make-up of individuals and of populations influences their survival and spawning success, and different combinations of gene variants are likely to do well under different environmental circumstances. As a result, for a given stream environment, some genetic types increase in number in the population found there, while less successful types decline in number.

This type of genetic adjustment to local conditions has been observed in Atlantic salmon populations for a gene known as MEP-2. This gene has two variant forms and their proportions among different river and tributary populations show a clear association with environmental temperature. However, while confirming the existence of genetic adjustment, the MEP-2 gene is only a small part of a highly complex genetic adaptation to local temperature which is likely to involve a large number of different genes.

Although environmental conditions may be quite similar in two different rivers, the combinations of gene variants chosen by nature in one population may well be different from those in another i.e. there are different genetic solutions to the same survival problems. Which solution is used depends on the overall environmental circumstances prevailing as well as what will be different. Because of this, a salmon population displaying a particular set of characteristics, for example, spring-running or low grilsing, in one river or tributary, may not display those same characteristics in another river or tributary.

In each environment, the proportions of different gene variants will evolve to produce the highest possible numbers of adaptive genetic combinations among offspring. As a consequence, the reproductive mixing of genetically different populations of salmon, by changing the proportions of gene variants in the local population, will reduce the numbers of adaptive genetic combinations among resulting offspring. In turn, this will lower the average numbers of offspring returning and spawning successfully. When mixing happens, even if it is only once, it will take a number of generations to return the genetic make-up of the population to its previous high level of genetic adjustment. Thus reductions in productivity may last for a number of generations.

In the wild, population mixing and the production of poor genetic combinations is minimized because nature has selected for salmon which home back to their natal streams to spawn. The result is that salmon return to environments in which their genetic make-up proved itself

successful and where they will find mates whose genetic make-ups have stood the same test. At the same time, the homing of salmon with tested and proven genes means they associate one generation to the next in locally adapted, reproductively separated populations. This separation is reinforced each generation and the resulting population structure contributes to the numbers and types of salmon in a river's run.

That salmon from different river systems belong to genetically and adaptively distinct populations is well supported by scientific evidence. It is also easy to accept intuitively. In contrast, while scientific studies show the same to be true within river systems, it is more difficult to envisage this being the case. In the absence of the clear physical separation of groups of salmon, the question of just how many populations there are and where the various populations start and stop becomes problematic. For example, tagging and genetic investigations demonstrate that salmon from the two Aberdeenshire Dee tributaries, the Baddoch and the Girnock, mix little or at all reproductively. As such they clearly belong to separate populations. On the other hand, salmon from each tributary may sometimes spawn in the water courses to which the tributaries connect and fish from these adjacent sections of the Dee may spawn in the Girnock and the Baddoch. Because of this, population boundaries are fuzzy and difficult to define. This would be true even if there was full documentation of where salmon within a river system were born and where they spawned. Thus for salmon within a river, while it is clear they are divided into distict populations, there is no easy way of identifying exactly how many populations exist or where they start and stop.

Given that salmon are divided into multiple, adaptively distinct populations, even within rivers, what are the implications for stock supplementation programmes? Firstly, it means that the best source of stocking material for a river or a tributary is its own stock. Its use will generate fish best suited to survive and reproduce there. In turn this will give the largest possible run of salmon. Secondly, mixing the local stock with that from elsewhere will almost inevitably lower productivity relative to that achievable with the local stock alone. The only possible exception to this would be if there had been genetic impoverishment of the local stock due to chronically low numbers of breeders. This would have to be numbers of in the order of 20 or less males (including early maturing parr) and females, a rare situation to find. Thirdly, it means that fish showing a particular characteristic in their own river when placed in another river will not necessarily show that same characteristic e.g. early running. Even if they do survive, the gene-environment interactions will be different causing salmon to develop different characteristics. Furthermore, these characteristics may not be suited to the new river and they may reduce reproductive success.

It is for these reasons that the transfer of salmon from one river system to another, or from one tributary to another, should not be considered except where no local population exists. Putting this policy into practice within a river system is, however, somewhat problematic given that populations within rivers are difficult to delineate. To take account of this, the best guideline is to take fish from the nearest location to that to be stocked. These fish will give the greatest chance of increasing the rivers run and pose the least threat to it when reproductive mixing occurs.

This approach does, however, pose a problem. Stocking is usually considered only where stocks are locally depleted. As a result no surplus fish will be available. However, the existing stock can form the basis for an enhancement programme by increasing egg to adult survival for those eggs which are produced. Taking this approach is perhaps logistically more difficult than using non-local stock but it will be offset by greater productivity in the long term.

The egg to adult survival can be increased most by reducing mortalities caused by starvation. Up to 70% of fry die in the wild during the first few months of life and much of this is a function of a shortage of food around the redds where the newly emerged fry are located. Redistribution of ova or fry, prior to this period, into other parts of the stream where there are few or no juveniles, or to new rearing environments in stream-side tanks (sometimes referred to as "satellite" tanks), can increase survival rates dramatically. Stream-side tanks use water piped from the stream and have supplemental feeding of fry. These are preferable to hatchery tanks as they are more natural and facilitate imprinting with respect to homing in adult fish.

For redistribution, eggs can be obtained form the artificial spawning of adults captured in the river in question, or by collecting of eyed eggs from natural redds. In either case, the eggs can then be cultured in hatcheries, or incubated in-stream in appropriately designed and secured containers, for later planting out in the stream or in satellite tanks. Successful methods for incubating large numbers of eggs in streams have been developed by Scottish Office and Atlantic Salmon Trust researchers.

This proposed approach to supplementing stocks of salmon avoids the introduction of non-local salmon into streams. Based as it is on the use of the salmon from the river or tributary to be enhanced, it will give the greatest gains to salmon runs in the medium to long term, if not the short term. Except where there is no existing stock, or genetic impoverishment can clearly be demonstrated, this approach should become standard practice. To do otherwise will compromise the potential gains which could be achieved by the supplementation programme or, even worse, it could add to the list of threats which a run already faces.

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## AN ATLANTIC SALMON RETURNING TO SCOTTISH WATERS TO SPAWN FOR A FOURTH TIME

(R.I.G. Morgan and D.C. Stewart)

On the 20th of June, 1994, Mr. Kenny Mackay caught an 11lb 6oz hen salmon in the Fhorsa river, Isle of Lewis. Nothing unusual except perhaps that a fish of this size was the exception rather than the rule. However, what was interesting was that scale reading revealed that this fish was returning to freshwater to spawn for a 4th time. The fish had originally migrated as a

3 year old smolt in 1990 and returned as a grilse in 1991 for its maiden spawning. Having spawned in 1991, it then achieved a further 2 spawning migrations before being caught in 1994 on its way for a 4th spawning trip.

