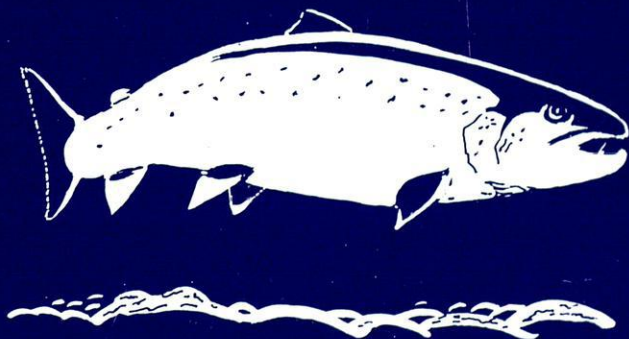




ATLANTIC SALMON TRUST

# PROGRESS REPORT

December 1996



The Atlantic Salmon Trust  
Moulin, Pitlochry  
Perthshire PH16 5JQ  
Telephone: Pitlochry (01796) 473439

Patron:

HRH The Prince of Wales

### COUNCIL OF MANAGEMENT

President:

The Duke of Wellington

Vice Presidents:

Mr. David Clarke  
Sir Ernest Woodroffe  
Dr. Wilfred M. Carter  
The Lord Nickson  
The Lord Moran

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Vice Chairman:

Major General John Hopkinson

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The Rt. Hon. Sir Cranley Onslow, MP

Mr. Colin Carnie

The Hon. C.A. Pearson

Mr. J.R. Carr

Mr. C. Robinson

The Hon. Mrs. Jean Cormack

Mr. H. Straker

Mr. J. Cunningham, MP

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Mr. A. Douglas Miller

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The Earl of Eglinton & Winton

Mr. O. Vigfusson

Mrs. L. Golding, MP

Mrs. Anne Voss-Bark

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Mr. A. Wallace

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Dr. K. Whelan

Mr. J. McGrigor

Mrs. Margit Worsham

Mr. Moc Morgan

Mr. R. Williamson

Mr. E. Mountain

### OFFICERS OF THE COUNCIL

Director:

Rear Admiral D.J. Mackenzie

Deputy Director/Secretary:

Mr. Jeremy Read

Treasurer:

Mr. Peter Tomlin

### INVITED REPRESENTATIVES OF OTHER ORGANISATIONS

ASF (USA)

Mr. J. F. Cullman 3rd

ASF (CANADA)

Mr. L. G. Rolland

AIDSA

Madame S. Tissier

RASA

Mr. Richard Buck

BFSS

(A Representative)

ASDSFB

Mr. Robert Clerk

SPEY TRUST

(A Representative)

FISHMONGERS

The Rt. Hon. Viscount Leverhulme

S&TA

Mr. John Bennett

WEST COUNTRY RIVERS TRUST

Mr. T. A. F. Barnes

Mr. Michael Martin

## 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.  
J. Browne, M.Sc. (Department of the Marine, Dublin)  
M. M. Halliday, Ph.D. (Joseph Johnston & Sons Ltd.)  
G. J. A. Kennedy, B.Sc., D. Phil. (Department of Agriculture for Northern Ireland)  
E. D. Le Cren, M.A., M.S., F.I.Biol., F.I.F.M.  
J. Solbé, M.B.E., 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. (Environment Agency)  
A representative from the Scottish Office Agriculture  
and Fisheries Department  
E. C. E. Potter, B.A., M.A.  
(Ministry of Agriculture and Fisheries)

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

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

Registered Charity No. 252742

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## CHAIRMAN'S INTRODUCTION

Earlier this year the Charity Commissioners published a Statement of Recommended Practice (SORP) which inter alia requires certain changes to the presentation of accounts of all charities. Although not mandatory until 1997, the Trust decided to produce this year's accounts in the new format so as to gain early experience of the new requirements and, if appropriate, guidance from the Commissioners. A particular requirement of the new SORP is the provision of a Trustee's Report. This contains a detailed financial review of the Trust's business and activities over the year and now replaces the Chairman's Report produced in previous years. The Trustee's Report is contained elsewhere in the Progress Report, together with a Summary of Financial Statements for the year ended 30th June 1996. If any reader should wish to see a full set of accounts, these can be obtained from Moulin on request.

Having heard so much about the activities of the fish farming industry, I took the opportunity this autumn to accept an invitation from Marine Harvest McConnell to visit their operations on the west coast. It was a most informative visit during which I was shown the full range of their operations from the incubation of the eggs through to the finished product being supplied to the consumer. A particularly interesting and impressive aspect is the work being undertaken into fish diseases and sea lice predation at the company's research establishment at Lochailort. During the full and frank discussions which took place throughout my visit, it was clear that the company fully understands the environmental and other issues of concern surrounding fish farming activities and is deploying considerable resources to resolve them. It was especially encouraging to hear that they are fully supportive of the recently formed West Coast salmon and sea trout Trusts and of their intention to play a full part in their work. I appreciate that there are some in the angling fraternity who seem keen to lock horns with the fish farming industry but that is not a productive way forward. I am convinced that only by working together and jointly deploying our various resources will we be able to make progress in resolving the present difficulties. As the Director has noted in his remarks, the Scottish Office review of procedures for granting licences has presented the Trust with an opportunity to recommend a tightening of all procedures to regulate the fish farming industry.

In the autumn I also had the pleasure of seeing at first hand the start of the new PIT tag project on the Conon. This is an exciting new development which will provide more accurate and comprehensive information than is presently possible about smolt migration and adult returns. An article on PIT tags appears elsewhere in these pages.

Contrary to what some may think, scientific and biological research remains a core activity of the Trust's business and its continuing development is crucial to understanding the complex life cycle and problems of the Atlantic salmon. I would like to pay particular tribute to all the many scientists, biologists (including John Webb, our own biologist) and others who contribute so much to our present knowledge and to a wider understanding of the salmon.

I should also like to record the Trust's gratitude to the Robertson Trust and to the Dulverton Trust for their generous contributions to the important DNA project, now in its second year, being undertaken by John Webb.

The Report of the Irish Salmon Management Task Force was received in the early autumn. While welcoming certain aspects of it, especially the importance attached to MSW spring fish, the Trust found many of the recommendations disappointing, particularly those relating to drift nets which, if implemented, will result in a greater number of salmon, both from Ireland and from other countries, being taken off the Irish coast. The Trust's response to the Irish Minister of the Marine is contained elsewhere in this Report.

It gives me great pleasure to welcome the following new members to the Council, who were elected at the Annual General Meeting on 4th December 1996:

The Hon. Mrs. Jean Cormack  
Mr. Andrew Douglas Miller  
Mrs. Anne Voss-Bark

In accordance with our procedures, the following members retired at the Annual General Meeting, having served six years on the Council:

Mr. J.A.G. Coates  
Mr. A. Dickson  
Dr. G. Harris  
Mr. I. Mitchell  
Dr. D. Solomon

I should like to thank them all for the substantial contribution they made to the work of the Trust over the years.

It was with the greatest sadness that we learned of the death on 9th October of our senior Vice-President, Vice Admiral Sir Hugh Mackenzie. Hugh, or Rufus as he was known to most of us, had a highly distinguished naval career, after which he became the Trust's first Director in 1969. He became Chairman in 1981 and thereafter a much esteemed Vice-President. We shall all miss his fund of knowledge and wise guidance very much. A tribute appears elsewhere in these pages.

Finally, as the year ends, I should like to thank our Director, Deputy Director, Treasurer and our indefatigable secretary, Jenny Sample, for their continuing endeavours in taking forward with great efficiency and good humour the many aspects of the Trust business. We are greatly indebted to all of them.

A very Happy New Year to you all.

H.F.O. BEWSHER, Chairman

## DIRECTOR'S REMARKS

My appeal during 1996 to covenant holders and to subscribers who have not given us anything for a long time has been very successful and has enabled us to reduce and update our mailing list. In an attempt to encourage new covenantors, this report has a loose-leaf Deed of Covenant form inserted. If it is no use to you personally, why not encourage a friend to support the Trust?

This Progress Report contains an interesting piece on 'PIT' tags. This is an area of exciting new research that the Trust is supporting. John Webb, the Trust biologist reports on his work. There is also a report on the West Coast Fisheries Trusts by Andrew Wallace, their development officer. Contrary to some ill-informed press comment, these Trusts are up and running and I am firmly of the opinion that they will bring a sense of purpose to the West Coast. We also welcome the formation of a trust in the West Country and have actively supported the Tamar 2000 Project. Lord Nickson's Task Force is due to report shortly and we eagerly await its findings.

As some will know, the Scottish Office is considering reviewing the procedures for granting leases for salt water fish farms; currently these are granted by the Crown Estate Commissioners who, it is understood, are keen to relinquish that responsibility. The Trust is of the view that this presents an important opportunity to tidy up all the existing procedures relating to the granting of leases and discharge consents (a SEPA responsibility) and to introduce altogether more comprehensive ones to regulate the aquaculture industry. The Trust has accordingly made appropriate representations to Scottish Office ministers in this regard.

We are attempting to arrange a workshop early in 1997 to discuss the formation of trusts, especially in England and Wales. We hope to involve MAFF, EA, Scottish Office and all existing trusts to show how trusts can bring benefits to rivers and how they can obtain grants especially from the EU.

The most important event in 1997 will be the Fifth International Atlantic Salmon Symposium in Ireland 16th to 20th September.

I hope that you will find this report is of interest and I wish you all a good year in 1997 and may the good Lord bring us water at the right time!

D.J. Mackenzie

**Stop Press:** The memorial service for Vice Admiral Sir Hugh Mackenzie will be held in Guildford Cathedral on Saturday, 8th February at 11.30 am.

AN APPRECIATION OF  
VICE-ADMIRAL SIR HUGH (RUFUS) MACKENZIE, KCB, DSO, DSC

*HE NEVER KNEW WHAT ENVY WAS OR HATE,  
HIS SOUL WAS FILLED WITH WORTH AND HONESTY  
AND WITH ANOTHER THING, QUITE OUT OF DATE  
CALLED MODESTY.*

These lines, on the cover of the Order of Service for the Funeral of Hugh (Rufus) Mackenzie, are a perfect description of a man who was known, loved and admired by so many people. The only words missing, to complete the picture, are warmth, kindness and humour.

His naval career was marked by dedication, bravery and tremendous achievement, but there must be many who only knew him, after his retirement, as a quiet, compassionate gentleman.

Rufus' love of fishing and subsequent respect for all game fish, had its roots in his early years, growing up in Inverness, where his father was a doctor. It is therefore not surprising that, on retiring from the Royal Navy in 1968, he became the first Director of the newly-formed Atlantic Salmon Research Trust.

With the same dedication, ability and perseverance that he had applied to organising the Polaris project, he laid the foundations of what is now an internationally recognised and respected organisation for the preservation and enhancement of wild salmon and sea-trout. In recognition of this achievement, in 1978 he was elected to the Livery by the Court of the Fishmongers' Company and also became a Freeman of the City of London.

In 1980 Rufus became Chairman of the Trust (now known as The Atlantic Salmon Trust) and gave inspired leadership until he retired in 1983 after a horrendous car crash on the M1 in which both he and his wife, Maureen, suffered severe burns.

In spite of this, Rufus still maintained close links with the Trust as a Vice-President. With his death, the Trust has lost an irreplaceable guide, supporter and friend.

It was the greatest fun to go fishing with him. It was an inspiration to work with him. It was a wonderful joy to be able to share his love of dogs and nature and, above all, it was a privilege to call him a friend.

To Maureen and the family, James, Helen and Alice, must go the deepest sympathy of all members of the Trust, for they have lost a devoted husband and father.

To Rufus, wherever you are in Heaven, 'Tight Lines!'



PRELIMINARY ANNOUNCEMENT

FIFTH INTERNATIONAL  
ATLANTIC SALMON  
SYMPOSIUM

MANAGING WILD ATLANTIC SALMON  
NEW CHALLENGES - NEW TECHNIQUES

GALWAY, IRELAND  
16-20 SEPTEMBER 1997

*Organised by*

The Atlantic Salmon Federation

and

The Atlantic Salmon Trust

MANAGING WILD ATLANTIC SALMON  
NEW CHALLENGES - NEW TECHNIQUES

## GENERAL INFORMATION

### **Venue**

The symposium will be held in the Corrib Great Southern Hotel in Galway, Ireland.

### **Accommodation**

There are many good hotels and 'bed and breakfast' establishments in the town. A provisional block booking has been made at Corrib Great Southern.

### All accommodation enquiries to:

Ireland West Tourism  
Reservation Department  
Aras Fáilte  
Eyre Square  
Galway  
Ireland

tel: 353 91 563081 / fax 353 91 565201

(enquiries should mention 5th International Atlantic Salmon Symposium)

### **Secretariat**

Ms. Sandra Doyle  
Secretariat  
5th International Atlantic Salmon Symposium  
Central Fisheries Board  
Balnagowan, Mobhi Boreen  
Glasnevin  
Dublin 9  
Ireland

Tel: 353 1 8379206

Fax: 353 1 8360060

### **Fees**

It is hoped to keep registration fees in the region of IR£100 to include proceedings.

### **Post Symposium Tour**

This will be for half a day on Friday 19th September.

### **Travel**

Best route - fly to Dublin and either internal flight to Galway airport or train from Dublin.

Firm programme will be sent to those who have expressed an interest in March 1997.

