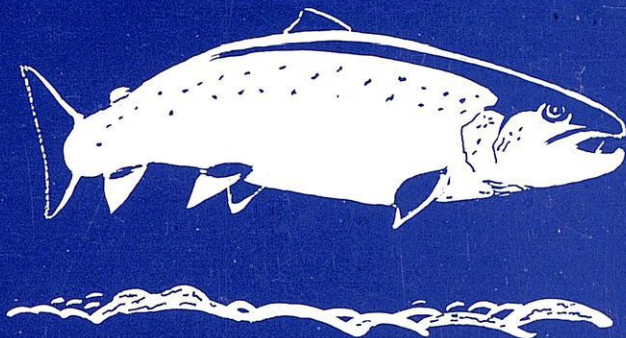




ATLANTIC SALMON TRUST

# PROGRESS REPORT

June 1989



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G. Harris, Ph.D. (Welsh Water Authority)  
G. J. A. Kennedy, B.Sc., D.Phil. (Department of Agriculture for  
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INTERNATIONAL CONSERVATION ORGANISATIONS  
WITH WHICH THE TRUST IS IN CONTACT

France: Association Internationale de Defense du Saumon  
Atlantique  
Belgium: Belgian Anglers' Club  
Ireland: Irish Game Fish Protection Federation  
Norway: Jeger of Fiskerforbund and Laksen of Oslo  
Sweden and  
Scandinavia: Theodor Dalensson, Scandinavian Atlantic Salmon  
Group  
Spain: Asturian Fishing Association of Oviedo  
U.S.A.: Restoration of Atlantic Salmon in America Inc.  
Canada and  
U.S.A.: Atlantic Salmon Federation

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## CHAIRMAN'S FOREWORD

All the indications are that it will be a dry summer and the pundits are drawing comparisons with 1975 and 1976. By the time you read these words we shall know whether another big grilse run has succeeded yet another lean year for spring fish and whether there has been enough water to bring grilse and summer salmon into the rivers in good numbers. No doubt we shall be discussing these matters at the various game fairs and country fairs round the country. A list of the shows at which the Trust will be present is given on page 15 and I do hope you will come to visit us.

The key issues concerning the Trust's policies and priorities do not change. Many of them are covered in this issue of the Progress Report. But let me list some of them briefly.

As the grilse congregate off Scotland's rivers in June so the international officials from the governmental body NASCO assemble for their meetings in Edinburgh.

The Trust has observer status at NASCO meetings and is in regular touch with the NASCO office in Edinburgh. The vexed question of interceptory fishing on the high seas will inevitably be discussed.

The legal English and Welsh and Irish drift net fisheries are becoming increasingly isolated as virtually the only countries apart from Greenland and the Faroes where fishing for salmon at sea is still allowed. The United States, Canada, Norway, Iceland and other European countries have all taken strong measures to reduce interceptory fishing so that stocks can be properly managed in their rivers of origin. There can be little justification in killing wild Atlantic salmon so indiscriminately for food now that output from the salmon farming industry is more than meeting available markets.

It will be more difficult to negotiate continued quotas in Greenland and the Faroes where fishing is the only possible employment unless the UK and Ireland fall into line with other European and North American countries.

The review due to be carried out by the UK Government at the end of the year therefore assumes enormous significance not just in this country but for the international implications for Atlantic salmon conservation.

In Scotland there is increasing concern over the proliferation of fish farming cages in freshwater lochs within the major salmon river systems. The concerns are on both genetic and disease grounds. Memories are short and despite the lack of recent scientific evidence of major disease problems caused by fish farms in the UK, the arrival of UDN in the Irish Blackwater in the mid-1960s and the devastation of so many Norwegian rivers in the 1980s were both due to disease spreading from fish farms to

wild stocks. There is also concern about escaping rainbow trout, which proliferate in many salmon rivers and are well known predators of salmon parr and smolts.

I wrote to Lord Sanderson of Bowden, the Minister of State at the Scottish Office in January. My letter and a copy of his reply are printed in this Progress Report. A change in the law on planning permissions is urgently required.

Other issues too continue to dominate salmon conservation. The increasing number of grey seals round major estuaries and on coasts, and their predation on scarce spring stocks, is at odds with the public perception of a species under threat from a virus. Most evidence points to the common and not the grey seal as the victim of this new virus.