Spawning usually takes place in this predominantly grilse system in November and assuming this fish was no different, it may have entered the sea in December. Whilst nothing can be said about the time intervals between spawnings 1-3, for the last return migration, some observations can be made. If the fish spawned in November, entered the sea in December and was caught in June, only an estimated 7 months had elapsed since last spawning. Kelts appear to require good feeding opportunities to replace lost body reserves during the period Januay to mid April, at a time of increasing photoperiod. If the body reserves can be replaced during this time, the fish will remature and spawn in the following autumn/winter. The capture of this fish raises some intriguing questions about post spawning sea migrations and feeding opportunity. Did this fish stay inshore and not undertake a long sea migration? Did this fish encounter sufficient inshore feeding opportunities to enable it to replace the lost energy reserves? From external appearance, this fish was wrongly identified as being of farmed origin i.e. heavy spotting - are many repeat spawners incorrectly identified as farmed fish and is the number of repeat spawners greater than is thought?

Calderwood (1913) in summarising Menzies' work on kelts of the river Add, Argyllshire, noted three fish that had spawned three times and one that had spawned five times. The laboratory at Faskally has records of multiple previous spawners including two worth noting. In 1924 a 29.5lb female salmon was taken in Loch Maree which had migrated as a three year old smolt and returned afater two sea winters as a salmon for its maiden spawning. It then spawned a further three times (i.e. a total of 4) before being caught. In the Grimersta system in 1925, a fish (sex unrecorded) of 14.5lbs was taken. This fish had migrated as a three year old smolt and returned for its maiden spawning after one sea winter as a grilse. It then undertook two further spawning migrations (i.e. a total of 3) before being recaptured on its return for a fourth time. The 1925 Grimersta fish displayed exactly the same age structure and spawning patterns as did the Fhorsa fish of 1994. In general, however, at the present time, very few salmon are seen that have spawned more than once, and the fish described here was a rare example.

*Calderwood, W.L. 1913. The spawning mark on salmon scales; a review.*
***Salmon Fisheries 111,** Fishery Board for Scotland.*

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## REVIEW OF SCIENTIFIC LITERATURE ON SALMON

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

### 1. Juvenile salmon

Juvenile experience influences timing of adult river ascent in Atlantic salmon. N. Jonsson, L.P. Hansen & B. Jonsson. Animal Behaviour, 48, 740-742, 1994.

The results of this Norwegian study indicate that juvenile river experience influences timing of adult river ascent. Although hatchery-reared smolts move to sea within a few hours of release and migrate thousands of km in the ocean, differences of a few hundred metres in the location of release influences timing of upstream migration. Duration of the juvenile river residency does not appear to influence the ability of adults to locate their natal river on return. Straying rates did not differ significantly whether juveniles were released in the upper or lower parts of the stream, or reared as wild juveniles in the river for 2 or more years.

Homing of Atlantic salmon: effects of juvenile learning on transplanted post-spawners. L.P. Hansen & B. Jonsson. Animal Behaviour, 47, 220-222. 1994.

The results of this study demonstrated that salmon, regardless of their genetic origin, return to the river they left as juveniles. This pattern was maintained even if the fish were transplanted as post spawners to distant rivers either side of the site of smolt release or genetic origin. The authors propose that the learning process that takes place during the smolt migration becomes fixed, and is not overridden by a new learning process at the post-spawning stage.

Is there a threshold size regulating seaward migration of brown trout and Atlantic salmon? F. Okland, B. Jonsson, A.J. Jensen & L.P. Hansen. Journal of Fish Biology, 42, 541-550, 1993.

Within populations smolt age depends on growth rate so that fast-growing parr smolted younger and smaller than slow-growing parr. The authors hypothesize that smolt size and age is a trade-off between expected benefits and costs imposed by differences in individual growth rate.

Evidence of straying from wild Atlantic salmon, Salmo salar L., smolt transportation experiments in northern Scotland. D. Mills. Aquaculture and Fisheries Management, 25, Supplement 2, 3-8, 1994.

Over a period of 4 years a total of 10,482 salmon smolts were transported from the River Bran, a tributary of the Conon, Ross-shire. The percentages of smolts recaptured as adult fish from the 4 years of the experiments were 2.8, 2.2, 2.2 and 4.0. Ninety percent of the fish were recaptured within the Conon system while the remaining 10% were taken in Greenland waters.

The recapture of tagged fish in other tributaries of the river system indicated that there was a certain amount of straying, with a straying rate of 18.9%, although it was only appreciable in the tributary nearest to the Bran.

Homing and straying of hatchery-reared Atlantic salmon, Salmo salar L., released in three rivers in Norway. N.A. Hvidsten, T.G. Heggberget & L.P. Hansen. Aquaculture and Fisheries Management, 25, Supplement 2, 9-16, 1994.

Releases of hatchery-reared smolts in 3 rivers yielded large percentages of strays (19.4, 13.7 and 13.8%). Homing precision to the rivers of release was independent of the release site on the river. Distribution of recaptured adult salmon within the rivers was dependent on the release site; upstream releases yielded more upstream recaptures than did downstream releases.

Comparison of the distribution and homing of hatchery-reared and wild Atlantic salmon, Salmo salar L., from north-east England. E.C.E. Potter & I.C. Russell. Aquaculture and Fisheries Management, 25, Supplement 2, 31-44, 1994.

No significant differences were observed in the patterns of exploitation of hatchery-reared and wild fish in the distant water fisheries. The distribution of tag recoveries in coastal waters was strongly influenced by the pattern of fishing effort which was concentrated in the middle of the fishery area, but recaptures tended to be biased towards the river of release. There were significant differences in the distribution of recaptures of fish released in different rivers and between hatchery-reared and wild fish from the River Wear. There were also differences in the timing of recaptures of hatchery and wild fish from this river in the coastal net fishery. Very few fish were recaptured in rivers other than the one in which they were released, and there was no significant differences in straying rates of hatchery and wild fish. The distribution of recaptures within fresh water provides clear evidence of tributary-specific homing of hatchery-reared fish.

## 2. Ocean life

Oceanic migration in homing Atlantic salmon. L.P. Hansen, N. Jonsson & B. Jonsson. Animal Behaviour, 42, 927-941, 1993.