\* \* \* \* \*

**IFM (SCOTTISH BRANCH) AND THE ATLANTIC SALMON TRUST**

**FISH COUNTERS SEMINAR**

**A K BELL LIBRARY, PERTH**

**FRIDAY, 4 APRIL, 1997**

**PROGRAMME / BOOKING FORM**

- 09.30 Registration / Coffee**
- 10.00 Chairman's Welcome** A V Holden (Chairman, IFM Scottish Branch)
- 10.05 Fish Counters and Fisheries Management**  
G Struthers (IFM Scottish Branch Secretary and Fishery Consultant)
- 10.30 The Logie Counter - Recent and Future Developments**  
D Gray (Aquantic Ltd)
- 11.00 The Logie Counter - Salmon studies on the North Esk**  
I Simpson (SOAEFD Freshwater Fisheries Lab, Montrose)
- 11.30 Scottish Hydro-Electric Fish Counters and their use at hydro dams**  
Dr A Stephen (Scottish Hydro-Electric plc)
- 12.00 The Spey Acoustic Counter**  
R Laughton / J Bray ( Spey Research Trust)
- 12.30 Discussion**
- 13.00 Buffet Lunch**
- 13.45 The VAKI Fish Counter - studies on the River Tweed**  
Dr R N B Campbell (Fishery Biologist, Tweed Foundation)
- 14.15 A portable electrode array for a resistivity fish counter**  
A D F Johnstone (SOAEFD Marine Laboratory, Aberdeen)
- 14.45 Fish Counter Developments in England and Wales**  
A Fewings (Environment Agency)
- 15.30 PIT Tags and Their Application to Fish Counting**  
Dr J D Armstrong (SOAEFD, Freshwater Fisheries Lab, Pitlochry)
- 16.00 General Discussion** Chairman: Alan Holden (IFM Scottish Branch)
- 16.30 Summing up** Rear Admiral D J Mackenzie (Atlantic Salmon Trust)
- 17.00 Close of Seminar**

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**IFM (SCOTTISH BRANCH) AND THE ATLANTIC SALMON TRUST  
FISH COUNTERS SEMINAR / ADVANCE BOOKING FORM**

I wish to attend the above Seminar to be held at the A K Bell Library, Perth, on Friday, 4 April, 1997, and enclose payment of £10 / £12 / £15 (delete as appropriate, see over for fee categories\*, which include lunch)

**Name:** ..... (please print)

**Address** ..... **Phone no:** .....

..... **Signature:** .....

..... **Date** .....

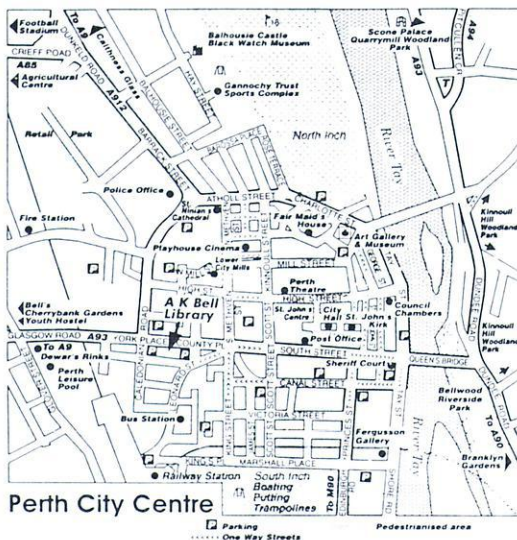
# IFM (SCOTTISH BRANCH) AND THE ATLANTIC SALMON TRUST FISH COUNTERS SEMINAR

A K BELL LIBRARY, PERTH

FRIDAY, 4 APRIL, 1997

The responsible and efficient management and exploitation of fish require information not only on catches but also on stocks to ensure sustainability of the resource. Although the Atlantic salmon has been the subject of considerable research over many years, the use of counters as a management tool is relatively recent. Until about 1980, in Scotland, automatic fish counting was essentially confined to the North of Scotland Hydro-Electric Board's own resistivity counters located at fish passes at a number of their dams. Since then, increasing awareness of the potential value of automatic counters for salmon stock management has resulted in the installation and testing of a range of counters on various Scottish rivers. This Seminar (see Programme on reverse side) seeks to review and assess the development and application of salmon counting in Scotland, in particular, and to look at what the future may hold for counter technology and salmon stock monitoring, assessment and evaluation.

## Location of A K Bell Library:



Further details of the Seminar can be obtained from:

Gordon Struthers, Secretary IFM (Scottish Branch), "Torshavn", Lettoch Road, PITLOCHRY, Perthshire, PH16 5AZ, Scotland (Tel/Fax: 01796 472846)

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## IFM (SCOTTISH BRANCH) AND THE ATLANTIC SALMON TRUST FISH COUNTERS SEMINAR

### \*FEE CATEGORIES / SUBMISSION OF ADVANCE BOOKING FORM

|   |        |
|---|--------|
| IFM (Scottish Branch) Members and AST Subscribers | £10.00 |
| IFM Members and Friends of Scottish Branch        | £12.00 |
| Others  | £15.00 |

Please complete ( see over), detach and return this Booking Slip, along with payment, (cheques payable to "IFM (Scottish Branch)" and crossed "A/c Payee") to:

Gordon Struthers, Secretary IFM (Scottish Branch), "Torshavn", Lettoch Road, PITLOCHRY, Perthshire, PH16 5AZ, Scotland, by 21 March, 1997.

## CHAIRMAN'S RESPONSE TO THE IRISH MINISTER FOR THE MARINE

The Hon. Eamon Gilmore TD  
Minister for the Marine  
Department of the Marine

22nd October, 1996

I am writing to thank you for sending the Trust the Report of the Irish Salmon Management Task Force.

We are pleased to see that the Report recognises the special problem of spring MSW salmon, and we welcome and endorse the recommendations aimed at protecting and rehabilitating spring stocks by restricting both net and rod exploitation in the early part of the season.

However, we find the overall treatment of coastal drift netting to be disappointing. While the Report refers to its indiscriminate nature, it stops well short of recognising the principle that good salmon management requires that fishing for individual stocks, whether commercial or recreational, should only take place in their river of origin, and that interceptory fishing of mixed stocks should cease. The Report, regrettably, does not acknowledge the fact that this principle has been accepted by all other salmon producing countries, and that almost all have implemented measures to end or at least phase out such netting. It is both surprising and disappointing that the example of other nations does not appear to have been considered.

Further, while the drift netting effort should be reduced by the restriction in the fishing week to four days, and by the rule of daylight fishing only, this will nevertheless be partly offset by the planned increase in the netting season, for which we do not think that a case has been made. In addition, the increase in net depth and the legalisation of the use of monofilament netting will increase fishing efficiency.

We are disturbed by the very high TAC figure of 900 tons, particularly since it was set to allow for estimates of the undeclared catch. As well as tacitly condoning an offence, this fails to reduce the level of exploitation of diminishing stocks. The allocation of this allowable catch appears arbitrary; we are disappointed not to see an examination of the comparative economic value of commercial and rod fisheries, which could have been taken into account in this allocation.

Perhaps our greatest concern is that the control and management of the proposed new measures are likely to pose serious practical problems. It is not clear how the quotas or the accompanying carcase tagging are to be implemented or enforced. Without an adequate control system in place, any early introduction of "pro-netting" measures, such as the use of monofilament nets of greater depth, will only increase exploitation.

In sum, we welcome the initiative that led to the setting up of the Task Force. However, at a time of international concern over salmon stock levels, we are concerned at the apparent imbalance of the Report. Its recommendations could well maintain and even enhance the proportionate numbers of salmon, both from Ireland and from other nations, that will be taken by drift netting off the Irish coast.

H.F.O BEWSHER, CHAIRMAN

## NORTH ATLANTIC SALMON FUND (UK)

(Report by the Deputy Director)

My account of the NASCO meeting in the June Progress Report explained the failure to set 1996 quota for the Greenland fishery. In July the Greenland Home Rule Government unilaterally set a quota of 174 tons (about 65,000 fish). Since then Orri Vigfusson has been focusing all his efforts to prevent or reduce the fishery, which opened in August.

Differences within KNAPK (the Greenland Fishermen's Association) have delayed the formal offer of a compensation agreement. However, many fishermen said publicly that they were in favour of such an agreement, especially one involving development projects for alternative fisheries (such as for lumpfish and snow-crab) initiated by NASF in the last two years. Many have not fished for salmon, and only some 70 tons had been landed at the latest report.

The proposal for an agreement is to be discussed at the KNAPK General Assembly in February. Orri Vigfusson is still seeking a multi-year agreement, and is already able to offer the fishermen considerable detailed technical and marketing information on the lumpfish "caviar" project.

On 31 August 1996, NASF(UK) completed its initial three year undertaking to raise £180,000 per year as the UK contribution to NASF. The NASF agreement to keep the Faroes fishery closed is still in force (and still has to be funded), but the lack of a resolution of the Greenland situation is delaying overall planning for future years. Nonetheless, Orri Vigfusson has clearly achieved encouraging success in limiting so significantly the effect of the fishery this season.

\* \* \* \* \*

## RIVER HABITAT RESTORATION - A POCKET GUIDE

The Game Conservancy, assisted by sponsorship from Wessex Water, has produced a booklet entitled "Helping fish in Lowland Streams". Written by Nick Giles and David Summers, it sets out in plain and well illustrated fashion the problems affecting lowland rivers and streams, and the remedial measures that can be taken to remedy them. Although written mainly in the context of trout and coarse fisheries, the principles apply to the well-being of all game fish.

Copies may be obtained free by sending a C5 stamped addressed envelope (38p second class) to:

Dr. David Summers  
The Game Conservancy Trust  
Fordingbridge  
Hampshire SP6 1EF

\* \* \* \* \*

**AST BIOLOGIST'S REPORT**  
(John Webb, Marine Laboratory, Aberdeen)

**Atlantic Salmon population management: maximising progeny numbers from natural and artificial spawning**

Lifetime fitness studies on spring salmon

In what is the third year of this collaborative study involving the AST, SOAEFD and Stirling University, a further twenty-one families of eggs have been laid down for planting-out next spring. These eggs will be the last year-class to be placed within the burn whose fortunes will be followed up to their return to the river as adults.

As part of the same project, this autumn has also seen the beginning of the long-term programme of juvenile sampling to establish the contribution of fish from the last two years plantings to the system's autumn parr and smolt production. All of the autumn parr that have been caught in the smolt trap this year have been micro-tagged and sampled for scales and their body-length and migration date noted. In addition, each migrant's adipose fin, which is routinely removed at micro-tagging, has been retained for DNA analysis.

The scales will be used to determine the freshwater age of each fish and therefore its year of birth. The fin-clip samples will then be individually analysed using the latest genetic fingerprinting techniques to establish its parentage, family and where it was originally stocked within the burn.

Sampling of all migrant parr and smolts that leave the burn will continue for the next four to five years. This will allow us to build up a detailed picture of the production and performance of each **individual** family stocked within the system.

Egg planting: field trials of a newly available egg planting device

Egg planting is a low level, low cost, intervention option with the potential to redistribute local surpluses of eggs into under-utilised habitats at low cost. As part of the continuing programme of research into the various methods of stocking eggs in streams, the AST was commissioned by the Dee Salmon Fishing Improvement Association to conduct field trials on the performance of the Fiskevardarna HB salmon egg planting device (SEPD) - a new machine developed in Sweden as a result of co-operation between the Swedish Salmon Research Institute and other fisheries management organisations. The salmon egg-planting device is a very simple and portable piece of equipment that has been designed to inject eggs directly into spawning gravels **without** the need for excavation.

In early April of this year egg-planting trials using the SEPD were conducted on two high altitude (430-575m) unpopulated tributaries of the river Clunie - an upper spawning tributary of the Aberdeenshire Dee. Eyed salmon eggs were planted at regular intervals throughout two separate study areas at the equivalent of a density of ca. 5 eggs m<sup>-2</sup>. The rates of planting achieved corresponded to the equivalent of 6825 to 10266 eggs per man hour depending upon the terrain and experience of the operator. In September, randomly selected census sites

within both study areas were electrofished to assess 0-group fry densities.

#### Comments and conclusions:

Overall, egg-planting efficiency using the SEPD was found to be good. Egg retention within the device was generally very low (<2% of planting load). However, much higher levels were evident when fine sediments entered the probe head of the SEPD causing a blockage. Between the two sites, this problem occurred in 1.5 and 12% of the total number of plantings undertaken.

Previous laboratory trials of the SEPD conducted by the Swedish Salmon Research Institute under controlled conditions of graded and cleaned gravel yielded rates of survival from egg to fry at emergence of between 96 to 97%. However, when the work was repeated in a natural stream average catches after one fishing were found to range from 2 to 38 fish per 100m<sup>2</sup>.

During our trials, conducted in relatively 'hostile', high altitude conditions, the estimated densities by the end of the first growing season ranged from 1.6 to 151 fry per 100m<sup>2</sup>. The overall mean density was estimated to be 33 fry per 100m<sup>2</sup>. However, despite the common planting rates used, differences in fry density between the two experimental burns were found. These differences appeared to relate to the gravel substrate structure; the generally better quality gravels generating the higher fry densities. Both experimental systems were considered suitable for stocking in that they supported rich invertebrate faunas and periphyton floras. Consequently, the differences observed were unlikely to have been due to differences in the mortality or other losses of young fish after emergence. Rather, the variability in fry numbers probably reflected differences in the survival of eggs and alevins during the incubation period as a result of intrinsic differences in planting and incubation habitat quality.

#### **Catch and release: behaviour of radio-tagged spring and early summer salmon in the Aberdeenshire Dee**

Research into the survival and behaviour of salmon returned to the river by anglers (catch and release) continued in a collaborative study involving the AST, SOAEFD and the Dee District Salmon Fishery Board.

Between the 1st March (see June 1996 AST Progress Report) and the 8th June this year, a total of twenty-four MSW salmon and early running grilse caught by anglers fishing the River Dee were tagged and released. Fish were caught on the Kincardine, Borrowston, Carlogie, Balogie, Sluie, Kineski, Upper Crathes and Park beats. The behaviour of the fish after release was monitored up to the completion of spawning at the end of November. Some of the results obtained are as follows:

Two of the spring fish released in March were recaptured by anglers later in the season. The first fish which was released during a snowmelt spate on the Kineski beat (about a mile upstream) on the 4th of March was recaptured on the Invery beat near Banchory (about a mile downstream!) on the 11th of May. The fish was killed.



The second fish was tagged on the Borrowston beat near Kincardine O'Neil in the first week of March and was recaptured on the Glen Muick beat near Ballater on the 13th June. Shortly after being released for the second time it dropped back downstream to a pool at Upper Woodend where it remained for several weeks. Nevertheless, later in the summer it made its way back upstream to Aboyne and then on to Ballater where it entered the River Gairn - a large spawning tributary that joins the main river just upstream of the town.

One of the fish tagged at Upper Crathes in early May was subsequently found dead in the river. This sea-liced, early summer fish had moved upstream to Cairnton where it remained until early June. However, during the first spell of hot weather of the summer, it was detected moving back downstream through the Park estate to the Keith Pot. The fish was subsequently recovered from the river by a member of the public who described it as being silvery and in good condition but having large red blotches on its flanks. This condition was probably due to the effects of the bacterial disease furunculosis - a disease that is endemic among the salmon and trout of the Dee and many other rivers.