Illegal fishing, frequently more organised and more criminally violent, continues. Close co-operation on law enforcement between government, police and bailiffs is essential.

There is concern that with new quotas on certain white fish stocks, more boats may turn to illegal salmon fishing off the coasts.

The introduction of dealer licensing has been postponed yet again and a further period of consultation lies ahead. It is true that an inefficient and ineffective scheme which did not work might do more harm than good, but more resolution and urgency is required on all sides to make some regulatory scheme possible, not least in the interests of the salmon farming industry itself which is increasingly liable to suffer from theft on a criminal scale. Perhaps the time is ripe to re-examine the earlier proposals for a carcase tagging scheme?

The economic studies into the value of salmon fishings to the UK, supported by both MAFF and DAFS and in which the Trust has been involved and interested for two or three years, are still under way. They are being conducted in England and Wales by Portsmouth Polytechnic and in Scotland by Mackay Consultants.

The complex issues of water privatisation and the National Rivers Authority will pre-occupy us over coming months as the Bill goes through Parliament.

The Trust has continued to support its research and scientific work under the guidance of Gordon Bielby, Chairman of the Honorary Scientific Advisory Panel. A report of the current and recent projects is given on page 6.

Many of the issues are also the concern of other salmon organisations, not least in Scotland the Association of Scottish District Salmon Fishery Boards to which I recently had the honour of being elected Vice-Chairman.

Meantime, perhaps those members of this Trust who are themselves fortunate enough to enjoy salmon fishing as a recreation might turn their minds to their own rivers and practices. Is the management of our rivers as good as it should be? Could you yourselves do more to encourage the improvement of spawning areas and open up under-utilised headwaters and burns?

Should those of us who enjoy angling and at the same time criticise the netsman still sell the fish we catch by rod and line? If salmon anglers are to defend their pastime as a recreational sport and yet attack the continued commercial exploitation of the wild salmon, should they not exercise more restraint themselves both in the numbers killed when conditions so very occasionally are good, and in the practice of selling fish to subsidise fishing costs. My personal view is that far more anglers might think again about selling for cash the fish they love and seek to catch for fun.

Sir David Nickson

#### DIRECTOR'S REPORT

As our Chairman says, I hope to see you at the shows around the country. The Display this year will be better than ever and we will be showing a video of spawning salmon taken in the wild on the Girnock Burn in Aberdeenshire.

In this Report I have tried to show the catch statistics for 1987 and also, by courtesy of MAFF, I reproduce a graph of the catches for 1952-1987. This has not previously been available except by the study of individual Water Authority reports.

The Annual Postal Auction was a great success and raised approximately £36,000 for the Trust. The overall figure was £85,000 with £47,000 to the Atlantic Salmon Conservation Trust (Scotland) and £2,400 to the Wye Owners Association. I will be sending out forms asking for fishing in the autumn. If anyone has some fishing available and is not normally approached, I am always keen to increase the number of lots.

A report on the very successful Workshop which was held at Bristol University in conjunction with South West Water is included in this Progress Report, as is an update on the radio tracking work carried out by Mr. John Webb.

As we go to press, the Water Bill is approaching its final stages in Parliament. In its original form, the Trust had some concerns over the provisions for the National Rivers Authority (NRA), and has been represented on a National Anglers' Council Working Party which has sought improvements. Although not many detailed amendments have been achieved, a number of Government assurances do give reasonable optimism for the future of the NRA.

There will be a further article on the subject in the next Progress Report.

One of our friends has suggested a good fund-raising scheme and the Trust is most grateful to him for his donation, received early in the year. He grows conifers, and around Christmas when the trees require thinning he invites his friends to come and thin them and take a tree away, donating something towards charity at the same time. I commend this to anyone wishing to raise funds for a charity!