There appear to be two phases to the homing migration of maturing Atlantic salmon, from feeding areas in the north Norwegian Sea to the home rivers in Norway: a first phase with crude navigation from the feeding areas towards the Norwegian coast and a second phase with more precise navigation in coastal and estuarine waters towards the home river.
Migration speed in the ocean increased with time during spring. Fish moving in the coastal current swam faster than those approaching the home stream in fjords. The return migration of salmon is an active process where more than one set of navigational cues are needed.

The incidence of farmed Atlantic salmon in the long-line fishery at Faroes and in Norwegian home waters. L.P. Hansen, R.A. Lund and J.A. Jacobsen. International Council for the Exploration of the Sea, C.M. 1994/M:13.

During the commercial fishing seasons 1989-93, the proportion of farmed salmon in the Norwegian coastal fisheries has varied between 44 and 49%, which is significantly higher than in fjord fisheries where the proportion of farmed fish has varied between 10 and 21%. In fresh water the proportion of farmed salmon in anglers' catches is relatively low, and has varied between 4 and 7% during the same period. However, when examining catches of brood stocks, the proportion increased considerably and varied between 21 and 38%. But the incidence of farmed fish in brood stocks appears to have declined in recent years. At Faroes the samples collected in 1982/3 and 1985/6 fishing seasons showed 1 and 4% proportions of farmed fish respectively. In the 1989/90, 1990/91 and 1991/92 fishing seasons, the proportion of farmed fish varied between 37 and 44%, whereas in the research fishery in the 1992/93 season 27% of the salmon were estimated to be of farmed origin.

## 3. Exploitation

High seas and homewater exploitation of an Irish reared salmon stock. J. Browne, N. O'Maoileidigh, T. MacDermott, A. Cullen, N. Bond & B. McEvoy. International Council for the Exploration of the Sea, C.M. 1994/M:10.

In 1991 over 292,000 reared finclipped and microtagged salmon smolts were estimated to have migrated from the River Shanon. Significant tag recoveries were generated from the Greenland and Faroese fisheries, and also from homewater net and rod fisheries. Exploitation and survival was estimated using the Run Reconstruction Model developed for North East Atlantic salmon stocks.

There appeared to be a very high post smolt mortality of 94%. The estimated number of European origin salmon taken in Greenland in 1992 was 46,900. The run reconstruction model suggests that the Irish contribution to the catch was over 20,000 salmon. The provisionally estimated number of 2SW fish in the national catch is 28,000 fish.

Exploitation of reared salmon released into the Burrishoole river system. N. O'Maoileidigh, J. Browne, A. Cullen, T. McDermott & M. Keatinge. International Council for the Exploration of the Sea, C.M. 1994/M:9.

Marine survival prior to homewater exploitation has been very variable in the period examined. Although homewater marine exploitation rates have varied considerably depending on the fishing areas, they remained high for all areas combined between the years 1982 to 1989 with exploitation rates up to 87%. The greater part of the catch is taken up in the Mayo area. Exploitation rates have decreased since 1989 and approximately 60% of the returning stock is estimated to have been exploited by coastal fishing methods in 1993. Survival to the river has also varied with an average of 2.5% of the total number of smolts released returning as adults to the river.

## 4. Salmon farming and ranching.

Discrimination of Norwegian farmed, ranched and wild-origin Atlantic salmon, Salmo salar L., by image processing. K.D. Friedland, C. Esteves, L.P. Hansen & R.A. Lund. Fisheries Management and Ecology, 1, 117-128, 1994.

A method of distinguishing between farmed, ranched and wild-origin Atlantic salmon using scale morphology is proposed. Circuli spacing and scale texture data, as expressed as a Fourier transform of transmission luminescent patterns, were extracted by image processing. Spacing patterns and texture features were most distinct for wild salmon compared with the other two groups.

Development of sea ranching of Atlantic salmon, Salmo salar L., towards a sustainable aquaculture strategy. L.P. Hansen & B. Jonsson. Aquaculture and Fisheries Management, 25, Supplement 1, 199-214, 1994.

To obtain maximum harvest and minimal straying, preferably all returns should be harvested. Ranched salmon should be harvested separately from wild salmon because an increased fishing effort in mixed-stock fisheries will increase the level of exploitation on wild stocks. The main factors affecting the survival and return of ranched salmon are those dealing with choice of stocks, rearing and release techniques, and the marine environment.

## 5. Fish counters

Development and testing of a new light gate fish counter in rivers. S. Gudjonsson & H. Gudmundsson. International Council for the Exploration of the Sea. C.M./M:14.

A new fish counter has been developed in Iceland for counting ascending fish in rivers. The counter can also measure the size of the counted fish. The counter consists of two sets of light emitters facing light sensing elements. By constantly monitoring trhe outputs from each sensor a picture of an object passing through the counter is obtained. Two microprocessors process the data and record the date of each fish passing the counter such as its direction of movement, its speed, length and height, the time and date. The information is stored in the memory of a display unit.

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## CHAIRMAN'S REPORT

The Chairman presents his report and the audited accounts for the year ended 30 June 1994.

1. OBJECTIVES AND FUNDING

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 to their Departments and to the European Community; it finances scientific research, arranges workshops and international conferences and publishes booklets on matters of general and scientific interest about the salmon, for the benefit of salmon managers, scientists and anglers.

In order to raise the necessary finance for its objectives, the Trust is entirely dependent on donations and, wherever possible, sponsorship support towards the cost of the scientific projects which it undertakes. In that connection, the Trust is particularly fortunate to have been sponsored over the past five years by Justerini & Brooks (J&B Rare Whisky) who have generously contributed £117,000 over that period to finance important projects administered by the Trust in Scotland and on the Continent of Europe. The Justerini & Brooks sponsorship ends in October 1995 and the Trust is now actively seeking other potential sponsorships to ensure that its scientific projects programme can be continued and adequately financed. On behalf of the Trust, I wish to express our gratitude to Justerini and Brooks for their support, without which the projects which they have financed could not have been undertaken.

The direct and indirect costs of running the Trust are mainly funded by investment income and by covenanted and general donations. In that connection the Trust, as a registered charity, is able to reclaim the income tax effectively included in its dividend and covenanted income. For that reason, covenanted donations are, wherever possible, encouraged as the tax recovered is a material factor.

It is an important objective of the Council of Management to ensure that investment income will continue to be maintained at a level which will sustain the direct and indirect expenditures in the future as well as in the present. However, as will be apparent later on in my report, it is not always feasible to ensure that important project expenditures are precisely matched by a concomitant income flow within the constraints of the accounting period in which they are incurred, ie. there will on occasions be an overlap. The Council of Management have therefore decided that in such circumstances it would be both proper and logical to finance any temporary shortfall from capital, rather than to delay or otherwise restrict the commencement of the projects concerned. I would, however, emphasise that this is not a fundamental change of policy, ie. that the Trust will not deplete its underlying capital resources to finance ongoing project expenditures in the longer-term period.