By the end of August, twenty of the original twenty-five fish tagged were still being followed. By this time contact had been 'lost' with three of the spring salmon due to tag failure or other reasons. These fish were last located at Aboyne, Glen Tanar and Abergeldie earlier in the summer. Two of this group remained undetected up to the end of the study. However, the third, (last located at the 'Kirks' pool at Glen Tanar in June) was briefly located again at the mouth of the River Gairn in early October.

Prior to spawning, eight of the spring salmon and the early running grilse were recorded to have entered six different upper tributaries of the river. These included the Ey (1), Clunie (1), Fearder (1), Girnock (1), Muick (1; the early running grilse) and Gairn (2). One other fish went as high as the Lin of Dee, ca. five miles west of Braemar where contact was lost. A fortnight later it was detected moving downstream (probably as a kelt) past Aboyne. The remaining five spring fish were scattered in the main-stem of the river between Glen Tanar and upper Invercauld during the spawning period.

Eight of the nine surviving MSW salmon tagged and released between early May and early June ran to areas in the middle and upper lower river - to Aboyne, Kincardine, Sluie and Banchory. The remaining fish, a small, coloured springer that was tagged at Sluie on the 22nd May subsequently entered the SOAEFD adult salmon trap on the Girnock burn in late October.

The results of this work suggest that most of the radio-tagged salmon returned to the river, survived to spawning; and that they continued their migration upstream to areas of the river known to be used by spring or summer running adult populations for spawning. Their distribution in early November is therefore entirely consistent with previous accounts of the stock structure of the river.

I would like to take this opportunity to thank all those proprietors, ghillies and their tenants for their co-operation and assistance in this study. Particular thanks go to John McGinley, Brian Sim, David Gibbon, Colin Simpson, Cliff Murdoch, Edwin White and Ian Ogden.

The findings of this study will be published as a Scottish Fisheries Research Report sometime next year.

## Meetings, presentations and publications

On the 21st of September I presented a paper at a conference organised by the Federation of Irish Salmon and Sea-trout Anglers in Skibbereen, Co. Cork, Ireland. The theme of the meeting was 'wild salmon management - the anglers options'. The subject of my presentation was 'The management of juvenile salmon populations in rivers - some new perspectives on low cost options'.

On the 27th of September I gave a brief presentation on the results of the catch and release radio-tracking project on the River Dee to the members of the Dee District Salmon Fishery Board and Dee proprietors at the Annual General Meeting of the Dee District Salmon Fishery Board.

A paper entitled 'Variation in the time of spawning of Atlantic Salmon (*Salmo salar*) and its relationship to temperature in the Aberdeenshire Dee' has been accepted by the Canadian Journal of Fisheries and Aquatic Sciences and will be published early next year.

\* \* \* \* \*

## WEST COAST FISHERY TRUSTS

(Andrew Wallace)

The autumn of 1996 saw the conclusion of the preparatory work of the West Coast Fishery Trust initiative which the West Highland Sea-Trout and Salmon Group, chaired by John Mackenzie, set on the road with the publication of its 'Action Plan' in April 1995. In spite of sniping from the press, the WHSTSG has confounded those cynics who view committees as a group of people who take minutes and waste hours.

The five new Trusts: West Sutherland, Western Isles, Wester Ross, Lochaber and Awe are now all operational. Each has secured sufficient core-funding and each now has a fishery biologist in post who individually and collectively have started tackling the many problems affecting sea-trout, salmon and trout fisheries on the West Coast of Scotland.

The five new Trusts, together with the West Galloway Fisheries Trust and the recently affiliated River Clyde Fisheries Management Trust, have formed an association - the Association of West Coast Fisheries Trusts - which is helping to co-ordinate the work of the Trusts, raise project funding and negotiate with the many organisations, both public sector, commercial and private, which have an influence on West Coast fisheries.

The result is an organisation with members whose Trusts cover a significant proportion of West Coast river catchments. Work is currently underway to look at how those areas as yet not covered by Trusts, in Ayrshire, Argyll and Skye & Lochalsh, could perhaps be integrated into the Trust initiative.

The work of the Trusts is also being closely co-ordinated with the Freshwater and Marine Laboratories of the Scottish Office who have been consistently supportive of the initiative.

With the essential groundwork completed, the real work now lies with the Trusts and there should be few illusions that the task will be an easy one. The stock situation on the West Coast, both salmon and sea-trout, is still extremely serious and the reasons far too complex to be explained away with simplistic arguments.

Fish-farming, habitat degradation, acidification, predation (both human and otherwise) and a miasma of nebulous marine factors are all implicated. But to establish the degree to which any or each of these might be contributing to stock declines, and how they might inter-relate, will require hard-work, competent practical fisheries research, patience and above all co-ordination both between Trusts and with the many other organisations both central and peripheral to the issues.

The Trust network will provide a frame-work for this work and the opportunity to develop an authoritative and co-ordinated voice to the management of West Coast rod-fisheries that can be used responsibly and taken seriously in the highly competitive and complex world of resource prioritisation and management. This in much the same way as we are currently witnessing being used to such good effect on several East Coast rivers.

Prophets of doom and despondency over the situation on the West Coast claim that they have become pessimists from listening to too many optimists over the last few years. But on the West, as in all areas of fisheries management there is no quick fix, tempting as it may be to cast around for one.

All those involved in the Trust initiative share the sense of frustration provoked, most notably, by the West Coast sea-trout stock collapse. But frustration and impatience alone will not solve the problem.

Difficult as the task ahead must surely be, it would be wise to bear in mind the definition of a pessimist as a person who, when faced with the choice of two evils, chooses both.

\* \* \* \* \*

## TITBIT

### 1997 Postal Fishing Auction

The 1997 Fishing Auction catalogues were sent out at the beginning of December with a closing date of Friday 31st January. Catalogues are only sent to those who request them. We send out almost 5000 a year!

\* \* \* \* \*

## SCOTTISH SALMON AND SEA TROUT CATCHES, 1995

*The Director is grateful to IFM (Scotland) for permission to reprint this article.*

In their recently published (November 1996) Fisheries Series Statistical Bulletin, the Scottish Office Agriculture, Environment and Fisheries Department (SOAEFD) reports that a combined total of 167,888 wild salmon and grilse (total weight 586 tonnes) was reported caught by all legal methods (rod-and-line, net-and-coble, and fixed engine) in 1995, substantially less than the corresponding figure (183,403) in 1994.

The 1995 catches comprised the following (to the nearest 100) by each method:

|                 |        |
|-----------------|--------|
| · rod-and-line  | 74,000 |
| · net-and-coble | 31,500 |
| · fixed engine  | 62,400 |

Compared to the 1994 figures, these showed a negative decrease for the rod (3.7%) and fixed engine (18.4%) fisheries, but a 4.6% increase for net-and-coble.

In terms of Salmon Fishery Regions, the North-East (South Esk, North Esk and Bervie, Dee (Aberdeenshire), Don, Ythan and Ugie Districts) accounted for the highest proportion (27.5%) of the Scottish wild salmon/grilse catch, with the East (Tweed, Forth and Tay Districts) slightly less at 27.4%. For individual Districts, highest combined catches were taken in the Tay (almost 27,000), followed by the North Esk and Bervie (17,600) and the Tweed (16,600).

Catches of 78,100 salmon (multi-sea-winter fish) and 89,700 grilse (one-sea-winter fish) accounted for 46.5% and 53.5% of the combined total wild catch. A total of 7,500 "Spring" salmon (January-April inclusive) were recorded, less than 10% of the total MSW catch. The majority (84%) of the springers were taken by angling.

The proportion of the rod catch returned to the water (catch-and-release) increased to 14% in 1995, compared with 8% in 1994, presumably indicating a greater awareness of the need to conserve spawning stocks.

The total of 485 farmed salmon and grilse reported caught and retained in 1995 was significantly less than in 1994 (1460). The West (35%) and North West (24%) accounted for the bulk of the farm origin fish in the 1995 combined wild and farmed catches.

The Scottish sea trout catch in 1995 (56,100) was very slightly down on the corresponding 1994 figure (56,500). Interestingly, unlike the wild salmon catches, rod-and-line (7.3% up) and fixed engine (18.3% up) sea trout catches showed increases compared with the previous year, while conversely, the net-and-coble return was down 24.5%.

For those wishing to obtain fuller details of the catch statistics for 1995, copies of the Bulletin are available, at a cost of £2.00 (including p&p), from:

The Scottish Office Library  
Room 1/44, New St. Andrews House, Edinburgh EH1 3TG  
(Tel: 01674 677070. Fax: 01674 672604)

## SANDEELS, SALMON SMOLTS, SEABIRDS, SEALS, AND SEA FISHERIES

(A.D. Hawkins, Marine Laboratory, Aberdeen)

*This article was first published in "The Salmon Net".*

World-wide, about a third of all fish caught are processed for the production of oil and meal, rather than human consumption. These so-called "industrial" fisheries can be very profitable, and they underpin major parts of the food industry, providing specialist oils for processed foods, and animal feeds. Most of these fisheries are based in the up-welling zones of the World's oceans, but there are also large industrial fisheries in the North Sea, where more than one million tonnes of sandeels, sprats and Norway pout are landed every year.

There has been much criticism of the industrial fishermen. This summer, there were concerted attempts by Greenpeace to prevent sandeel fisheries taking place on banks off the east coast of Scotland. Indeed, Greenpeace has called for an immediate ban on industrial fisheries in ecologically sensitive areas in the North Sea. Why are these fisheries so strongly opposed? Should they be more carefully controlled?

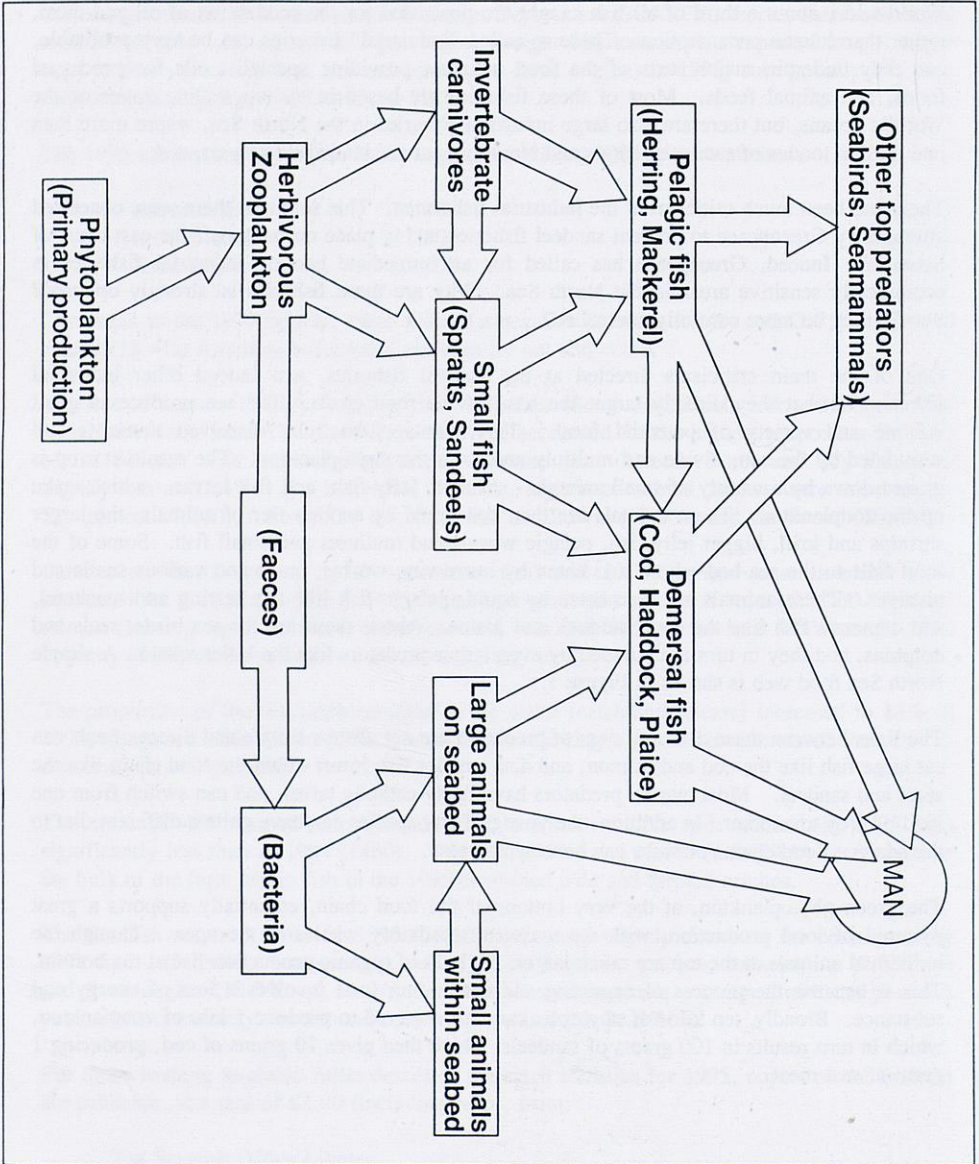
One of the main criticisms directed at the sandeel fisheries, and indeed other industrial fisheries, is that they directly target the base of the food chain. The sea produces a great volume and variety of potential food. Tiny plants, fuelled by dissolved nutrients and stimulated by the sun, divide and multiply and form the phytoplankton. The resultant crop is grazed down by a variety of small animals - shrimps, jelly-fish, and fish larvae - which make up the zooplankton. These animals are then consumed by another tier of animals, the larger shrimps and krill, bigger jelly-fish, pelagic worms and mulluscs and small fish. Some of the food falls to the sea-bed where it is eaten by burrowing worms, crabs and various snails and bivalves. These animals are then eaten by squid, pelagic fish like the herring and mackerel, and demersal fish like the cod, haddock and plaice. Above them are the sea birds, seals and dolphins, and they in turn are pursued by even larger predators like the killer whale. A simple North Sea food web is shown in Figure 1.

The links between these different tiers of predation are not always simple and direct. Seals can eat large fish like the cod and salmon, and also smaller fish lower down the food chain like the sprat and sandeel. Most marine predators have fairly catholic tastes, and can switch from one kind of prey to another. In addition, the young of any species can have quite a different diet to the adults. Food chains or webs can be very complex.