D. J. Mackenzie

REPORT ON THE WORK OF THE HONORARY SCIENTIFIC ADVISORY PANEL,  
AND CURRENT AND PROPOSED PROJECTS

The Honorary Scientific Advisory Panel met in April at Bristol immediately prior to the Bristol Workshop. Mr. Gordon Bielby took the Chair in succession to Sir Ernest Woodroffe. Mr. Ian Allan and Professor Ron Edwards have resigned from the Panel and they were thanked by Sir Ernest for their services over many years. Mr. Warwick Ayton of Welsh Water and Professor Noel Wilkins have accepted invitations to join the Panel. Dr. Tony Hawkins attended in lieu of Mr. Shearer.

The Trust had supported a Workshop on Genetics held by DAFS in Aberdeen. A report of this Workshop is included in this Progress Report. It was decided that a possible Workshop in conjunction with IFM should be held in 1990 entitled, "Rehabilitation of Rivers". It was proposed that in 1991 a Workshop be held in Dublin on "Measurement and Evaluation of the Exploitation of Atlantic Salmon".

Current projects were discussed, the major one being the radio tracking work, of which a full report is given by John Webb in this Report. This work is coming to an end, and John Webb is to be congratulated on his very fine work. He has been and continues to be an excellent ambassador for the Trust. He has lectured throughout Scotland and very recently in Spain. A list of the publications on the reports of the tracking project are given in his article.

The Trust has funded a post-graduate student to back up Paul Carling of the FBA in a most important project on the effect on salmonids of the run-off from land being prepared for forestry, and on possible different methods of planting.

Dr. Hawkins gave an account of the Spey Trust's work and highlighted the project to determine the particular characteristics of a spring salmon, thereby finding means of encouraging new runs within a river system. This is such an important project, with relevance to all rivers, that the



Management Committee has decided to give £2,000 to the Spey Trust.

Some of the south-west Scotland District Fishery Boards have set up a Trust to employ a biologist to assess problems caused in their rivers by afforestation. The AST is seeing how it can help in this and the Director will be visiting Galloway before long.

DAFS asked if the Trust could help in funding the services of an Irish biologist to extend the scope of some work already carried out on genetic correspondence between farmed stock and the original brood stock. The Scottish Salmon Growers Association has agreed to match any contribution the Trust makes and the Trust has agreed to employ the biologist for approximately three months. Our contribution will be in the region of £2,000.

The Panel thought that there was a need for more work on the impact of farmed escapees on wild stocks. DAFS are considering a project and it is very likely that the Trust will be involved. The Director is continuing to press most strongly for work to be done in this area.

Blue Books These continue to be most popular and new books in the pipeline are:

Scotland - to be written by Bob Williamson  
England and Wales - to be written by Warwick Ayton  
Bensinger-Liddell Report by Tom Cross - about to be printed  
Lancaster Workshop - report by John Gregory, being revised  
Bristol Workshop - report by Nigel Milner, being written

At the recent meeting of the Management Committee it was decided to make a grant to the Tweed Foundation of £3,000 to further their work.

#### RIVER TAY TRACKING STUDY, 1988

(by J. Webb)

November 1988 - April 1989

The December 1988 Progress Report contained a brief summary of the radio-tracking project undertaken on the River Tay in that year. This report allows further description of some of the results obtained.

Final observations on the positions of radio-tagged fish in the river were recorded in late November and early December. Of the 33 tracked as far as Scone Palace, the movements of 19 fish were recorded up to the spawning period.

Ten fish ascended the lower Tummel to the area of the Port-Na-Craig Hydro Electric dam at Pitlochry. Accordingly, particular attention was devoted to examination of the behaviour of these

fish during their migration through the Rivers Tay and lower Tummel and at the dam site.

With the exception of two fish that stopped in the lower beats, movement from the head of tide at Perth to the junction of the River Tummel with the Tay at Logierait took 2 to 15 days (mean 7.5). Temporary halts took place typically in holding pools within the Kercock, Murthly, Dalguise and Kinnaird beats.

Movement through the lower Tummel appeared little influenced by the range of regulated flows prevailing over the study period. A diurnal pattern of activity was observed, similar to that recorded in the Tay. However, distances covered per migratory period ranged from 0.56 - 9.16 km (mean, 3.1 km) and this level of activity was significantly different from that shown by the same fish within the mainstem Tay (moving from Islamouth to Logierait) where the corresponding range was 0.72 - 15.2 km (mean, 6.1 km). Ascent from the confluence of the Rivers Tummel and Tay at Logierait to the Port-Na-Craig dam by the more active fish took 0.4 - 6.6 days (mean, 3 days).