2. REVIEW OF THE YEAR

As I mentioned in my Chairman's report last year, the choice of projects which the Trust supports is aimed at those of special significance, rather than expending our available resources on a larger number of projects of lesser importance. Those projects and the sources from which they have been funded are set out below.

Annual Postal Fishing Auction

This continues to be a great success and raised £32,000 for the Trust during the year, an increase of £1,100 over the previous year. The popularity of the Auction and its fishing opportunities has not diminished over the years and we are hopeful that a comparable amount will be raised for the current financial year ending 30 June 1995. The Auction is conducted in conjuntion with the Tweed Foundation and Wye Owners, for whom the Trust continues to act as agents.

Special Projects

The gross expenditures on projects sponsored by other organisations and those directly financed by the Trust totalled £78,000 (1993: £47,500). The total gross expenditures of £78,000 included, however, two Continental projects sponsored by Justerini & Brooks during the year ended 30 June 1993, amounting to £12,000, which were deferred until 1994. The true gross project costs attributable to the current year ended 30 June 1994 therefore amounted to £66,000, representing a significantly additional involvement in the Trust's salmon conservation aims.

Sponsorship finance actually utilised during the year ended 30 June 1994 amounted to £56,500 and thereby reduced the total net project costs to £21,600 (1993: £15,500), embracing both sponsored and AST self-financed projects. Details of the individual projects concerned are shown in Notes 10 and 11 to the accounts, on page 8.

Other important longer-term projects currently in progress include the maximisation of progeny numbers from natural spawning (John Webb) and the effects of river flow and water abstraction on the River Dee (Dr. Ian Smith). During the year, Dr. Smith completed a study into fish counter development and the Trust has also been involved in a number of other projects in conjunction with the Scottish Office, principally electrofishing surveys, studies on Loch Leven and sea trout post-smolt sampling, all of which have involved the temporary engagement of scientific personnel.

Finally, Alan Youngson, as the selected applicant for the 1994 Bensinger-Liddell Memorial Fellowship prize, has been engaged on scientific studies in the USA and Canada of the effects of conditions in the Greenland feeding areas on the number of spring salmon returning to European rivers. A Blue Book will be published in due course.

As a follow up to the Fourth International Atlantic Salmon Symposium held in Canada in June 1992, the Trust published a Blue Book entitled "Surveying and Tracking Salmon in the Sea" in November 1993 which has been well received by scientists and others involved in the conservation of salmon.

Contribution towards salmon stock enhancement

During the year ended 30 June 1993, the Trust agreed to a formal commitment of £25,000 towards salmon stock enhancement, specifically related to the effect of the West Greenland and Faroes salmon fisheries and a payment of £25,000 was made to the Atlantic Salmon Conservation Trust (Scotland) during the year ended 30 June 1994 for this purpose.

Operational results

The operating activities of the year resulted in an overall deficit ot £39,765 but included exceptional expenditure of £25,000 as a contribution towards salmon stock enhancement, as mentioned above. The effective operational deficit on the core activities of the Trust therefore amounted to £14,765 (1993 deficit £435). As I have explained, it is not considered desirable to curtail important projects whose life extends beyond a single financial year. A longer term approach is, therefore, considered appropriate with the proviso that project expenditures should not erode the Trust's capital base over time.

There were no fundamental changes in the investment portfolio during the year and we have had periodic meetings with our investment managers to ensure that the appropriate ratio between equities, loan stocks and cash deposits is maintained so as to provide an optimum level of income, coupled with a reasonable expectation of capital growth in the long-term. The resultant disposals of quoted investments and reinvestment of the proceeds during the year produced realised capital gains of £31,791 which, under the Trust's accounting policy were transferred to reserves, ie. not utilised for operational purposes. As a corollary, the excess of the market value of quoted investments over historical cost as at 30 June 1994 (£147,834) declined by £50,024 by comparison with the previous year and therefore reduced reserves by the same amount. Details of the accounting effect of the realised gains and the reduction in excess market values are shown in Note 7 to the accounts. The net effect was a reduction in reserves of £18,233, to £265,951 (1993: £284,184).

Future projects policy

The Trust will be involved and will continue to support several important projects during the current year ending 30 June 1995. These will, in particular, include John Webb's current project, in conjunction with the Scottish Office, on the maximisation of progeny numbers and also Dr. Ian Smith's project on the effects of river flow and water abstraction on salmon in the River Dee, in collaboration with the Scottish Office Environment Department and Grampian Regional Council Water Services Department.

The Trust is also continuing, along with other organisations, to press strongly for accelerating the phase out of the North Sea drift net fishing activities and I hope to be able to report more positively on this extremely important issue in my next Chairman's report.

3. STAFF

John Mackenzie's secretary, Brenda Ward, resigned in October 1993 and Jenny Sample succeeded her at the Trust's Pitlochry office. There were otherwise no changes in staff and I wish to pay tribute to their hard work and dedication. Finally, I wish to thank all our subscribers and donors for their valuable support, with once again special mention of Justerini & Brooks for their generous sponsorship contributions over a period of several years. The Trust has since received a further final contribution of £9,000 from J&B for the current financial year ending 30 June 1995, which will be applied specifically to John Webb's investigation of new ways of maximising progeny numbers from natural spawning, as mentioned earlier in my report.

NICKSON
Chairman

# THE ATLANTIC SALMON TRUST LIMITED

A COMPANY LIMITED BY GUARANTEE

AND

A REGISTERED CHARITY

FINANCIAL STATEMENTS: YEAR ENDED 30TH JUNE 1994

Registered Charity No. 252742

Company Registration No. 904293

## REPORT OF THE AUDITORS TO THE MEMBERS OF THE ATLANTIC SALMON TRUST LIMITED ("THE TRUST") (A COMPANY LIMITED BY GUARANTEE)

We have audited the financial statements on pages 2 to 9 which have been prepared under the historical cost convention and the accounting policies set out on page 5.

### Respective responsibilities of the Council of Management and auditors

Company law requires the Council of Management to prepare financial statements for each financial year which give a true and fair view of the state of affairs of the Trust and of the surplus or deficit of the Trust for that period. In preparing those financial statements, the Council of Management is required to:

- select suitable accounting policies and then apply them consistently;
- make judgements and estimates that are reasonable and prudent;
- prepare the financial statements on the going concern basis unless it is inappropriate to presume that the Trust will continue its charitable activities.