The green phytoplankton, at the very bottom of the food chain, essentially supports a great pyramid of food production, with the seals and predatory whales at the apex. Though the individual animals at the top are much larger, the bulk of organic production lies at the bottom. This is because the process of capturing and consuming food involves a loss of energy and substance. Broadly, ten kilos of phytoplankton are required to produce 1 kilo of zooplankton, which in turn results in 100 grams of sandeels, which then gives 10 grams of cod, producing 1 gram of seal meat.

**Figure 1**

A simplified North Sea food web, based on the main groups of organisms.



Man as a fisherman can derive his food from any level of the production pyramid. At one extreme, man can hunt the seals, as he once did, obtaining high grade red meat in large packages but only limited quantities. At the other extreme, it would be possible, though very laborious, to filter off the phytoplankton or zooplankton in massive quantities to produce an equally nutritious but very different tasting food. If maximising food production is a priority, then cropping the base of the pyramid is the best option. In general, however, people prefer the larger more tasty food items. The value per kilo is therefore much higher for cod, haddock and plaice, and it is these resources that most UK fishermen choose to target. It has to be recognised that this preference is not universally shared. The Japanese and Norwegians like to take a proportion of their seafood as whale and seal meat, while others deliberately target the smaller fish species lower down the food pyramid and then convert these into acceptable foods. Thus, Danish fishermen trawl with fine mesh nets for species like the sprat, sandeel and Norway pout, which they then turn into oil and meal. These products can be used directly in foods like margarine or fed to pigs, cattle, or farmed salmon to produce smaller quantities of more expensive and attractive food - essentially an extension to the process that is taking place in the sea.

There is no particular moral or operational reason why food should not be removed from a lower level of the food pyramid. If the actual bulk of food production is important, and taste and appearance is secondary, then it is quite proper to harvest near the base, where a greater bulk of material is available. The question of whether to fish for sandeels or cod is an economic, rather than a moral argument. Indeed, the balance of judgement would probably favour the sandeel fishery. Not only is that fishery capable of supplying more bulk, it could also be argued that because fish at the top of the pyramid are present in fewer numbers, and are slower growing and longer lived, they may be more vulnerable to over-fishing and may show only slow recovery from stock collapse. Their stocks may need to be managed more carefully. In truth, there is a case for pursuing a variety of fisheries, based on several tiers of the food pyramid, to provide for diverse tastes in food, and to avoid over-exploitation of any particular part of the marine ecosystem.

Especially strong criticism of the industrial fisheries has come, however, from those lobbying on behalf of wildlife conservation. It is argued that these fisheries are competing directly with sea birds and sea mammals for the smaller species of fish. In some coastal waters the state of well-being and fertility of some sea birds is said to be affected by a lack of food, brought about by the industrial fisheries.

It is inevitable that there is some competition between the top predators, whether these are sea birds, sea mammals or sea fishermen. The factors limiting the size of bird and mammal populations will include, alongside predation and the availability of suitable habitat, the provision of sufficient food to enable populations to sustain themselves. There will always be a limit to the breeding success of top predators. Many of the marine predator populations around the North Sea are currently in a very healthy state. Indeed, populations of some sea birds, including the herring gull, fulmar, gannet and cormorant, are at unprecedentedly high levels. Breeding numbers of these birds on North Sea coasts have increased at least tenfold since the beginning of the century. Grey seals too have increased steadily in numbers, and are currently growing at about 7% per year. Even killer whales appear to be on the increase. The growth of these predator populations almost certainly reflects the removal of predation, especially by man. However, the continuing growth of these populations also suggests that there is no shortage of suitable food.

How can this be so when many small fish are being removed?

The effects of removing large quantities at a particular level of the food pyramid are not well understood. One view is that the total production of organic material within the pyramid will tend to remain the same, subject only to fluctuations arising from oceanographic factors. If a particular species is removed in large quantities, there are others to take its place. With this theory, the loss of a species like the sandeel would result in other species cropping the food that is released. These in turn will be eaten by the top predators. The species replacing the sandeel will not necessarily be a fish, of course, and some top predators may be more flexible than others in cropping the newly abundant species. In recent years, the fishing industry itself has effectively provided a new source of food. It seems that some of the seabirds, like the fulmar and herring gull, have benefited from the discarding of fish by the fishing industry - a source of food which has increased greatly since the imposition of quotas on fish catches.

Seals too may show a great deal of flexibility in their diet. Paul Thompson and his colleagues have shown that common seals in the Moray Firth may switch their diet from one year to the next. When sprats and herring are abundant, they are eaten in preference to other species. When they are in short supply, then cod, sandeels and other species are eaten. Interestingly, however, the general state of health of the seals is less good when they are feeding on the non-preferred species.

Switching to alternative prey is not always possible and some predator populations can be seriously affected by food shortages, especially when they are competing with other, more flexible predators. In the Shetland Isles, some sea birds are almost entirely dependent on young sandeels, which they catch close to the coast. This reliance on a single prey species was highlighted during the 1980s, when there was a decline in the breeding success of some sea birds as a result of low sandeel abundance. Species like the arctic tern and puffin were particularly badly affected. Studies by Peter Wright at the Marine Laboratory showed that this low abundance of young sandeels in particular years at Shetland was the result of unfavourable oceanographic conditions affecting the early survival of sandeels and their immigration into Shetland coastal waters from spawning grounds to the south and west. The fishery was not primarily responsible for the shortage, though some might argue that it may have exacerbated the problem at a local level. Rather, the fishery suffered from the shortage of sandeels, just as the birds did. In these circumstances, where the supply of young fish is very variable, it is important that the fishery should be properly managed for its own sake. Both the small sandeel fisheries at Shetland and the fishery on the west coast of Scotland are now tightly regulated.

So far, we have not mentioned the Atlantic salmon, our main interest. The salmon is a freshwater fish which migrates into the sea to take advantage of the better feeding opportunities there. While they are in the sea, salmon largely feed on the smaller species of pelagic fish and crustaceans. They are fairly catholic feeders, however, and their diet at a particular time and place seems to depend on the main prey species available. Close to the coast, sandeels and clupeoid fish (herring and sprat) may predominate. Further offshore, and to the north, where the shelf-living prey species are much less abundant, other fish species like the blue whiting, argentine and capelin, and crustaceans like the shrimp *Themisto* may be more commonly eaten. Those of us with an interest in salmon fishing may argue that the salmon is a very valuable resource, and that it is worth foregoing any fishery for the smaller industrial fish in favour of better growth and survival for the favoured salmon. However, industrial fishermen do not see



things in the same light. They argue that the salmon is not in their area for very long and in any case it has many other things it can eat. To shut down a large fishery in the hope that this might provide more food for a transient visitor to the North Sea would be difficult to justify in their eyes. If the salmon is eating its prey in 'their' coastal waters they might even demand a grazing fee for allowing salmon to take a small proportion of their resource! This is, of course, the argument which has been used to justify the high seas fisheries for salmon.

Nevertheless, the salmon is an exceptionally valuable and vulnerable resource, and it is especially important to ensure that its food supply is not over exploited. It is also important that the salmon itself is not inadvertently harvested when it passes through waters exploited by sea fishermen. Salmon smolts enter the sea on the east coast of Scotland in April, May, and the first half of June. The post-smolts are initially quite small, around 14 to 18 cm in length. Their subsequent movements are somewhat of a mystery, and attempts to catch them in coastal waters in drift nets have largely failed. During recent investigations by the Norwegians off the continental shelf to the north west of Britain, small numbers of post-smolts were caught in the surface waters in June and July. This year, operating from the Scottish Research Vessel *Scotia*, Richard Shelton of the Freshwater Fisheries Laboratory caught over 160 salmon post-smolts early in June on the Wyville Thomson Ridge to the west of Shetland. The fish were caught in surface waters, and were feeding predominantly on small blue whiting and a variety of crustaceans. The presence of post-smolts so far north, early in June, is evidence that the fish quickly leave the coasts of Britain. While they are close to the coast, however, it seems likely that they will depend for their food on small fish and crustaceans in the surface waters, including juvenile sandeels. Sandeels are certainly found in the stomachs of returning adult salmon and sea trout caught along our coasts.

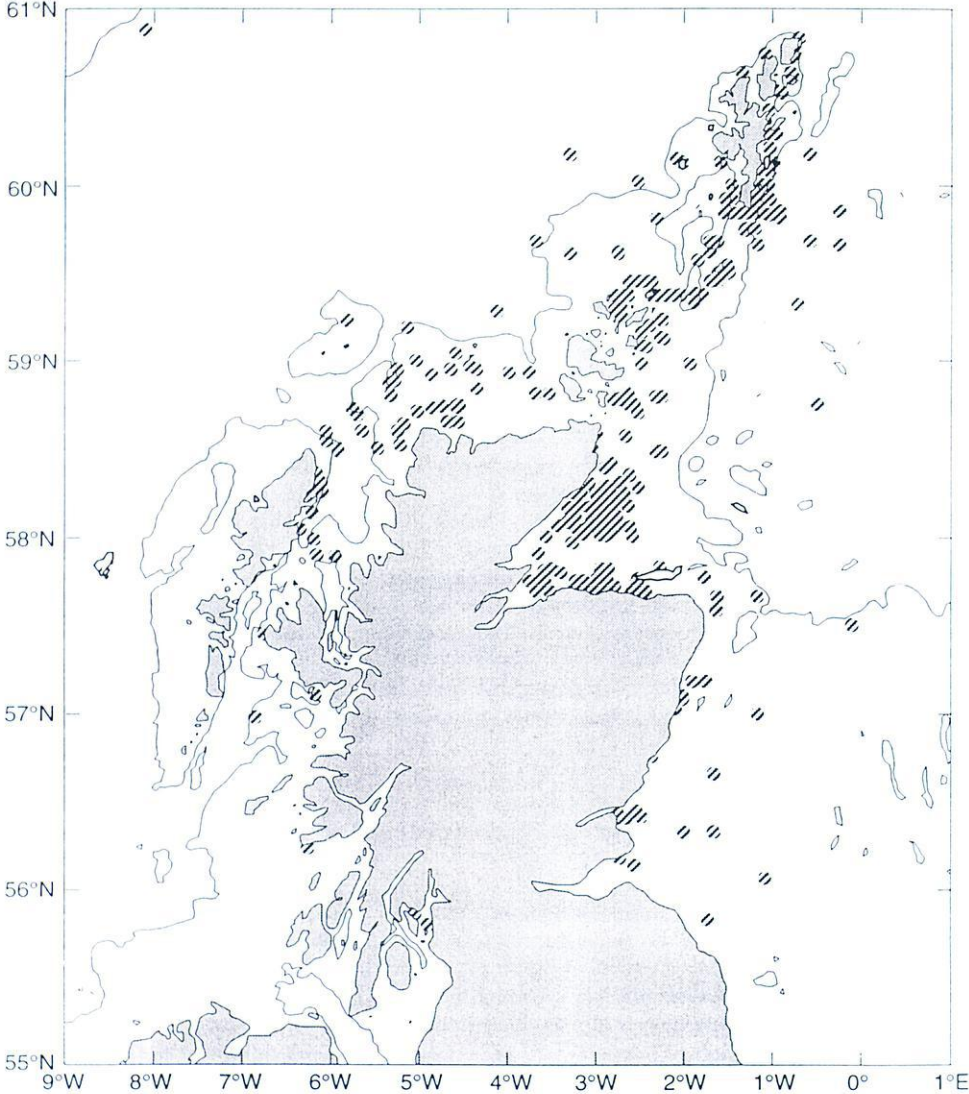
Adult sandeels are very choosy about their habitat. They live and spawn in sandy sediments, in which they can bury themselves, often located on 'banks' immediately off the coast. These banks are at known locations, and form a series of disconnected 'islands' (Figure 2). The sandeel larvae, and the subsequent juveniles have a far more extensive range than the older age classes and are subject to dispersal by the water currents. In the early part of the year the small '0' group larvae are distributed throughout the North Sea (Figure 3), and are scattered in mid-water. By April/May the larvae begin to school and by June/July the juvenile fish begin to settle on to the sandy sea bed, alongside the adult fish. By this time they are about 4-5 cm long.

It is not known whether the smolts emigrating from Scottish rivers go to the sandeel banks, and take the larger of the juveniles as they settle on the seabed. Certainly the settling '0' group sandeels are the right size to meet the needs of post-smolts. However, it seems more likely that the post-smolts remain in the surface waters as they migrate through the North Sea to feeding grounds further north, taking the more widely distributed larvae of sandeel and other species as food. It is important that we resolve this question. We must find out more about the movements of the post-smolts, and determine whether they are found near the seabed in the vicinity of the sandeel banks.

In June and July each year, many of the Danish industrial fishermen direct their attentions to the sandeel banks off the Scottish coasts and other eastern parts of the North Sea as well as those along the Danish coast, and on the Fisher and Dogger Banks. They trawl backwards and forwards on the seabed, using small mesh nets, to catch adult sandeels, and any newly settled juveniles.

**Figure 2**

Distribution of adult sandeels *Ammodytes marinus* in Scottish waters, determined from trawl surveys.





By any standards, the fishery is a large one, and currently it is essentially unregulated. Examination of the catches indicates that in June and July the catch of '0' group sandeels is small, suggesting that the fishery at that time is not competing with salmon post-smolts. The catches are routinely monitored by the Scottish Fisheries Protection Agency and in general they also appear to be 'clean'. That is, there is no significant by-catch of human consumption species. Sampling of the catches by the Marine Laboratory specifically for salmon post-smolts has not so far revealed a single one. However, it must be said that if only one in a million of the fish caught were post-smolts, it might nevertheless indicate that the fishery was having a serious effect upon the survival of salmon in the sea. The salmon is a very scarce fish by marine standards. More measurements are therefore needed from this fishery.

Where local and especially vulnerable species of wildlife, such as seabirds, or emigrating smolts are wholly dependent on sandeels for food, there is a strong case for regulating the sandeel fishery. There may be times of the year, and locations, where industrial fisheries are perfectly legitimate - where the by-catch of the human consumption species is minimal, and the risk of damage to the stocks of industrial species may be small. Currently, there is no indication that the current level of industrial fishing has resulted in any overall decline in the North Sea stocks of these species. However, there is a need for further consultation on the management of the industrial fisheries, backed up by more detailed scientific studies. The UK government is suggesting to the European Union that closer consideration be given to the management of the more intensive industrial fisheries, particularly where they lie close to the Scottish coast.