Over the period 8 May to 6 September, numerous daily observations were made of the position of radio-tagged fish present below the dam. Continuous listening station monitoring of activity in the area of the dam base and fish pass entrance indicated that fish remained active for the greater part of the day, over a range of seasonal flows. Between 28 May and 11 June, during the operation of a single turbine, tagged fish repeatedly entered the area of the operating turbine draught tube exit. Reception of the radio tag was lost over periods of up to ca. 20 minutes. Bankside observations confirmed that Floy-tagged/radio-tagged fish were behaving in a similar manner to numbers of untagged fish present at the same time. Subsequently some of the fish moved downstream. Three broad classes of downstream movement from the dam area were recorded; ranging from descent of less than 600 m and movements greater than 600 m with subsequent return to the dam and incidences of extensive descent (>10 km) downstream into the River Tay. No further activity was recorded in 5 tagged fish that moved downstream for 10 km or more.

Other than a tendency for descent from the dam site to occur during the operation of a single turbine, no single aspect of the generating regime (e.g. the timing of turbine changes) or operation and servicing of the fishladder could be linked with the range of movements recorded. However, at emerging generating flows of greater than ca. 50 m<sup>3</sup> sec<sup>-1</sup>, this activity is not recorded.

Over the lower range of generating flows, fish remained in the channel below the turbine exit, swimming in the strong flow emerging from the turbine unit rather than gathering at the fishladder entrance.

Individual tagged salmon remained below the dam for long periods. Approach to the fishladder entrance was not associated with any

particular time of the day, although little activity was recorded during the hours of darkness. Those fish that successfully ascended the fishladder structure (4) remained below the dam for periods of 0.6 to 43 days (mean, 23.7 days). Of this group, 2 had already entered the ladder on at least one occasion. No single level of hydroelectric generating discharge was associated with the repeated entry to the pass entrance by the same fish. Only in one case was the timing of emergence from the top of the fish-pass into the loch monitored, passage through the ladder structure taking 2 hours 31 minutes.

A full report is being compiled on the movements of these fish and will be published in the summer of 1989. The results have been described to the AST radio-tracking project steering committee, the North of Scotland Hydro Electric Board Board Fisheries Committee and the NSHEB Chief Engineer and advisers.

### Autumn 1988

Field studies on spawning fish continued on the Girnock Burn, a tributary of the Aberdeenshire Dee, in early October. Several studies were undertaken. A radio-tracking and conventional tagging study of the behaviour of entrants re-released back into the Dee was carried out and showed that fish remained in those pools downstream of the confluence area, re-entering the tributary during periods of increased flow.

The timing of the entry to the tributary by spawning fish was examined in relation to flow and other factors by using radio-tracking, the operation of a fish counter, and by the monitoring of catches at an adult salmon trap, positioned ca. 900 m upstream from the confluence of the Dee. As in previous years, an association between the entry of adults to the tributary and flows significantly above the seasonal norm was recorded.

The distribution and timing of spawning activity was studied in relation to discharge and other factors. Observations confirmed that females may spawn at quite different levels of flow at different areas of the stream. Some areas of the burn are utilised over a comparatively wide range of seasonal flows, whereas others are utilised at specific levels of discharge. It would appear that a range of flows is required over the spawning season to ensure that spawning activity might be adequately distributed throughout the burn.

Filming of particular aspects of spawning behaviour of salmon continued, and included sequences of spawning in the higher areas of the burn catchment and competition between females for spawning sites.

### Reporting on the Project

In all the studies undertaken over the past two years, a considerable amount of data has been accumulated. Accordingly,

most of the information obtained is at present being incorporated in a number of detailed reports. Future titles, in preparation, include:

1. The movements of adult Atlantic salmon (Salmo salar, L.) in the River Tay. (A summary of the 1987 studies.)
2. The behaviour of adult Atlantic salmon (Salmo salar, L.) ascending the River Tay to the Port-Na-Craig dam, Pitlochry.
3. Discharge utilisation by spawning female Atlantic salmon (Salmo salar, L.) in the Girnock Burn, a tributary of the Aberdeenshire Dee.
4. Tributary entry and confluence behaviour of Atlantic salmon (Salmo salar, L.) in the Girnock Burn, a tributary of the Aberdeenshire Dee.