The Council of Management is responsible for keeping proper accounting records which disclose with reasonable accuracy at any time the financial position of the Trust and to enable it to ensure that the financial statements comply with the Companies Act 1985. It is also responsible for safeguarding the assets of the Trust and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

As described above the Council of Management is responsible for the preparation of the financial statements. It is our responsibility to form an independent opinion, based on our audit, on those financial statements and to report our opinion to you.

### Basis of opinion

We conducted our audit in accordance with Auditing Standards issued by the Auditing Practices Board. An audit includes examination, on a test basis, of evidence relevant to the amounts and disclosures in the financial statements. It also includes an assessment of the significant estimates and judgements made by the Council of Management in the preparation of the financial statements, and of whether the accounting policies are appropriate to the Trust's circumstances, consistently applied and adequately disclosed.

We planned and performed our audit so as to obtain all the information and explanations which we considered necessary in order to provide us with sufficient evidence to give reasonable assurance that the financial statements are free from material misstatement, whether caused by fraud or other irregularity or error. In forming our opinion we also evaluated the overall adequacy of the presentation of information in the financial statements.

### Opinion

In our opinion the financial statements give a true and fair view of the state of the Trust's affairs as at 30th June 1994, and of its deficit for the year then ended and have been properly prepared in accordance with the Companies Act 1985.

Davies Watson & Co.

DAVIES WATSON & CO
CHARTERED ACCOUNTANTS
REGISTERED AUDITORS

15a Lesbourne Road
Reigate
Surrey RH2 7JP

29th November 1994

## THE ATLANTIC SALMON TRUST LIMITED

## BALANCE SHEET AT 30TH JUNE 1994

| 1993 | | | | | Note |
|---|---|---|---|---|---|
| | | **FIXED ASSETS** | | | |
| | | **Tangible fixed assets** | | | |
| 49,500 | | Scottish Headquarters: freehold property at valuation | 49,500 | | |
| 16,801 | | Other tangible fixed assets at net book values | 12,248 | | |
| | 66,301 | | | 61,748 | 2 |
| | | **Investments** | | | |
| 881,317 | | Quoted shares and securities at valuation (cost £701,033) | 848,867 | | 3 |
| 28,578 | | Investment deposit account | 1,275 | | |
| | 909,895 | | | 850,142 | |
| | 976,196 | **Total fixed assets** | | 911,890 | |
| | | **NET CURRENT ASSETS** | | | |
| | | **Current assets** | | | |
| 312 | | Stocks of promotional items at cost | 167 | | |
| 15,302 | | Debtors and prepaid expenditures | 12,564 | | 4 |
| 4,826 | | Bank and cash balances: operational funds | 43 | | |
| 20,440 | | | 12,774 | | |
| | | **Current liabilities** | | | |
| | | Creditors and accrued expenditures: | | | |
| 15,279 | | Amounts falling due within one year | 25,670 | | 5 |
| | 5,161 | **Net current assets (liabilities)** | | (12,896) | |
| | £981,357 | **TOTAL NET ASSETS** | | £898,994 | |
| | | **CAPITAL AND RESERVES** | | | |
| | 661,805 | **ACCUMULATED FUND** | | 622,040 | 6 |
| | 284,184 | **RESERVES** | | 265,951 | 7 |
| | 945,989 | | | 887,991 | 8 |
| | | **DEFERRED CONTRIBUTIONS** | | | |
| 28,868 | | Sponsored projects | 11,003 | | |
| 6,500 | | Other | - | | |
| | 35,368 | | | 11,003 | 9 |
| | £981,357 | **TOTAL CAPITAL EMPLOYED** | | £898,994 | |

**Approved by the Council of Management on 29th November 1994**

THE LORD NICKSON KBE, DL (CHAIRMAN).....

REAR ADMIRAL D.J. MACKENZIE CB (DIRECTOR).....

P.J. TOMLIN FCA (TREASURER).....

## THE ATLANTIC SALMON TRUST LIMITED

## SUMMARY INCOME AND EXPENDITURE ACCOUNT

## YEAR ENDED 30TH JUNE 1994

| 1993 | | | | | Note |
|---|---|---|---|---|---|
| | | NET OPERATING DEFICIT FOR THE YEAR | | | |
| | 116,964 | Operating income | | 113,800 | |
| 101,870 | | Operating expenditures and charges | 106,952 | | |
| 15,529 | | Net project expenditures | 21,613 | | |
| | 117,399 | | | 128,565 | |
| | (435) | DEFICIT PER OPERATIONAL INCOME AND EXPENDITURE ACCOUNT | | (14,765) | |
| | | Add: | | | |
| | | EXCEPTIONAL EXPENDITURE | | | |
| | - | Contribution towards salmon stock enhancement | | 25,000 | |
| | £ (435) | TOTAL NET OPERATING DEFICIT FOR THE YEAR | | £(39,765) | |
| | | CAPITAL GAINS | | | |
| | £46,193 | Realised net gains on disposals of quoted investments | | £31,791 | |
| | | STATEMENT OF TOTAL RECOGNISED GAINS AND LOSSES | | | |
| | 45,758 | Deficit for the year after realised capital gains (surplus 1993) | | (7,974) | |
| 58,795 | | Unrealised gains (losses) on quoted investments | (50,024) | | |
| 7,669 | | Unrealised gain on freehold property: excess of market value over historical cost | - | | |
| | 66,464 | | | (50,024) | |
| | £112,222 | TOTAL RECOGNISED GAINS (LOSSES) RELATING TO THE YEAR | | £(57,998) | |
| | 112,222 | NET SURPLUS (DEFICIT) FOR THE YEAR BEFORE TRANSFERS FROM RESERVES | | (57,998) | |
| | | Deduct: | | | |
| | (112,657) | Net Transfers from (to) Reserves | | 18,233 | 7 |
| | £ (435) | DEFICIT FOR THE YEAR TRANSFERRED TO ACCUMULATED FUND | | £(39,765) | 6 |
| | | CONTINUING OPERATIONS | | | |

None of the Trust's activities were acquired or discontinued during the above two financial years.