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## **THE ELECTRONIC TAG DEVELOPMENT PROJECT**

(John Armstrong, Freshwater Fisheries Laboratory, Faskally)

With the advent of new technologies it is possible to unravel some of the many mysteries that surround the lives of fishes. In studying Atlantic salmon, resistivity counters gave insights into run timing, the development of miniature radio transmitters allowed the tracking of individual fish through rivers, and new genetic methods are revealing aspects of the structuring of populations within rivers. A further technological advance that is opening up avenues to yet further knowledge is the development of passive identification transponders (PIT tags). Each PIT tag essentially comprises a microchip, which encodes a number unique to the tag, and a tiny copper coil which enables communication between the tag and a suitable interrogating antenna. The tags are small, being enclosed within a tube about 12mm long with a 2mm diameter, and so can be carried internally by salmon parr with no sustained effects on their growth or survival. There is no battery inside the tag, instead it is energised by an external antenna and then replies giving its number. This has the advantage that the tags have a long life. Therefore, they can operate in parr and smolts leaving the river and also in the same individual fish when they return as adults from the sea. A disadvantage of the method, compared with the use of radio tags, is that the detection range is relatively small so tags must pass close to an antenna to be detected.

Recent developments in the design of PIT-detecting antennae, both in North America and Scotland, allow the monitoring of movements of wild juvenile salmon within streams, and also of smolts and adult salmon migrating through regions where rivers are confined, such as fish-passes associated with hydro-electric installations. It may soon be possible to follow the passage of individually tagged salmon from their natal burn, on their downstream migration, to register their return to the river as adults and to follow their movements back to spawning grounds. Already, it is possible, in theory, to use PITs to study a large part of the salmon migration, provided that structures exist on the river to enable the successful operation of existing antenna techniques. The River Conon is particularly well-suited as a site for monitoring PIT tagged fish due to the presence of various structures that force salmon to pass through sufficiently narrow gaps. In addition, the extensive stocking and enhancement work that is taking place on the river facilitates a relatively high degree of control over an otherwise natural population of salmon. This will enable a degree of experimental manipulation that can rarely be achieved in natural river systems.

Together with the Scottish Office Agriculture and Fisheries Department, Scottish Hydro-Electric and the Conon District Salmon Fisheries Board, the Atlantic Salmon Trust is supporting the first stages of a project which will track salmon on the River Conon using PIT tags. Amongst the ultimate aims of the programme are: to make direct estimates of mortality of migrating salmon in relation to the abundance of predators in various sections of the river, to compare the movement and survival of fish migrating at different periods within the smolt run, to compare migration of fish of different genetic origins and from different in-stream environments, and to develop methods for operating fish passes more efficiently if necessary. However, the first stages of the project involve research into the best means of tagging fish (for example, by comparing the survival of salmon tagged as smolts and as parr) and an evaluation of the possibilities for incorporating new designs of reading antennae into various structures on the river. PIT tags allow unparalleled insights into aspects of the ecology of Atlantic salmon. Research currently underway on the River Conon is an important step in developing the technology for future use in a range of applications for studying salmon, and indeed other species of fishes, throughout the UK.

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## TITBIT

### Publications

"The Lives of Salmon" - by Alan Youngson and David Hay

*Published by Swan Hill Press, price £19.95*

This is a fascinating book which is a must for all those interested in salmon.

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## THE BEST LAID PLANS OF LICE AND MEN

(Dr. Sally Northcott & Dr. Andy Walker  
*Scottish Office Agriculture, Environment and Fisheries Department,  
Freshwater Fisheries Laboratory, Faskally*)

In the West Highlands of Scotland, in western Ireland and Norway, fish farmers and anglers despair at the damage caused by sea lice to their salmon and sea trout. These serious pests are expensive to control and even more costly to ignore but they are, at least, confined to the sea. However, where there is a niche to be filled, in this case living on the skin of a fish, there is invariably a creature to fill it. In fresh water a "distant cousin" of the sea louse, the freshwater louse, takes over.

Two species of freshwater lice are endemic in the UK, *Argulus foliaceus*, *Argulus coregoni* and recently a third species, *Argulus japonicus*, has been introduced. Found on a wide range of fishes and even on amphibians, they cause few problems when they occur in low numbers and probably go largely unnoticed by fishery managers, farmers and anglers. Occasionally, however, they undergo a population explosion with disastrous consequences for their fish hosts and for those whose livelihood depends on them. Just such an event was first reported in Scotland in 1994. Sandyknowes put-and-take rainbow trout fishery in lowland Perthshire reported heavy infestations of freshwater lice which killed large numbers of stocked fish and also naturally occurring sticklebacks. Over 1000 lice were found on individual rainbow trout. The owner closed the fishery during the summer with consequent loss of revenue. Despite supplying cool water to the loch from a bore-hole and removing large amounts of weed that may have harboured over-wintering eggs, a further outbreak occurred in summer 1995 and once again the fishery was closed. In winter 1995/96 the loch was almost drained in the hope that frost would kill most of the eggs at a time when few adult lice were present. Fortunately, Christmas was exceptionally cold with air temperatures as low as -22°C. It appears that this management technique has been successful because there has been little evidence of lice at all this summer let alone a population explosion. Annual draining of the loch appears to be the best policy.

The lice that plagued this fishery in 1994 and 1995 were *Argulus foliaceus* and were thought to have been introduced from the nearby River Earn which occasionally floods the loch. However, the lice found in the river turned out to be exclusively *Argulus coregoni*, and fish in Glenfarg Reservoir, which is supplied from the Earn, were also infected by this species. There was no sign that these lice were causing fish mortalities although some of the brown trout from the reservoir were quite heavily infested with up to 154 lice on a single fish.

Such outbreaks of freshwater lice have been reported elsewhere in the UK as well as abroad but this was a first for Scotland. The presence of *A. foliaceus* in Sandyknowes and *A. coregoni* in the River Earn were also the most northerly records for both species in the UK. Their distribution was examined just 25 years ago and so they appear to have moved further north in recent years. Similarly, *Argulus japonicus* was first recorded in the UK in 1992 but was not known here just ten years before. The species, *Argulus japonicus*, was thought to have been introduced with exotic fish but it appears to be restricted to southern England at present. It is possible that warmer weather in recent years has enabled these parasites to survive further north.

Clearly, it is vital that exotic parasites are not brought into this country and fish importers must ensure the correct certification for their supplies in order to avoid such introductions. Once present in our waters, it is essential to avoid spreading these parasites. Fishery managers and fish farmers should examine their purchases within the UK carefully and quiz their supplier for any possible risk of transporting parasites. Anglers too, should be aware that they may transfer parasites with bait and even on their waders and tackle, especially if these are kept cool and wet between fishing venues.

In studying the outbreak of freshwater lice in Scotland, a worrying trend emerged. With the exception of sticklebacks, both lice species appeared to infect game fishes in preference to coarse species. For example, roach, minnows and flounder were barely infected at all. The preference for salmonids is of particular concern in this country where angling fisheries and fish farming are primarily salmonid-based and of major economic importance. If freshwater lice are spreading north and as they are capable of devastating a put-and-take fishery, fish farmers and fishery managers may not find their lice problems confined to the sea.

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## **ENHANCEMENT OF SPRING SALMON**

**Proceedings of a One-day Conference held in the  
Rooms of the Linnean Society of London**

**26 January 1996**

**Edited by Derek Mills**

*This excellent Report, edited by Derek Mills, is available from the Trust's offices - price £12.*

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*The following extract from the latest report by Tweed Commissioners is of interest and emphasises the need to look at the past as well as the present.*

**TYPE OF SALMON CAUGHT IN TWO TWEED FISHERIES:-**

|                     | <b>Downstream of the Ettrick</b>   | <b>Upstream of the Ettrick</b>  |
|---------------------|--|---|
| <b>1895-1904</b>    | Small, Autumn fish dominate<br>No fish caught before 1st July  | ( no records )  |
| <b>1905-1919</b>    | 10-15% of catch are small fish,<br>caught before the 1st July  | Large, Autumn fish dominate<br>Almost no fish caught before<br>1st July   |
| <b>1920-1929</b>    | 30-40% of catch are small fish,<br>caught before the 1st July  | Large, Autumn fish dominate<br>Almost no fish caught before<br>1st July   |
| <b>1930-1949</b>    | 70-80% of catch are small fish<br>caught before the 1st July   | Large Autumn fish still very<br>important. But 15-20% of catch<br>are small fish caught before the<br>1st July. |
| <b>1950-1955</b>    | 70% of catch are small fish<br>caught before 1st July.<br>An element of large fish now<br>caught before 1st July as well | 70% of catch are small fish<br>caught before 1st July. Large,<br>Autumn fish now of little<br>importance        |
| <b>1956-1969</b>    | (no records)   | Proportion of small fish caught<br>before 1st July drops to around<br>15% over this period                      |
| <b>1970-Present</b> | Around 40% of catch are<br>small fish caught before<br>1st July  | Almost no fish caught before<br>1st July. Small, Autumn fish<br>dominate  |

This analysis shows the importance of knowing the past behind any present situation. In fact, if the past is not studied, the interpretation of the present can go very wrong. It is obvious from the above that there is no fixed level of any particular "population" of fish (defined either seasonally or by size) in any particular catchment but that change is the only constant. What drives such changes is unknown, but once the genetics results are in, we will at least know if we are dealing with a single or with different strains of fish in the two catchments.

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## 'PATHFINDER' PROJECT FOR TAMAR SALMONIDS

(Arlin Rickard: Director Westcountry Rivers Trust)

The Westcountry Rivers Trust has just unveiled an exciting new initiative, the **Tamar 2000 SUPPORT** (Sustainable Practices Project On the River Tamar) Project. In addition to working closely with farmers to develop sustainable catchment land management practices, it aims to conserve and restore key river and wetland habitats for salmon, trout and other wildlife.

The River Tamar is over 70 km in length with a catchment of 928 kilometres and forms the boundary between Devon and Cornwall for the greater part of its length. This new project comes swiftly after the Trust's own inception in 1994 as an environmental charitable trust formed, "to conserve, maintain and improve the natural beauty and ecological integrity of rivers and streams in the Westcountry".

The Trust, which works closely with riparian interests and farmers, identified the need for measures to further address a series of problems that affect areas of the Tamar catchment, these include the need to:-

- Reduce erosion and the sedimentation of salmonid spawning gravels
- Reduce diffuse pollution
- Conserve and restore wetlands and their function
- Restore river corridor habitats
- Sustain local communities which maintain the river

A "pathfinder" project, Tamar 2000 tackles the causes of the decline in water quality not just the symptoms, seeking to achieve its aims through a holistic approach offering a comprehensive package of professional advice and assistance to farmers and riparian owners. This may involve the production of a "Riverwise Plan". This integrated farm and river based management plan can be coupled with a series of support measures which include buffer zones, wetland re-creation, tree planting and funds for river bank fencing.

On completion of the **SUPPORT** project a number of specific quantifiable targets will have been achieved including:

### **Training and Advice**

- Specialist advisors trained in integrated land management planning;
- Training and advice on integrated land use management made available to 500 land owners linked to the development of new enterprises and employment.
- Over 300 land owners and farmers trained in integrated land use planning, informed of opportunities of diversification.
- Integrated management plans produced for some 300 areas of land;

## Environmental Improvements

- River corridor restored, replanted and stock drinking access provided;
- Vulnerable riverbank fenced;
- River corridor woodland regenerated/re-planted;
- Wetlands restored/improved;
- Sites of accelerated erosion reduced/controlled;
- Demonstration sites developed;
- Salmonid spawning areas improved;
- Streams cleared of obstructions;
- Habitat improvements in key areas;
- Buffer strips/zones developed;

## Technical Improvements

- A practical, integrated land use manual will be produced;
- A field tested training and advice system for improving land management will be developed;
- A Tamar catchment data base will be produced;

## Wetland Technical Improvements

- Maps identifying river marginal wetlands in the area, with a zoning of their capacity to carry out those functions that will alleviate impacts currently causing environmental degradation of the river corridors;
- Training in the use of wetland functional assessment procedures for those involved in the selection and management of buffer zones;
- A handbook for the identification, creation and management of buffer zones.

This innovative Westcountry Rivers Trust project is delivered in partnership with, the Wetland Ecosystems Research Group (part of the Royal Holloway Institute for Environmental Research, University of London), Farming and Wildlife Advisory Group, BDB Associates and Silvanus. It also enjoys the active support of the Environment Agency and South West Water Plc.

The £1.6 million project runs to the year 2000 and receives around half its funding from a combination of MAFF and EU sources, under EU Objective 5B, EAGGF Measure 5.1. The Westcountry Rivers Trust are working to secure the remaining funding from charitable Trusts, company sponsorship and other private contributions. **The Atlantic Salmon Trust**, Launceston Anglers Club, Tamar and Tributaries Fishing Association, Endsleigh Fishing Club, Lower Tamar Fishing Club, Strutt & Parker and a number of individuals have already generously supported the appeal.

It is intended that as the project develops it will not only help conserve existing stocks of salmon and trout but also allow an expansion in the present limited range and recruitment of salmonids in the catchment. The Westcountry Rivers Trust together with the project partners hope that the 'pathfinder' approach of Tamar 2000 will test and prove this method of encouraging sustainable land use which will be transferable to other EU catchments.

Further information: Arlin Rickard, Director, Westcountry Rivers Trust, Bradford Lodge, Blisland, Bodmin, Cornwall, PL30 4LF: Tel. 01208-851369 Fax. 01208-851376.

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## TWO ICELANDIC CONFERENCES, 1996 (Derek Mills)

The last week of September and the first week of October saw two fisheries conferences in Reykjavik. The first, held on 26th September, was a friendly informal affair arranged to celebrate the 50th Anniversary of the Institute of Freshwater Fisheries (Veidimalastofnun). The larger gathering was the Annual Science Conference of the International Council for the Exploration of the Sea (the 84th Statutory Meeting) held from 27th September to 4th October.

### 50th Anniversary Conference

Most salmon scientists know of the Icelandic Institute of Freshwater Fisheries headed for the greater part of its life by its first Director, Thor Gudjonsson, and since 1986 ably directed by Arni Isaksson, well known to those who attend NASCO.