A paper on the entry and movements of spawning fish in relation to water flow in the Girnock Burn, a tributary of the Aberdeenshire Dee, was presented at the AST/WWA Workshop on Fish Movement in Relation to Freshwater Flow and Quality, held at Bristol University in April 1989.

During the course of the year a number of lectures and illustrated talks were given to various groups and organisations including: IFM meeting, Aberdeen; IFM meeting, Perth; BBC Radio Scotland and the Atlantic Salmon Conservation Trust (Scotland). A report has recently been published -

Webb, J. and Hawkins, A.D. (1989). The movements and spawning behaviour of adult salmon in the Girnock Burn, a tributary of the Aberdeenshire Dee, 1986. Scottish Fisheries Research Report; No. 40, 1989. 41 pp. ISSN 0308 8022.

The remainder of the final year of the project will concentrate on completion of the reports described above and the production of a further colour video encompassing the migratory and spawning behaviour of salmon in the River Dee.

WORKSHOP ON GENETIC PROTEIN VARIATION IN ATLANTIC SALMON  
(by Professor Noel Wilkins)

The workshop was held in the Marine Laboratory, Aberdeen, December 14-16, 1988 and was attended by 18 researchers.

The programme comprised three sections

- review of previous work and compilation of bibliography;
- standardisation of nomenclature for alleles and loci;
- discussion of progress and plans for the future

#### Review of Previous Work

This session was opened by papers from Wilkins (Ireland) and Stahl (Sweden), followed by short presentations of work from 1983 to date given by the other participants. The results indicate that protein electrophoresis is useful in visualising and quantifying differences between Atlantic salmon populations a) in different continents; b) in different geographic regions within a continent; c) between river systems within some regions; and d) within different tributaries of certain catchments. Although the degree of genetic differentiation between populations of Atlantic salmon is considerably less than that between populations of brown trout, it is nevertheless sufficient to justify a population-by-population management approach rather than a mixed-fishery approach to the resource. Salmon populations do show genetic evidence that they are reproductively separate; consideration of the genetic implications of this was left to the final section.

Work carried out since about 1980 has concentrated less on blood proteins (as the earlier work had done) and more on tissue enzymes. This reflects the easier availability of solid tissue samples than of fresh blood from commercial catches and the greater range of enzyme proteins which can be investigated in solid tissues.

Data were compiled on all papers and research reports, published and unpublished, which were prepared since 1970; these will be collated to provide the first complete international bibliography on protein genetic variation in Atlantic salmon.

#### Standardisation of Nomenclature

In the long run, this will prove the most valuable and enduring product of the workshop. Since 1980, geneticists working on populations of Atlantic salmon have examined: up to 10 different tissues (e.g. heart, liver, brain, white muscle etc.); up to 20 different types of enzymes; populations from over 10 countries, comprising up to 100 separate rivers. These alone suggest the absolute necessity for a common nomenclature and common standards to apply to all workers in the various countries, if results are to be directly comparable from study to study and from time to time.

From the nomenclature of the various enzymes and the manner in which they are written, the meeting adopted the broad outlines of the scheme proposed by the Fish Genetics Nomenclature Committee of the American Fisheries Society. Thus, for example, phosphoglucose isomerase (PGI) will henceforth be abbreviated GPI by all researchers on salmon. Where different types of GPI are observed i.e. various gene loci, the various loci will be labelled GPI1, GPI2, etc., in an agreed manner. The meeting went on to examine the known number of loci encoding the 20 most common enzymes studied in Atlantic salmon and agreed on a standardised terminology for each locus and all of its presently-known variants. Because of this standardisation, many of the existing reports and all future reports on protein genetic variability will be directly comparable, even when produced by different workers in different countries. If the standardisation is adopted by others it will enable international comparisons to be readily made and eliminate misunderstandings. This will be a major development having lasting and valuable consequences for research on salmon and for the international exchange and comparison of genetic data.