## THE ATLANTIC SALMON TRUST LIMITED

## OPERATIONAL INCOME AND EXPENDITURE ACCOUNT: YEAR ENDED 30TH JUNE 1994

| 1993 | | | | | | Note |
|---|---|---|---|---|---|---|
| | | **OPERATING INCOME** | | | | |
| | | Investment income: | | | | |
| 50,037 | | On quoted shares and securities, including tax recoverable | | 51,578 | | |
| 2,923 | | On investment and bank deposit accounts | | 764 | | |
| | 52,960 | | | | 52,342 | |
| | | Donations: | | | | |
| 16,225 | | Under covenant, including tax recoverable | | 16,060 | | |
| 16,348 | | General and pledged donations | | 12,899 | | |
| | 32,573 | | | | 28,959 | |
| | 30,892 | Postal fishing auction: share of proceeds, less direct costs | | | 32,073 | |
| | 539 | Miscellaneous income | | | 426 | |
| | £116,964 | **TOTAL OPERATING INCOME** | | | £113,800 | |
| | | **OPERATING EXPENDITURES** | | | | |
| 50,095 | | Costs of promoting salmon conservation and enhancement | | 51,493 | | |
| 36,336 | | General and administration costs | | 36,300 | | |
| | 86,431 | | | | 87,793 | |
| | 6,558 | Progress Reports | | | 6,777 | |
| | - | International Symposium publications: net costs | | | 1,199 | |
| | 801 | Trust publications: cost less sales | | | 621 | |
| | 600 | Donations and support grants to other associations | | | 3,430 | |
| 6,000 | | Treasurer's remuneration | | 6,000 | | |
| 5,000 | | Less: Contribution by Worshipful Company of Fishmongers | | 5,000 | | |
| | 1,000 | | | | 1,000 | |
| | 95,390 | **Total operating expenditures** | | | 100,820 | |
| 5,924 | | Depreciation of tangible fixed assets | | 6,132 | | |
| 556 | | Loss on disposal of tangible fixed asset | | - | | |
| | 6,480 | | | | 6,132 | 2 |
| | £101,870 | **TOTAL OPERATING EXPENDITURES AND CHARGES** | | | £106,952 | |
| | 15,094 | **OPERATING SURPLUS FOR THE YEAR BEFORE PROJECT EXPENDITURES** | | | 6,848 | |
| | | **PROJECT EXPENDITURES** | | | | |
| | | | Gross | Net | | |
| 5,717 | | On projects sponsored by other organisations | 61,188 | 4,725 | | 10 |
| 9,812 | | On projects financed directly by the Trust | 16,888 | 16,888 | | 11 |
| | 15,529 | | £78,076 | | 21,613 | |
| | £ (435) | **NET OPERATING DEFICIT FOR THE YEAR** | | | £(14,765) | |

## THE ATLANTIC SALMON TRUST LIMITED

## ACCOUNTING POLICIES

1. Convention

The Financial Statements for the year ended 30th June 1994 have been prepared under the historical cost convention, as modified by the inclusion of the freehold property and quoted investments at market value and in accordance with the Accounting Standards Committee Statement of Recommended Practice No 2 (SORP 2) for registered charities.

2. Depreciation of tangible fixed assets

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

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

3. Cash flow statement

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

THE ATLANTIC SALMON TRUST LIMITED

NOTES FORMING PART OF THE FINANCIAL STATEMENTS

YEAR ENDED 30TH JUNE 1994

## 1. STATUS OF THE COMPANY

(i) The company is limited by guarantee and does not have share capital. Every member of the company undertakes to contribute to the assets of the company in the event of its being wound up while he is a member, or within one year after he ceases to be a member, for the payment of the debts and liabilities contracted before he ceased to be a member, such amount as may be required, not exceeding £5.

(ii) The company is a registered charity and, as such, is exempt from taxes under the provisions of the Income and Corporation Taxes Act 1988.

## 2. TANGIBLE FIXED ASSETS

| | Freehold property | Office equipment | Motor car | Publicity caravan | Tracking equipment | Total |
|---|---|---|---|---|---|---|
| Cost or valuation: | | | | | | |
| At 30th June 1993 | 49,500 | 13,475 | 15,199 | 3,393 | 4,696 | 86,263 |
| Additions | - | 1,579 | - | - | - | 1,579 |
| At 30th June 1994 | £49,500 | £15,054 | £15,199 | £3,393 | £4,696 | £87,842 |
| Provision for depreciation: | | | | | | |
| At 30th June 1993 | - | 9,691 | 3,436 | 2,139 | 4,696 | 19,962 |
| Charge for the year | - | 1,993 | 3,800 | 339 | - | 6,132 |
| At 30th June 1994 | £ - | £11,684 | £ 7,236 | £2,478 | £4,696 | £26,094 |
| Net book values: | | | | | | |
| At 30th June 1994 | £49,500 | £ 3,370 | £ 7,963 | £ 915 | £ - | £61,748 |
| At 30th June 1993 | £49,500 | £ 3,784 | £11,763 | £1,254 | £ - | £66,301 |

Valuation of freehold property

The valuation of the freehold property is based on a report dated 18th May 1993 by a firm of qualified valuers in Pitlochry, Perthshire. The historical cost of the property is £41,831.

## 3. QUOTED SHARES AND SECURITIES

The quoted shares and securities are valued at mid market prices, based on a report dated 3rd August 1994 by the investment managers to the Trust.

## 4. DEBTORS AND PREPAID EXPENDITURES

| | 1994 | 1993 |
|---|---|---|
| Income tax recoverable: dividends and covenants | 3,952 | 1,366 |
| Sponsored projects: contributions receivable | - | 6,740 |
| Postal fishing auction: proceeds receivable | 3,520 | 3,000 |
| Dividends and interest receivable | 959 | 2,240 |
| Contributions receivable and miscellaneous expenditures | 2,400 | - |
| Other debtors and prepayments | 1,733 | 1,956 |
| | £12,564 | £15,302 |

THE ATLANTIC SALMON TRUST LIMITED

NOTES FORMING PART OF THE FINANCIAL STATEMENTS

YEAR ENDED 30TH JUNE 1994

5. CREDITORS AND ACCRUED EXPENDITURES

| | 1994 | 1993 |
|---|---|---|
| Bank overdraft | 1,619 | - |
| Postal Fishing Auction: share of proceeds payable | 3,344 | 2,850 |
| Progress Report: June 1994 (1993): printing and distribution costs | 3,666 | 3,116 |
| Scottish Office: joint projects account | 3,453 | - |
| Inland Revenue: income tax and social security contributions | 3,623 | 3,067 |
| Projects: 1993 contributions payable | - | 1,500 |
| Audit and accountancy fees | 2,744 | 2,803 |
| Salmon posters: artwork | 2,700 | - |
| Bensinger-Liddell Fellowship: travelling expenditures | 2,553 | - |
| Other creditors and accrued expenditures | 1,968 | 1,943 |
| | £25,670 | £ 15,279 |