The detailed account by Thor Gudjonsson of salmon and freshwater activities in Iceland over 40 years (1946-86) was a most impressive saga of how Iceland has managed its salmon resource so wisely. Much of the early work of the Institute, with an initial staff of two, rising to four in 1966 and fourteen in 1986, was centred on bringing the freshwater fisheries to order on the basis of the Salmon, Brown Trout and Char Fishing Act of 1932 (revised in 1957, 1970 and 1990). A major development in its life has been the advent of the Experimental Fish Farm at Kollafjordur which has achieved an international reputation, particularly with regard to ocean ranching.

A brief overview of the management of Iceland freshwater fish species by Arni Isaksson emphasised the private ownership of the resource which only allows freshwater and estuarine harvest of salmon. Icelandic salmon can therefore only be taken with rod and line or riverine gill nets, which were historically used in glacial rivers. The backbone of the management system in Iceland is the fact that the fishing rights in rivers and lakes are privately owned and go with the ownership of the surrounding land. The river owners are obliged to form fishing associations which take all major decisions regarding the fisheries as well as enhancement.

The research aspects have become of greater importance as staff size has increased and the Institute has now regional offices with resident scientists. Some of their work was presented and occasioned a great deal of interest among fellow scientists present from other countries. Presentations included: Classification of Icelandic watersheds to explain distribution; abundance and life history forms of freshwater fishes, by Sigurdur Gudjonsson; Smolt abundance and stock fluctuations, by Tumi Tomasson; Salmon enhancement, by Sigurdur Einarsson, Magnus Johannsson and Sigurdur Gudjonsson; Heritability and selection for sea-age at maturity in Atlantic salmon ranching, by Jonas Jonasson, a most thought-provoking paper with some implication of the results for changes in sea-age at maturity in natural salmon populations. The last paper was on the use of the new data storage tags. These tags record series of measurements from the environment of the fish, both pressure (depth), temperature and conductivity (salinity). The smallness, low weight (12 gms) and cylindrical shape of these tags allows their use on relatively small fish.

A fitting end to the Conference was a Reception by the Minister of Agriculture at which representatives from various overseas salmon institutes, organisations and associations were able to say a few words in congratulating the Institute on reaching its 50th Anniversary. It was my pleasure to relay the Trust's congratulations to the Institute and give our best wishes for its every success in the coming Millennium.

Anyone wishing bound copies of abstracts of the above papers should contact me via the Trust.

### ICES Annual Science Conference

The Open Lecture after the opening General Assembly of the 84th Statutory Meeting was "Physical and Biological Effects of the North Atlantic Oscillation" by Dr. R. Dickson of the Fisheries Laboratory, Lowestoft. This talk gave another perspective to the project with which the Trust is involved on the climatological study of sea surface temperature and salmon habitat. It is hoped to pursue some of the biological aspects (e.g. plankton abundance) with the Sir Alister Hardy Foundation for Ocean Science whose director I met and discussed the project with while at the Conference.

This year the Anadromous and Catadromous Fish Committee (Anacat) held a theme session on "Fish Restoration Programmes: A Time for Evaluation". Some of the papers presented in this session are summarised in the Current Review of Scientific Literature appearing elsewhere in this publication. There were some interesting papers given covering various aspects of salmon restoration. A rather unusual one was the collection of 4,100 wild-origin salmon parr from six Maine rivers which were then reared on in a freshwater hatchery until they became adult fish. These were then stripped and their eggs were held in the hatchery until the resulting fry had reached the feeding stage when they were released into their rivers of origin. A total of 1.2 million of these fry have so far been stocked. Assuming a 5-10% survival between the stocking of the fry and the parr stage, this means that a minimum of 50-100 parr will have replaced each of the original parr collected. Satellite rearing, which involves the establishment of small rearing facilities at remote 'satellite' sites and the rearing of swim-up fry in the autumn when they are released to appropriate sites, was not considered all that successful, as the fry were very conspicuous when released to the natural habitat through their having taken on the sky-blue colouration of their rearing basin. Danish scientists had tried to re-establish a new salmon stock in the Gudena River using five different (non-native) strains from the Conon, Atran, Lagan, Corrib and Burrishoole. To date it is too early to choose or disqualify any of these strains as their seaward migrating and returning times were different. A decade of salmonid habitat improvement in Newfoundland was summarised and the various projects described. There were two five-year programmes involving 62 and 80 projects respectively. Both received considerable government funding. Some have been successful and others failures.

In summing up, discussions ranged widely. One question raised was whether fish passage facilities should be provided at the start or end of a restoration programme. It was pointed out that often when various constraints (e.g. water quality, barriers etc) preventing salmon stocks from inhabiting a river were removed there was often natural recolonisation through straying. A number of examples were cited. In some instances straying rates can be quite high and in Iceland rates of 10% have been recorded.

While no official opinion was given for criteria for evaluation of a restoration programme, the general consensus was that it had been successful when a self-sustaining salmon population had been produced and there was no further need for any more remediations such as stocking.

During the normal Anacat sessions a number of papers were given on a wide range of subjects and the most pertinent to salmon work are given in the Review of Scientific Literature.

The future organisation of the various ICES committees is presently under review, as is the whole structure of the Organisation. If the proposed new grouping of committees and possible working groups is adopted then Anacat and the Working Group on North Atlantic SALmon will disappear into a much wider grouping. While one appreciates the need for re-organisation with a much greater attendance at the ICES statutory meetings (there was a record 500+ at the Iceland meeting), much of the informality and ease of information exchange between scientists and managers will inevitably be lost. However, things will remain the same for the 1997 meeting, to be held in Baltimore.

It would be a mistake to close without mentioning the closing days of the Conference being highlighted by the eruption of the volcano Grimsvotn under the Vatnajokull glacier. This subsequently led to massive flooding and the destruction of relatively new bridges and the one and only southern highway linking the west and east of the island. No salmon rivers were affected!

\* \* \* \* \*

## **REVIEW OF SCIENTIFIC LITERATURE ON SALMON**

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

### **1. Post Smolts**

Sampling Atlantic salmon in the NE Atlantic during summer: methods of capture and distribution of catches. M. Holm, J.C. Holst & L.P. Hansen. International Council for the Exploration of the Sea CM 1996/M:12.

In July/August 1991 the Norwegian Institute of Marine Research performed a pair trawling (two boat trawl) experiment with a surface trawl to catch young herring in the northern Norwegian Sea. Thirty-four post smolts and two 1-sea winter salmon were caught as by-catch. This was the first time post smolts were recorded in large numbers during fishing in the open sea in the North East Atlantic, although the area is believed to be one of the main feeding areas for salmon in the summer. A (one boat) pelagic trawl has been developed by IMR for scientific surveys of the pelagic fish stocks. In 1993 a study was made to test whether the new trawl would catch salmon. This study proved successful and consequently Atlantic salmon was included in a large scale ecology study in the Norwegian Sea, the so-called "Mare Cognitum Programme". In 1995, the first year of salmon surveys, in the MCP framework, in addition to

the trawl surveys, otter-board salmon trolling and salmon drift line fishing with an experimental line of 200 hooks were developed and tested. A total of 157 post smolts and nine 1-sea winter salmon have been caught in surface hauls since 1991. The fish have been caught in an area stretching from west of Scotland and the Hebrides up to 75°N and 18°E. Sampling was from June to mid-August.

Observations on abundance, stock composition, body size and food of post smolts of Atlantic salmon in the NE Atlantic during summer. J.C. Holst, L.P. Hansen & M. Holm. International Council for the Exploration of the Sea CM 1996/M:4.

Post smolt salmon were caught during pelagic trawl surveys in the Norwegian Sea in July-August, 1991 and 1995, and off the Hebrides in May-June, 1995. Using the swept area technique abundance estimates of post smolts were produced for three areas giving estimates of 3.18 million post smolts within the sampled area of the Norwegian Sea in 1991, 12.89 million within the sampled area of the Norwegian Sea in 1995 and 3.26 million post smolts within the sampled area off the Hebrides in 1995. The smolt age distribution of the post smolts indicated a large component of post smolts with a southern origin, both of these caught off the Hebrides and in the Norwegian Sea. Only a small fraction of the post smolts had empty stomachs. Parathemisto spp. and 0-group herring, redfish and blue whiting were the dominant food items.

## 2. Adult Salmon - Sea.

The food of Atlantic salmon, Salmo salar L., north of the Faroe Islands. J.A. Jacobsen & L.P. Hansen. International Council for the Exploration of the Sea CM 1996/M:10.

The food of salmon was investigated from samples taken in a research fishery for salmon north of the Faroes. The salmon caught on floating long-lines were sampled in November-March during the three consecutive fishing seasons 1992/93, 1993/94 and 1994/95. The contents of 3,848 stomachs were examined. Crustaceans of the genus Themisto and euphausiids and shrimps were the most frequent organisms in the stomachs followed by pelagic and meso-pelagic fish such as lantern fish, pearlsheds and barracudinas. In total number the crustaceans accounted for more than 80% of the food. However, in weight, more than 60% of the food was fish. Early in the fishing season (November-December) crustaceans were the dominant food item whereas fish were the most important food item during February-March. The available prey sampled from fifteen plankton net tows at 0-50m depths generally included the same species as were found in the stomachs, although salmon did not appear to feed on Sagitta (arrow worms) or Calanus finmarchicus (copepods) that were observed in the plankton samples.

Aspects of sexual maturation in Atlantic salmon suggested by elemental analysis of otoliths and gonadosomal indices. K.D. Friedland, D.G. Reddin, N. Shimizu, R. Haas & A.F. Youngson. International Council for the Exploration of the Sea CM 1996/M:3.

The abundance of North American salmon that mature after two sea winters has been correlated to the areal extent of thermal habitat in the Northwest Atlantic, thus suggesting a related link to the maturation process. The maturity state of salmon caught in the

Newfoundland-Labrador fisheries during the period 1985-88 was examined and it was found that many fish believed to be on feeding migrations were in a state of sexual readiness. To attempt to clarify the meaning of these data, chronological transects of strontium:calcium ratios from the otoliths (ear stones) of maturing and immature 1-sea winter fish were examined. The ratios for immature fish suggested that sexual readiness was achieved during the feeding migration and that maturation regression occurred in the absence of migrational cues to begin a spawning migration. Maturing fish were found to have similar Sr:Ca ratios to the immature fish of the same stock. A hypothesis is developed that post smolts that make a northerly migration after their first sea winter fail to receive cues to begin spawning migrations and thus continue on feeding migrations and regress in their maturation state. Alternatively, fish that make a more southerly migration receive cues associated with their natal rivers and develop sexually, thus invoking other behaviours to find their spawning sites.

### 3. Adult Salmon - Fresh Water

Exploitation ratio of salmon in relation to salmon run in three Icelandic rivers. S. Gudjonsson, T. Antonsson & T. Tomasson. International Council for the Exploration of the Sea CM 1996/M:8.

The average exploitation ratio in the River Ellidar was 0.36, in the River Blanda 0.62 and 0.75 and in the River Upsa (a tributary of the Midfjardara) it was 0.75 and 0.85 for grilse and salmon respectively. For hatchery smolts the exploitation ratio in the River Nupsa was 0.66 and 0.77 for grilse and salmon respectively. The exploitation rate was generally higher in years with a small run of fish than in years with a large run.

The closure of commercial netting in R. Hvita, Iceland. Effects on rod catches of salmon (Salmo salar) in the tributaries. S.M. Einarsson & G. Gudbergsson. International Council for the Exploration of the Sea CM 1996/M:7.

Since 1991 there has been no commercial netting of salmon in the R. Hvita in Borgarfjordur due to a temporary agreement to lease the net fishing rights to fisheries associations of the R. Hvita tributaries. The aim of the agreement is to enhance the rod fishery. The results to date show that rod catches in the tributaries (e.g. Nordura, Tvera, Grimsa, Flokadalsa, Reykadalsa, Gljufura and Andakilsa) are 20.6% higher on average than predicted values indicating a positive effect of the net fishery closure for the period investigated.

Differences in the time of river entry of Atlantic salmon, Salmo salar L., spawning in different parts of the River North Esk. D.W. Summers. Fisheries Management and Ecology 1996, 3, 209-218.

Spawning adult salmon were sampled in five tributaries of the River North Esk during the winters 1989/90 and 1990/91. The fish furthest upriver had higher sea- and smolt-ages and the one-sea-winter fish were smaller and more coloured than those spawning further downstream. These differences indicate that the uppermost tributaries are populated by fish which enter the river early in the year and the lowest tributaries by fish entering late in the year. It is suggested that these differences may be adaptive and that selection effects may be continually modifying these populations.

Environmental influences on the timing of spawning of Atlantic salmon, *Salmo salar* L., in the River North Esk. D.W. Summers. *Fisheries Management and Ecology* 1996, 3, 281-283.

Geographic differences in the time of spawning were found within the River North Esk system. Spawning activity occurred progressively later at lower altitude. In the three streams with the highest altitude, spawning commenced during a period of elevated discharge when the median daily temperature was around 6°C (late October). Spawning was not observed in two of these streams after mid/late November, when both temperature and discharge had decreased. Spawning ceased in the third stream in early December despite similar conditions to those prevalent when spawning took place being experienced later in the season. In one of the streams at a lower altitude no spawning occurred before mid-December despite high water levels concurrent with temperatures similar to those which occurred in the upper streams when salmon were spawning. In the other stream at low altitude most spawning activity occurred late in the year. Therefore, unlike in the upper tributaries, salmon in the lower tributaries did not appear to spawn at the first apparently suitable opportunity. This suggests that salmon in different parts of the North Esk do not attain full maturity at the same time. Other factors may determine when a salmon is ready to spawn and only then may environmental cues be important in determining when spawning actually takes place.

#### 4. Salmon Restoration.

*(The following papers, except for CM 1996/M:6, were among those presented in a theme session entitled "Fish restoration programmes: A time for evaluation" at the ICES Annual Science Conference held in Reykjavik in September.)*

Utilisation of wild Atlantic salmon parr as captive broodstock in USA restoration programs. E. Baum, T. King & J. Marancik. ICES CM 1996/T:2.

Since 1992 more than 4,100 wild-origin salmon parr have been collected from six Maine rivers and reared to maturity in fresh water. Overall, about 65% of the parr matured after two years in captivity. A total of 1.2 million feeding fry have been stocked into their rivers of origin during the initial two years of this programme. Each parr which survived to maturity (both sexes combined) has resulted in the production of 1,200 feeding fry for restocking purposes.