### Discussion of Progress

From the review and the standardisation exercise it was abundantly clear that protein studies indicate that salmon populations represent separate breeding units. The question arises as to what the protein variations mean for the fish and for the manager? The frequency of different enzyme proteins could differ between populations either because they contribute to local adaptation in each population, or entirely by chance, or by a chance difference in the original founders of the population. We do not know which of these is the cause, or whether different causes must be invoked for different enzymes. However, the consensus was that in the absence of information on the selective value of variants the prudent approach is to proceed on the basis that natural variation should be conserved in management strategies. As work continues it is clear that some variants - e.g. those of transferrin and malic enzyme - show distribution patterns which suggest that they do have selective value, thus confirming the wisdom of the conservative approach. The need for further studies on selective advantage of variants is clearly necessary.

Where protein variants are not of selective value they are most useful as population markers and the meeting considered their use in identifying natural interspecific hybrids and in identifying river stocks in mixed fisheries. At present, proteins are more useful when analysing close-by mixed fisheries than for distant mixed fisheries (because distant mixed fisheries have a greater variety of river stocks contributing to them). The search for new variants, especially those which may be characteristic of individual rivers, should be continued.

Consideration of the value of protein markers in studying the effects of escapees from fish farms on natural stocks led to

extended discussion. Escapes are inevitable, but there is, as yet, no hard evidence that escapees damage natural stocks in a genetic way. We do not know how well they compete in the wild with native fish, or how well they succeed in spawning. There is need for a large-scale experiment to determine how the introduction of a large number of "foreign" fish can alter the gene pool of an indigenous population. This links back to the question of the selective or adaptive value of the protein variants. If a local population has a certain variant at a frequency of, say, 80% and it is swollen by stocked (or escaped) fish with that variant at 10% frequency, what happens to the variant? We can calculate how the frequency will be altered immediately but, over ensuing generations will the frequency return to the old, 80% equilibrium or settle at a new equilibrium? Does it matter? We simply do not know. There is no doubting that in certain cases e.g. where there never was a salmon stock, or where one was wiped out, stocking with hatchery fish is useful. But otherwise is it valuable? Paradoxically, we still do not know the answer to this question which could help us to predict or even determine the effects of escapees.

In resumé, the group was confident that genetic protein variants have a more valuable role than ever both in the basic and applied studies on Atlantic salmon. In almost all countries such studies have confirmed that natural stocks are reproductively separate and genetically different, for whatever unknown reason. Protein studies have also shown that artificial cultivation results in a loss of some variants and alteration in the frequency of others. We need to know the significance of these changes and until we do, caution should be shown in the legitimate and valid use of hatchery material. For stocking purposes, protein electrophoresis can help in ensuring that levels of genetic variability are maintained and in monitoring the effects of some transfers and introductions.

Finally, although there is less work in train than the group felt was needed, it was clear that protein studies were no longer being seen as highly expensive academic studies: they are more and more being applied to specific problems and the outcome looks brighter for a fuller description of the genome of the Atlantic salmon and its population structure using this technique.

ATLANTIC SALMON TRUST/WESSEX WATER WORKSHOP  
"Fish Movement in Relation to Freshwater Flow and Quality"  
held at University of Bristol, 4th - 6th April, 1989

This jointly-organised Workshop was attended by 58 people representing a number of Government departments, Water Authorities, District Fishery Boards and research organisations. Many of the Trust's Honorary Scientific Advisory Panel were also present; they had held their annual meeting immediately prior to the Workshop. The theme of the meeting was directly related to the management of the salmon resource, but it became clear early

on that in different parts of the United Kingdom management emphasis differed. Of the ten papers given at the meeting, those which related to England and Wales dealt with projects involving the counting and tracking of salmon, which were, in the main, directly related to possible future water abstraction schemes or the pollution of estuaries. Papers given by speakers from Scotland were, in general, descriptions of research projects. The aims of the Workshop were, however, clear cut. Speakers were invited to discuss their own salmon tracking or counting projects and to indicate clearly the object of the study, the method used and why and, finally, whether it was successful.