6. ACCUMULATED FUND

| | |
|---|---|
| At 30th June 1993 | 661,805 |
| Deduct: Deficit for the year transferred from Summary Income and Expenditure Account | (39,765) |
| At 30th June 1994 | £622,040 |

7. RESERVES

| | Investment Reserve | Investment Valuation Reserve | Property Valuation Reserve | Total Reserves |
|---|---|---|---|---|
| At 30th June 1993 | 78,657 | 197,858 | 7,669 | 284,184 |
| Transferred to (from) Summary Income and Expenditure Account | 31,791 | (50,024) | - | (18,233) |
| At 30th June 1994 | £110,448 | £147,834 | £7,669 | £265,951 |
| Transfers to (from) Reserves during the year: | | | | |
| Realised gains on disposals during the year | 31,791 | - | - | 31,791 |
| Unrealised gains: decrease in market value during the year: | | | | |

| | 1994 | 1993 | | | |
|---|---|---|---|---|---|
| Market value | 848,867 | 881,317 | | | |
| Historical cost | 701,033 | 683,459 | | | |
| Excess of market value over historical cost | £147,834 | £197,858 | - | (50,024) | - | (50,024) |
| As above | | | £31,791 | £(50,024) | - | £(18,233) |

8. RECONCILIATION OF MOVEMENTS ON CAPITAL AND RESERVES

| | 1994 | 1993 |
|---|---|---|
| Surplus (deficit) for the year after realised capital gains | (7,974) | 45,758 |
| Other recognised gains (losses) | (50,024) | 66,464 |
| | (57,998) | 112,222 |
| Opening capital and reserves | 945,989 | 833,767 |
| Closing capital and reserves | £887,991 | £945,989 |

THE ATLANTIC SALMON TRUST LIMITED

NOTES FORMING PART OF THE FINANCIAL STATEMENTS

YEAR ENDED 30TH JUNE 1994

9. DEFERRED CONTRIBUTIONS

| | |
|---|---|
| Scottish Office and Grampian Regional Council: effects of river flow and water abstraction on salmon | 4,458 |
| Scottish Natural Heritage: Loch Leven study | 6,545 |
| | £11,003 |

10. PROJECTS SPONSORED BY OTHER ORGANISATIONS

| | Project costs | Sponsorship contributions | Contribution deferred | Net costs |
|---|---|---|---|---|
| (i) Justerini & Brooks Limited | | | | |
| Maximisation of progeny numbers from natural spawning | 18,725 | (15,000) | - | 3,725 |
| Salmon publications: German translation | 6,000 | (6,000) | - | - |
| Repairs to damaged French hatchery | 6,000 | (6,000) | - | - |
| | £30,725 | £(27,000) | - | £3,725 |
| (ii) Other sponsorships | | | | |
| Loch Morar sea trout improvement: Scottish Hydro Electric Plc | 2,262 | (2,262) | - | - |
| Fish counter development: anonymous | 12,220 | (12,220) | - | - |
| Sea trout cage experiment: SOAFD and Enterprise Companies | 5,809 | (5,809) | - | - |
| Electrofishing surveys: Hope & Shiel District Fishery Boards | 3,188 | (3,188) | - | - |
| Effects of river flow and water abstraction on salmon: Scottish Office and Grampian Regional Council | 4,542 | (9,000) | 4,458 | - |
| Loch Leven study: Scottish Natural Heritage | - | (6,545) | 6,545 | - |
| Sea trout post-smolt sampling: Scottish Fishery Boards | 2,442 | (1,442) | - | 1,000 |
| | £30,463 | £(40,466) | £11,003 | £1,000 |
| Total sponsored project costs and contributions | £61,188 | £(67,466) | £11,003 | £4,725 |

11. PROJECTS FINANCED BY THE ATLANTIC SALMON TRUST

| | |
|---|---|
| Spawning of wild and hatchery precocious male salmon parr: Leicester University | 3,000 |
| Development of stochastic model for predicting growth of sea trout in varying water temperatures: Institute of Freshwater Ecology | 5,000 |
| "What Makes a Sea Trout": Salmon Research Agency | 3,000 |
| Bensinger-Liddell Fellowship: research expenditures | 4,138 |
| Miscellaneous projects | 1,750 |
| Total Atlantic Salmon Trust financed project costs | £16,888 |

THE ATLANTIC SALMON TRUST LIMITED

NOTES FORMING PART OF THE FINANCIAL STATEMENTS

YEAR ENDED 30TH JUNE 1994

12. OPERATING DEFICIT

| | 1994 | 1993 |
|---|---|---|
| | £ | £ |
| The operational deficit for the year is after charging: | | |
| Depreciation of tangible fixed assets | 6,132 | 5,924 |
| Loss on disposal of tangible fixed asset | - | 556 |
| Directors' emoluments | 45,000 | 43,727 |
| Auditors' remuneration | 1,183 | 1,469 |

13. STAFF COSTS INCLUDING PROJECT PERSONNEL

| | 1994 | 1993 |
|---|---|---|
| Salaries | 87,442 | 78,790 |
| Social Security costs | 8,918 | 7,889 |
| | £96,360 | £86,679 |

14. DIRECTORS' EMOLUMENTS

| | 1994 | 1993 |
|---|---|---|
| Services as directors | £45,000 | £43,727 |

15. STAFF NUMBERS

The average number of persons employed by the Trust during the year (including project personnel) amounted to 6 (1993: 6).

16. COVENANTED DONATIONS

At the current basic rate of income tax (25%), the gross annual equivalent of the net covenants unexpired at 30th June 1994 (209 covenants) is estimated at £46,500 (1993 : £46,000), as under:

| | |
|---|---|
| Years ending 30th June: 1995 | 12,600 |
| 1996 | 10,700 |
| 1997 | 7,200 |
| 1998 and later years | 16,000 |
| | £46,500 |

17. FUTURE FINANCIAL COMMITMENTS

The Trust has agreed to future financial commitments in connection with the following projects:

| | 1995 | 1996 |
|---|---|---|
| (i) Salmon Research Agency of Ireland: "What Makes a Sea Trout" | 3,000 | |
| (ii) Tweed Foundation: joint AST and Tweed Foundation population management studies | 1,250 | 1,250 |
| (iii) West Gallaway Fishing Trust: spring fish radio tracking | 2,000 | |
| (iv) Royal Society of Edinburgh: predators' symposium | 1,500 | |
| (v) Maximisation of progeny numbers: John Webb's project | 2,500 | |

# DEED OF COVENANT

## TO THE ATLANTIC SALMON TRUST LIMITED

(Registered Charity No. 252742)

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

Signed and delivered .....