Integration of satellite-reared parr to the Upsalquitch River, New Brunswick. F. Whoriskey, K. Banggaard & K. Brown. ICES CM 1996/T:3.

Satellite-rearing uses volunteer helpers to raise 0+ salmon parr from hatch until age four months for an autumn release to the wild. The fry were 30% larger than similar aged wild fish, but had assumed the sky-blue colour of their rearing basin and were evident to predators. They dispersed little following their release and tended to occupy areas of higher current velocity than wild fish. Satellite-reared fish and wild fish both used the gravel as a refuge, but the reared parr were slow to adopt indigenous foods. The satellite-reared fish quickly adapted to fall riverine conditions, but growth advantages may not extend to the second year.



Evaluation of a stocking programme to enhance spring salmon runs on the River Test, southern England. I.C. Russell, E.C.E. Potter, D.J. James and I.K. Johnson. ICES CM 1996/T:4.

In the late 1980s, in an effort to arrest the decline of spring salmon on the Test, local fishery managers sanctioned the stocking of salmon parr and pre-smolts derived from a Scottish salmon stock characterised by a large proportion of MSW fish. More recently, the size of the stocking programme has been increased, with very large numbers of fry and parr being introduced. There were significant differences in the allele frequencies at the AAT-4\* locus between fish from the Test and from introduced stocks and this therefore could be used as a marker to assess the effects of the stocking programme. Changes in the frequency of the AAT-4\* 100 allele indicate that the stocking has resulted in a significant introgression of the Scottish genotype into the local stock. However, there has been no evidence of an increase in the MSW component over the duration of this enhancement programme.

Study on five different (non native) Atlantic salmon strains in first and second part of a salmon rehabilitation project in River Gudena - Denmark. G. Holdensgaard, C. Pederson & S. Thomassen. ICES CM 1996/T:10.

To re-establish a new salmon stock in the River Gudena five different Atlantic salmon strains have been released in the river since 1990. Two strains originating from Sweden: River Atran and Lagan, two from Ireland: Corrib and Burrishoole and one from Scotland: Conon. The preliminary results show a difference between the strains. In the seaward migration both in the river and the brackish fjord the Swedish strains Atran and Lagan show a higher preference for the main current. In migration velocity and timing the three strains Atran, Lagan and Corrib are faster and earlier migrating than Burrishoole and Conon. The return to homewater is also different among the strains, but there is no connection with the seaward smolt migration performance since the strains Burrishoole, Atran and Conon have a higher return success compared to that of Lagan and Corrib. From these preliminary results it is still too early to choose or discard any strain as the future Gudena stock.

A decade of salmonid habitat improvement and restoration in Newfoundland, Canada: What have we learned? D. Scruton, K.D. Clarke, T.C. Anderson, A. Hoddinott, M. van Zyll de Jong and K. Houston. ICES CM 1996/T:17.

There has been a large interest in the economic potential of the recreational salmonid fisheries in Newfoundland over the last ten years. In the light of this interest, there have been a number of government sponsored habitat improvement and restoration programmes undertaken in the Province. An important part of these programmes has included scientific evaluation of key projects to provide information on the effectiveness of techniques and approaches taken. Projects are presented as case studies in relation to programme components including: (i) habitat inventory, (ii) planning and delivery, (iii) projects restoring habitat degraded from historic forest harvesting practices, (iv) projects where migration barriers were removed to open new habitat, and (v) projects improving habitat through the use of instream structures. A major project involving construction of artificial fluvial habitat as compensation for habitat destroyed by highway construction is also discussed.

Maintenance of angling through smolt release in the Ranga River in southern Iceland. M. Johansson, A. Isaksson, S. Oskarsson & Th. Ellidason. ICES CM 1996/M:6.

Releases of massive numbers of smolts into the Ranga river were started in the late 1980s. This was primarily a sea trout river with poor salmon habitat (i.e. a very sandy river bed). Since the start of the project yearly releases have been gradually increasing from 21,000 smolts in 1989 to 148,000 in 1992. The resulting angling catches have ranged from 450 to 1600 salmon, primarily grilse, and the river has twice been among the top three angling rivers in Iceland. The project has demonstrated that angling can be maintained artificially through smolt release in a fairly large river and that the recaptures, as demonstrated by tags, tend to congregate close to the respective adaption ponds used for the release.

## 5. Sea Trout.

Migratory pattern of wild sea trout (Salmo trutta L.) in S-E Iceland recorded by data storage tags. J. Sturlaugsson & M. Johansson. International Council for the Exploration of the Sea CM 1996/M:5.

Sea trout were tagged with data storage tags and conventional tags in the River Grenlaekur, SE Iceland in early May, 1995. The data storage tags measured both pressure (depth) and temperature with a four hours interval during periods of up to four months. Data storage tagged trout showed a strong negative relationship between length at tagging (39-65cm) and the cumulative temperature experienced in fresh water until sea migration, as the biggest fish started their sea migration in late May and the smallest in mid-June. The recordings showed that fish migrated into sea water predominantly nocturnally. The growth of the sea trout in the sea was negatively related to their length at tagging. During sea migration the fish spent most of their time in the top five metres, but deeper dives were taken down to a depth of 26 metres. After a period of 33 to 97 days in the sea, fish entered fresh water to spawn and/or overwinter. In fresh water, the fish showed a diurnal rythm in depth, staying deeper during the day.

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# THE ATLANTIC SALMON TRUST LIMITED

## TRUSTEES' ANNUAL REPORT

### PART 1. OBJECTIVES AND FINANCIAL REVIEW

The Trustees are pleased to present their Annual Report and the audited Financial Statements for the year ended 30 June 1996.

#### 1. OBJECTIVES AND FUNDING

- (i) The principal objective of the Atlantic Salmon Trust is to protect and enhance the stocks of salmon in the United Kingdom for the benefit of the community. To achieve this objective, it draws the attention of the appropriate authorities to the particular dangers and problems facing the salmon; it offers advice to Government Ministers and their departments and to the European Union; it finances scientific research, arranges workshops and international conferences and publishes booklets on matters of general and scientific interest about salmon for the mutual benefit of salmon managers, scientist and anglers.
- (ii) To raise the necessary finance to meet its objectives, the Trust is entirely dependent on donations and wherever possible on sponsorship and/or comparable financial support towards the costs of scientific projects and the related salmon conservation activities which it undertakes. During the year ended 30 June 1996, the Trust was particularly fortunate to receive two grants which have ensured continued involvement in an important scientific project both during the year and in the current financial year ending 30 June 1997. The Robertson Trust donated £25,000 in September 1995 which ensured continuation of John Webb's studies into the maximisation of progeny numbers from natural spawning. In May 1996, the Dulverton Trust gave a sponsorship grant of £20,000 which will similarly finance John Webb's project during the current year. The Trust is especially indebted to both donors for their extremely generous financial support.
- (iii) The costs of managing the Trust's varied activities are mainly funded by investment income and by covenanted and general donations. As a registered charity, the Trust is entitled to reclaim the tax effectively included in both its investment and covenanted income. Covenanted donations are therefore encouraged wherever possible, as the tax recoverable over the minimum four year covenanted period is a material factor in the Trust's total income resources. Covenanted donations received during the year ended 30 June 1996, together with the tax recovered, totalled £16,800, an increase of £1,900 over the previous year. Non-covenanted donations of £250 or more also attract a tax recovery if made under the Inland Revenue Gift Aid Scheme and the Trust also benefited from this particular relief during the year.
- (iv) A particularly important financial objective is to plan for investment income to be maintained at a level which will sustain the costs of managing the Trust's activities both now and in the future. It is not, however, always possible to ensure that expenditures on major ongoing projects are exactly matched by the income generated within the same financial year in which the expenditures are actually incurred. In such circumstances, the policy agreed by the Council of Management is that it would be both prudent and realistic to finance any temporary shortfall from capital so as to avoid any undue delay or restriction of the underlying projects concerned. The utilisation of capital funds has not been necessary since the year ended 30 June 1994 and is not, it is emphasised, a long-term option under any circumstances.

#### 2. REVIEW OF OPERATIONAL ACTIVITIES FOR THE YEAR

- (i) The operational surplus for the year ended 30 June 1996 amounted to £11,400 (1995: £3,500), an increase of £7,900. The increase was due to a number of factors but was particularly influenced by two extraneous items in the year, namely:
  - (a) additional income of £5,500 from the distribution of shares by Southern Electric in the National Grid Group.
  - (b) a legacy of £2,000 from the Estate of Mrs. Sheila Bonsor deceased.Items (a) and (b) are specifically referred to later in this Report.
- (ii) The investment income also increased substantially (by £7,500) to £60,200 (1995: £52,700) but this mainly resulted from the Trust's shareholding in Southern Electric and the involvement of the electricity generating companies in the National Grid Group. The National Grid shares were, in turn, distributed by the generating companies to their own shareholders, including the Trust, and were treated for both accounting and tax purposes as an income (as opposed to a capital) distribution, thereby attracting the normal tax recovery available to registered charities. Southern Electric simultaneously paid a special net dividend of £1,250 to the Trust and the combined effect of these transactions, including the tax recovered, amounted to £5,500. The remaining increase in investment income arose from the interest received on the Coutts investment deposit account, resulting from greater deposits from the successful Postal Fishing Auction and from general investment policy changes during the year. Bank interest income accordingly increased by £2,600 to £3,200.

- (iii) It will be appreciated that the Southern Electric transactions referred to above boosted investment income to a level which is not likely to be sustained during the current year ending 30 June 1997. The Trust's shares in both Southern Electric and the National Grid Group were in any case subsequently sold as part of the overall investment portfolio strategy.
- (iv) In an overall review of the operating activities during the year, the following items deserve special mention:

#### Postal Fishing Auction

This has continued to be a great success and raised £35,700 for the Trust, an increase of £4,000 over the previous year. The Trustees gratefully acknowledge the continuing interest in this important activity and the generosity of the donors of the fishing rights. They also wish to record their appreciation of the major efforts of the Director and his secretary at Pitlochry office, without which this significant contribution to the Trust's finances could not have been achieved.

#### Raffle of fishing rods

David Norwich, rodmaker, generously donated two rods (a 13' and 15') in a leather case for the Trust to raffle, the draw having taken place at the Moy Game Fair on 3 August 1996. The total raffle proceeds amounted to over £3,000, a result beyond all expectations and the Trustees wish to record their appreciation of Mr Norwich's most generous gift. Raffle proceeds collected to 30 June 1996 amounted to £1,800 and have been carried forward in the financial statements as deferred income. The total proceeds of £3,000 will feature as a separate income item in the accounts for the year ending 30 June 1997.

### 3. Scientific projects

- (i) The gross expenditures incurred on scientific projects financed by other organisations during the year totalled £70,900 (1995: £61,500) and the Trust expended a further £17,900 (1995: £10,400) on projects financed from its own resources. Continuing from the previous year, certain of the projects financed by other organisations included the Scottish Office Agriculture Environment and Fisheries Department (SOAEFD), supported by other organisations, with the Trust employing the project personnel and handling the payroll. The Trust levies an administration charge to cover the payroll management costs, which amounted to £1,300 for the year (1995: £1,800). Third party financial contributions brought forward at 1 July 1995, plus further contributions received during the year ended 30 June 1996 totalled £105,800 of which £70,900 was actually expended. The remaining unutilised contributions of £34,900 were carried forward at 30 June 1996 and will be utilised on ongoing scientific projects during the current year ending 30 June 1997.
- (ii) An important long-term project continued from the previous year was John Webb's study of the maximisation of progeny numbers from natural spawning and this will extend into the year ending 30 June 1997 and beyond. A major project carried over at 30 June 1996 was Dr. Ian Smith's studies into research trap design, environmental influences and migration and angling success but this had to be temporarily suspended as a result of his resignation. The project was, however, continued until 31 October 1996 by Dr. Tobias Carter, pending further funding by SOAEFD.
- (iii) An important new long-term project which commenced in September 1995 was the Shieldaig sea trout electrofishing and habitat survey, financed jointly by SOAEFD, the Scottish Enterprise companies, Scottish Natural Heritage, Ross & Cromarty District Council and sundry other Scottish organisations. This particular project is continuing into the current financial year. Other scientific projects involving the temporary engagement of scientific personnel and undergraduates have included (a) electronic archives of sea trout catch statistics (b) a parasite argulus foliaceus study and (c) an investigation into the effects of the discharge of cooling waters from distilleries on the lifecycle of salmon in the River Fiddich, sponsored by United Distillers, a subsidiary of Guinness plc. United Distillers contributed £10,000 in March 1996 to finance this project and have made a further grant of £10,000 during the year ending 30 June 1997 of which £5,000 was spent on a specific project of their choice, with the remaining £5,000 as a general donation to the Trust. The Trustees are very grateful for United Distillers' involvement and for their generous financial contributions to the Trust's finances.

### 4. Operational results

- (i) As already mentioned in paragraph 2 of this Report, the various operational activities during the year, together with investment income and the extraneous items already referred to, resulted in an overall surplus of £11,400, an extremely satisfactory financial outcome, given that scientific project expenditures continued to be maintained at an ever increasing level. The additional funds generated from the operational surplus will, of course, be utilised towards continuing direct charitable expenditures during the current year ending 30 June 1997, in accordance with the principal salmon conservation and enhancement objective of the Trust.
- (ii) There were no fundamental changes in the Trust's investment portfolio during the year and the Finance Committee has continued to have regular meetings with the managers to ensure that the appropriate ratio between equities, government and corporate 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 longer term. In view of the volatility of the London stock market during the year and the possibility of either renationalisation or a "windfall" tax on utilities if there were to be a change of government in 1997, it was decided to dispose of the Trust's holdings in electricity and water shares and to reinvest the proceeds in additional government stocks on a relatively short-term basis until such time as it was deemed appropriate to move back into "blue chip" equities. The resultant disposals of these particular holdings, coupled with other routine changes in the portfolio during the year, generated realised capital gains of £59,700 (1995: £27,800) which, in accordance with the Trust's accounting policy, were transferred to reserves, i.e. not utilised for operational purposes.