Speakers from England and Wales presented salmon movement studies in relation to projects undertaken in the Water Authorities in the South West, Wessex, Wales and the North West. There was also discussion of a project undertaken by the Freshwater Biological Association in respect of the effect of water discharges on salmon migration in the River Frome, a chalk stream. This study mainly involved an assessment of salmon movements by a resistivity counter. The tracking of salmon through the polluted estuary of the River Ribble, using oxygen-sensing acoustic transmitters, was also presented. The latter proved to be a very labour-intensive operation which relied solely on the use of drift nets to capture salmon for tagging. The meeting was also given details about the first year's work on a tracking scheme designed to study the migration of salmon into the River Tywi, which is affected by a lake upstream and possibly also by low dissolved oxygen levels in the estuary.

Two speakers, both with a great deal of tracking experience, stood out. Dr. David Solomon, who is taking part in a study of salmon tracking in the Hampshire Avon, the details of which were very well described at the Workshop, both chaired a session and, at the end of the meeting, reviewed the papers and discussions in a masterly way. He intimated what we could learn from the projects and how much we had to gain from further research of this kind. He pointed out that salmon tracking was probably more cost-effective than counting, and the flexibility of tracking to obtain information about salmon movement made it in some circumstances more attractive. The other prominent person was Dr. Tony Hawkins. He, and his assistant John Webb, who is sponsored by the Trust, gave papers on tracking work undertaken in a number of rivers on the east coast of Scotland, mainly in the River Dee and the Tay.

Although it is difficult to relate the results of one project to other rivers, it seems clear from information currently available that salmon, in the absence of a spate, have a tendency to move at night.

In all the studies described, migratory activity was recorded over a wide range of seasonal flows. Despite the range of flows recorded, in each of the rivers studied it is increasingly apparent that there is an underlying temporal pattern to the migratory activity of individuals entering rivers at different



times of the year. At various, broadly identifiable stages of the range of migration patterns recorded, they may be more susceptible to the effects of changes in levels of flow than at others.

Entry and dispersal of fish intending to spawn in smaller spawning tributaries appears to be highly dependent on increases in discharge above the seasonal norm. In the absence of suitable flows, migratory activity and subsequent spawning distributions may be compromised.

Surprisingly, discussion did not develop on whether the tracking findings should be used to evaluate the effectiveness or otherwise of the weekly close times as laid down for various rivers. It was interesting to learn that there was a lot of evidence indicating that a proportion of salmon, put at over 10% in some cases, made the mistake of entering the wrong river at first, before turning around and migrating to their natal estuary.

A bonus was accorded the meeting when Mr. Webb showed his first-class film on salmon spawning in the Girnock Burn, a tributary of the Dee. The film was quite outstanding.

The Workshop was very successful, with a range of excellent papers and discussions which were far-reaching and very relevant. The arrangements were, as usual, excellent and much credit is due to the Director, Deputy Director, Mr. Tony Barber and Wessex Water for providing first-class arrangements and facilities. The University authorities at Badock Hall were also very helpful. It was delightful to see two members of the Committee of Management present at the meeting; Mr. Michael Martin and the Hon. Edward Davies.

Dr. Nigel Milner of Welsh Water is summarising the papers and discussions, and the Trust will publish the proceedings as a Blue Book.

\* \* \* \* \*

THE TRUST'S CARAVAN WILL BE AT THE SCOTTISH FAIR AT SCONE PALACE,  
THE GAME FAIR AT STRATFIELD SAYE AND AT THE HOLKHAM COUNTRY FAIR.  
WE WILL ALSO BE AT THE HIGHLAND FIELD SPORTS FAIR (IN A TENT) AT  
MOY, NEAR INVERNESS. DETAILS OF THESE SHOWS ARE GIVEN OVERLEAF.

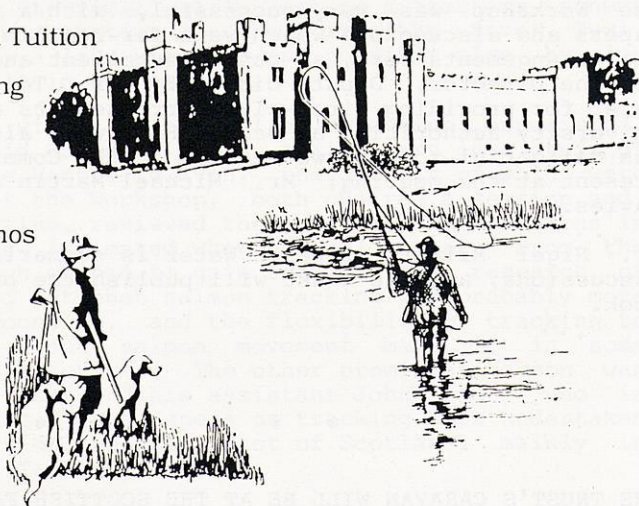


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- ♣ Game Cooking Demos
- ♣ Children's Corner
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**SCONE PALACE**