Date .....

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

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

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

Witnessed by:

Signed .....

Full Name .....

Address .....

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

---

## THE ATLANTIC SALMON TRUST LIMITED

## BANKER'S ORDER

Subscriber's Bank

To ..... Bank plc

Branch Address .....

.....

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

Please pay to BANK of SCOTLAND, 76 Atholl Road, Pitlochry PH16 5BW (80-09-41) for the credit of THE ATLANTIC SALMON TRUST LIMITED, account No. 00890858 the sum of £ ..... (..... pounds) on the (i) ..... day of ..... 19... and a like amount on the same day each (ii) month/quarter/half year/year for a total period of (iii) ..... years. Total number of payments .....

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

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

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

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

---

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

(ii) Please delete as appropriate.

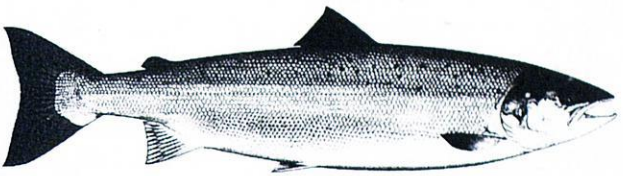
(iii) Insert number of years (minimum four years).

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

# SALMON *a fisherman's guide* RECOGNITION

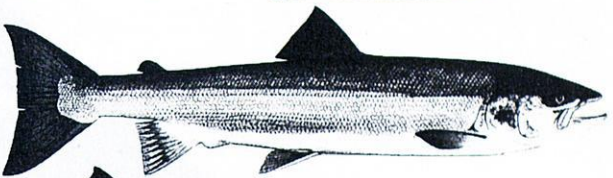
### FRESH RUN SALMON

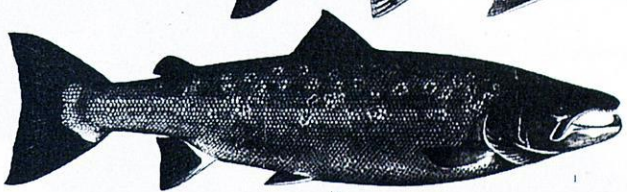
Recognised by the pristine condition and bright silver flanks. Fish straight from salt water have loose, easily detached scales and many carry sea lice which drop off within a few days. Hen salmon (illustrated) have a tiny kype on the lower jaw but unlike cocks they retain normal head proportions while in the river. Fresh run salmon make the best eating.



### KELT

Kelts are salmon which have spawned. Usually identified by the thin shape, distended vent and presence of "gill maggots" on the red gill filaments, they are often encountered by anglers in spring when they regain a silvery appearance and can be mistaken for fresh run Springers. Kelts must be returned unharmed to the water.





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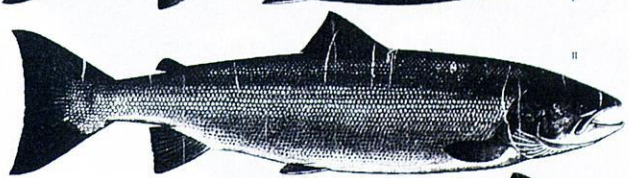


II

### MATURING COCK & HEN

I. Cock. Recognised by the enlarged jaws, cocks often become coloured soon after leaving salt water. This one shows typical appearance after a few weeks in fresh or brackish water, some are more reddish, others less so but all will have the partially developed kype. At this stage cocks are still good to eat.

II. Hen. These are usually less coloured than cocks of similar river age and they never have enlarged jaws. This one will have spent a few weeks in river or estuary – note the coloured head and lack of true silver flanks. Hens should not be killed on the basis of colour alone – autumn fish are closest to spawning regardless of colour. For conservation purposes hens are the most important.

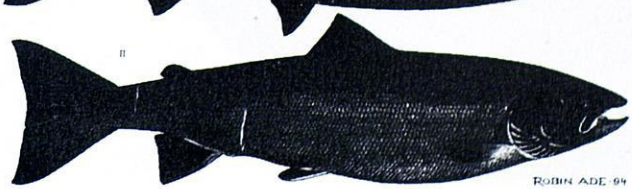
### COCK & HEN IN BREEDING DRESS

I. Cock. The combination of "tartan" colours is typical although shades vary – the fully developed kype, used in fighting rivals, is the most consistent indicator of maturity. Condition can be gauged by viewing from above (fig.1) – if the back is still thick a fish is in better condition (and more likely to be edible) than a thin "kipper" which, unless it is a first salmon, is better returned.

Fig 1.

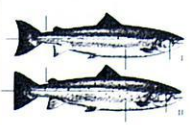
II. Hen. This is a summer fish – Springers are often darker by spawning time while late entrants may still be silver flanked. Fully mature hens have soft, swollen bellies and spawning is imminent if they also have protruding vents.

I



II

ROBIN ADE '94



### SALMON & SEA TROUT

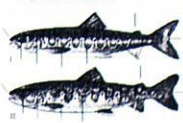
Salmon (I) can be distinguished from large Sea Trout (II) by a more streamlined shape, constant tail, slimmer tail wrist, upper jaw reaching no further than rear of eye, few if any black spots below lateral line, 10 to 15 usually 13-15 scales counted obliquely forward from adipose fin to lateral line – trout have 13-16.

### GRILSE & SALMON

Grilse or one sea winter salmon, which comprise more of the annual rod catch, are often indistinguishable from multi sea winter salmon except by scale reading. They are smaller on average (2-3lb. in May, 3-7lb. in July) but grilse entering rivers in September often attain 8-10lb. and in October 12-15lb. Salmon usually weigh over 8lb. Most are 25% fish, these returning in spring average 8-10lb., in summer 12-14lb., in autumn 16-18lb. Salmon tend to double in weight during each full growing period (May - Oct) spent at sea.

### SALMON & TROUT PARR

Salmon Parr (I) can normally be distinguished from young Brown/Sea Trout (II) by the more streamlined shape, deeply forked tail, longer pectoral fin, lack of orange on adipose fin, smaller mouth, sharper snout, only 1-4 spots on gill cover (often one large spot), well defined parr marks.



## ATLANTIC SALMON TRUST PUBLICATIONS

| | | £ |
|---|---|---|
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**FILMS AND VIDEO CASSETTES AVAILABLE FOR HIRE**

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

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

*Printed in Scotland by Woods of Perth (Printers) Ltd., 3/5 Mill Street, Perth PH1 5JB -- Telephone 01738 622244*