- (iii) Given the somewhat volatile nature of the UK stock market in recent times, the market value of an investment portfolio at each year end (or indeed at any date) does not necessarily indicate a longer-term trend. At 30 June 1996, the market value of the portfolio amounted to £943,000 (1995: £885,600), an increase of £57,400. As, however, the historical cost of new acquisitions in the year totalled £69,000, the excess of the market value of the portfolio over historical cost at the year end fell by £11,600. The following figures illustrate the position:

|   | <u>Market value</u> | <u>Historical cost</u> |
|---|---------------------|------------------------|
| At 30 June 1996                         | 943,000             | 702,900                |
| At 30 June 1995                         | 885,600             | 771,900                |
|   | 57,400              | (69,000)               |
|   | (69,000)            | -                      |
| <u>Reduction in excess market value</u> | <u>(£11,600)</u>    |                        |

- (iv) For the first time in the Trust's history, the total assets have exceeded £1 million (at £1,050,000) with capital and reserves of £1,014,000. The Trust therefore continues to remain in a very healthy financial position, although it is important to emphasise that maintaining the total income level in the future is a vital pre-requisite to the Trust's ability to continue to finance important scientific projects.

#### 5. Future projects policy

The Trust will be involved in and continue to support several important scientific projects during the year ending 30 June 1997. These will, in particular, include John Webb's project, in conjunction with the Scottish Office, on the maximisation of progeny numbers and the Sheildaig study on the electrofishing and habitat survey of sea trout. The Trust has also committed two further annual payments of £6,000 in each of the years ending 30 June 1997 and 1998 to the University of Lancaster towards a three year study of flow dynamics of water in redds. With a payment of £6,000 already made during the year ended 30 June 1996, the Trust's total contribution to this particular project will have amounted to £18,000 by 30 June 1998. Other projects to which the Trust is giving financial support include a £5,000 commitment to the Westcountry Rivers Trust towards their major environmental studies on the River Tamar and a contribution of £6,000 for the purchase of passive integrated transponder (PIT) tags and a data recorder by Freshwater Fisheries Laboratory, Faskally.

#### 6. Staff

The Trustees wish to express their gratitude to the Director, John Mackenzie and to the Deputy Director, Jeremy Read for their untiring efforts in the continuing fight for salmon conservation. Their professional knowledge and approach to the many problems and their efficient liaison with other organisations in furthering the Trust's objectives are largely responsible for the high reputation that the Trust continues to enjoy.

#### 7. Legal and administrative information

The new Statement of Recommended Practice (SORP), issued by the Charity Commissioners for England and Wales in October 1995, with the approval of the Accounting Standards Board, requires certain legal and other administrative information to be given by Trustees of registered charities, as part of their Annual Report. This information is given in Part II of this Report, together with an Appendix listing the names of the Trustees and is intended to form part of the overall Trustee's Annual Report in conjunction with Part I. The Trustees' Annual Report will therefore replace the Chairman's Report, as previously incorporated into successive December Progress Reports issued by the Trust.

Signed on behalf of the Trustees (Council of Management)

Colonel H.F.O. Bewsher, LVO, OBE (Chairman)..... *H.F.O. Bewsher*

Major General J. Hopkinson, CB (Vice-Chairman)..... *J. Hopkinson*

Mr. M. D. Martin (Member of Council)..... *M.D. Martin*

4 December 1996

TRUSTEES' ANNUAL REPORT (Continued)

PART II: LEGAL AND ADMINISTRATIVE DETAILS

The following information, together with that contained in Part I of the Trustees' Annual Report is in accordance with paragraphs 27 and 28 of the Statement of Recommended Practice (SORP) issued by the Charity Commissioners for England and Wales in October 1985 and approved by the Accounting Standards Board:

1. The full name of the charity is The Atlantic Salmon Trust Limited, incorporated on 21 April 1967 under the Companies Act 1948.
2. The governing document is the Memorandum and Articles of Association; the charity is constituted as a Company Limited by Guarantee and not having a share capital. The charity and company registration numbers are 252742 and 904293 respectively.
3. The names of the charity Trustees who have acted at any time during the year ended 30 June 1996 are listed in the Appendix to Part II of this Report. All such Trustees comprise the Council of Management, the governing body of the Trust, responsible for policy and the general administration and monitoring of the Trust's activities. Five of the Trustees are also elected members of the Finance Committee, reporting to the Council of Management. The method of appointment or election of Trustees is governed by the Trust's Memorandum and Articles of Association which, inter alia, also provides for the periodic retirement by rotation of one-third of the Council of Management members and their re-election where appropriate.
4. It is intended that the financial review and other matters contained in Part I of the Trustees' Annual Report shall also serve as the Director's Report required by Section 234(1) of the Companies Act 1985. In that connection, the names of the Trustees who also acted as Directors of the Trust during the year ended 30 June 1996 were as follows:

Colonel H.F.O. Bewsher, LVO, OBE (Chairman)  
Major General John Hopkinson, CB (Vice Chairman)  
Mr. M.O. Martin (Member of Council)

5. The registered office of the Trust is Fishmongers' Hall, London EC4R 9EL, with the principal office situated at Moulin, Pitlochry, Perthshire PH16 5JG.
6. The names and addresses of other relevant organisations acting for the Trust are as follows:
  - (i) Bankers: The Bank of Scotland, 76 Atholl Road, Pitlochry, Perthshire PH16 5BW
  - (ii) Auditors: Davies Watson, 15a Lesbourne Road, Reigate, Surrey RH2 7JP
  - (iii) Investment advisers: Greig Middleton & Co. Limited, 155 St. Vincent Street, Glasgow G2 5NN
7. The Trustees confirm that the Trust's governing document does not impose any specific restrictions on the manner in which the charity can operate.
8. The Trust's investment powers are governed by Clause 3(L) of the Memorandum and Articles of Association, which places no restriction on the nature of the securities or property concerned. In practice, investment in securities is restricted to equities and loan stocks (government and corporate) quoted on the London Stock Exchange. The investment in the freehold property at Moulin, Pitlochry (the "Scottish Headquarters") is intended as a permanent acquisition, i.e. not with any intention of resale from an investment standpoint.

THE ATLANTIC SALMON TRUST LIMITED

SUMMARY FINANCIAL STATEMENTS: YEAR ENDED 30 JUNE 1996

STATEMENT OF FINANCIAL ACTIVITIES

|  | 1996            | 1995<br>(Restated) |
|--|-----------------|--------------------|
| <u>INCOMING RESOURCES</u>  |                 |                    |
| Investment income  | 60,246          | 52,709             |
| Donations  | 39,480          | 34,740             |
| Legacy   | 2,000           | -                  |
| Fishmongers Company: contribution towards Treasurer's remuneration | 6,000           | 5,000              |
| Postal Fishing Auction   | 35,711          | 31,730             |
| Miscellaneous income   | <u>2,433</u>    | <u>2,766</u>       |
| <u>Total incoming resources</u>                                    | <u>£145,870</u> | <u>£126,945</u>    |
| <u>RESOURCES EXPENDED</u>  |                 |                    |
| Direct charitable expenditures on promotion of salmon conservation | 100,714         | 94,817             |
| Donations and grants to other organisations                        | 525             | 480                |
| Publicity expenditures   | 8,188           | 7,398              |
| Management and administration of the charity                       | <u>25,058</u>   | <u>20,765</u>      |
| <u>Total resources expended</u>                                    | <u>£134,485</u> | <u>£123,460</u>    |
| Net incoming resources before transfers                            | 11,385          | 3,485              |
| Net gains on investment assets                                     | 48,055          | 62,690             |
| Transfers to Reserves  | 59,440          | 66,175             |
| Net movement in Funds during the year                              | <u>(48,055)</u> | <u>(62,690)</u>    |
| Fund balance brought forward at 1 July 1995                        | 11,385          | 3,485              |
|  | <u>625,525</u>  | <u>622,040</u>     |
| <u>Fund balance carried forward at 30 June 1996</u>                | <u>£636,910</u> | <u>£625,525</u>    |

BALANCE SHEET  
FIXED ASSETS

|                       |              |           |
|-----------------------|--------------|-----------|
| Tangible fixed assets | 65,844       | 56,304    |
| Investments           | 981,513      | 902,322   |
| Total fixed assets    | 1,047,357    | 958,626   |
| Net current assets    | <u>2,954</u> | <u>40</u> |

TOTAL ASSETS £1,050,311 £958,666

CAPITAL AND RESERVES

|   |               |              |
|---|---------------|--------------|
| Accumulated Fund  | 636,910       | 625,525      |
| Reserves  | 376,696       | 328,641      |
| Total Capital and Reserves                                | 1,013,606     | 954,166      |
| <u>DEFERRED PROJECT CONTRIBUTIONS AND INCOME RECEIPTS</u> | <u>36,705</u> | <u>4,500</u> |

TOTAL CAPITAL EMPLOYED £1,050,311 £958,666

Approved by the Council of Management on 4 December 1996

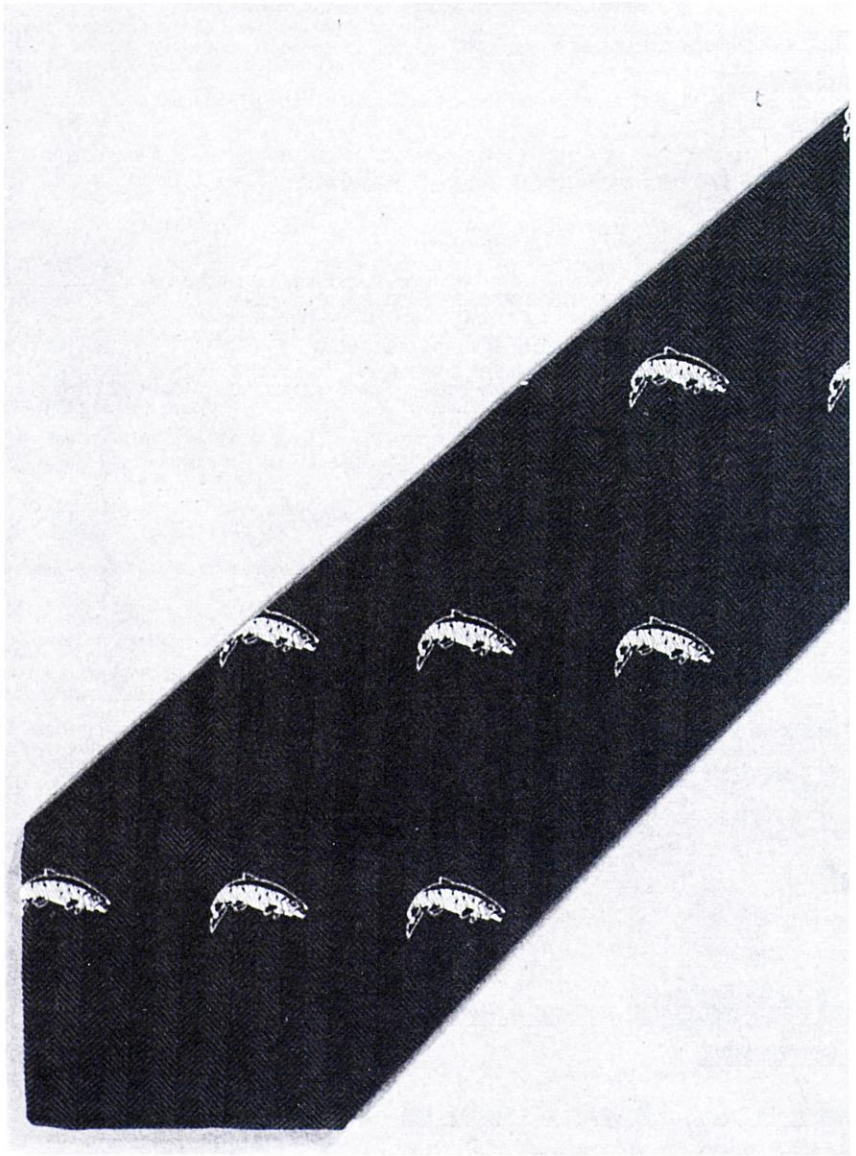
COLONEL H.F.O. BEWSHER LVO, OBE (CHAIRMAN).....

MAJOR GENERAL J HOPKINSON CB (VICE-CHAIRMAN).....

M.D. MARTIN (MEMBER OF COUNCIL).....

The Summary Financial Statements have been prepared from the full accounts of the Trust, which have been audited by Davies Watson, Chartered Accountants and Registered Auditors.

ATLANTIC SALMON TRUST TIES



Available in blue and dark blue polyester @ £7.50  
and dark blue silk @ £10.00





## ATLANTIC SALMON TRUST PUBLICATIONS

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

|  |                                      |       |
|--|--------------------------------------|-------|
| Acidification of Freshwaters:<br>The Threat and its Mitigation   | by R. North                          | 3.00  |
| Strategies for the Rehabilitation of<br>Salmon Rivers (Proceedings of a Joint<br>Conference held at the Linnean Society<br>in November 1990)                         | by D. Mills                          | 5.00  |
| Salmon Fisheries in Scotland   | by R. Williamson                     | 3.00  |
| The Measurement and Evaluation<br>of the Exploitation of Atlantic<br>Salmon  | by D.J. Solomon<br>and E.C.E. Potter | 3.00  |
| Salmon in the Sea and New<br>Enhancement Strategies (Proceedings of<br>the 4th International Atlantic Salmon<br>Symposium, St. Andrews, New Brunswick,<br>June 1992) | edited<br>by D. H. Mills             | 30.00 |
| Surveying and Tracking Salmon<br>in the Sea  | by E.C.E. Potter<br>and A. Moore     | 3.00  |
| Problems with Sea Trout & Salmon<br>in the Western Highlands   | edited<br>by R.G.J. Shelton          | 3.00  |
| Automatic Salmon Counting<br>Techniques - A Contemporary Review  | by G.A. Fewings                      | 3.50  |
| Salmon in the Dee Catchment:<br>The Scientific Basis for Managment<br>(Proceedings of a one day meeting held<br>at Glen Tanar House, 13 October 1994)                | by A. Youngson                       | 3.50  |
| Spring Salmon  | by A. Youngson                       | 3.00  |
| Enhancement of Spring Salmon<br>(Proceedings of a one-day Conference<br>held in the Rooms of the Linnean<br>Society of London, 26 January 1996)                      | edited<br>by Derek Mills             | 12.00 |

#### FILMS AND VIDEO CASSETTES AVAILABLE FOR HIRE

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