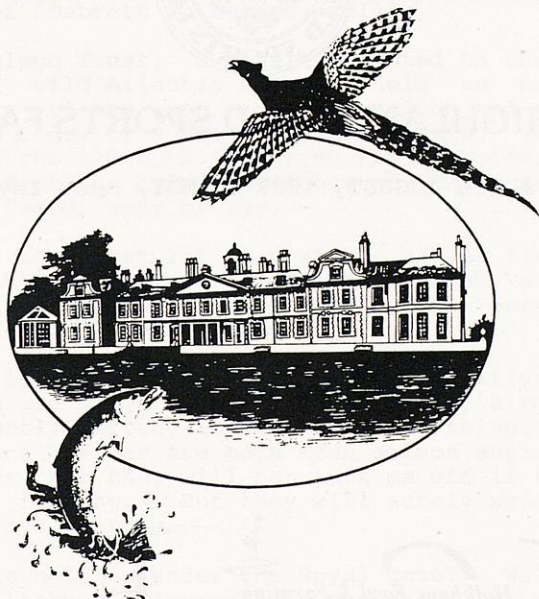
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**SATURDAY & SUNDAY JULY 8/9**

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## HIGHLAND FIELD SPORTS FAIR

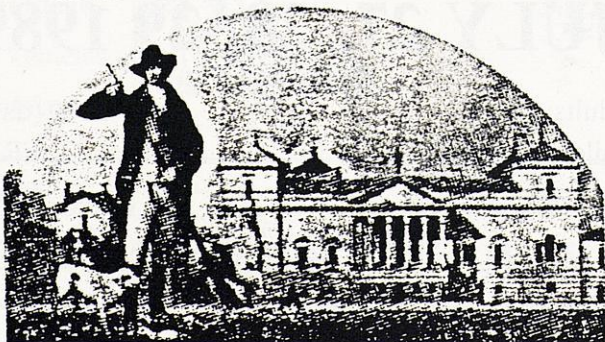
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*Country Fair*



**AUGUST 5th & 6th 1989**  
HOLKHAM PARK - WELLS - NORFOLK



The following article by Keith Elliott appeared in 'The Independent' on 3rd January, 1989, and is reprinted with the Editor's permission

#### WHERE TO DRAW ROYAL LINE

Fishermen pack some pretty odd things when they head off for a week-long trip, but my next excursion after salmon may be doomed without a copy of 'Debrett'. Let me explain.

The Atlantic Salmon Trust, a charity devoted to the management and welfare of wild Atlantic salmon, hold an annual postal auction. Owners of the most exclusive salmon and trout fishing in the UK donate a day or a week on their waters. There is stiff competition for the 171 lots, because few 'outsiders' ever get the chance to fish the prime stretches of the great Scottish rivers like the Tweed, Spey or Tay.

Now this year, the first lot is a week's salmon fishing on the Dee in Aberdeenshire, a river I have yet to fish, so I put in my bid and only afterwards read the description carefully. The water has been donated by the Queen.

The fishing is in late March and there is a qualifying sentence: "The dates given are subject to the Royal Family's requirements". I am now distinctly twitchy about the whole thing. The Queen Mother and Prince Charles are both keen salmon anglers. Surely noblesse obliges that they will not turf me off if they fancy a couple of hours' fishing. But they will surely wander down and cast a critical eye over me.

Will my technique hold up under the Royal gaze? Will I be able to execute the flashy but impressive Spey cast, or will the line loop like an anaconda about my body? And horror of horrors, what if my wild flailings hook a Royal personage? Will they frown upon me for using a modern carbon-fibre salmon rod, rather than the traditional unwieldy cane monster?

I shall have to tidy my tackle into neat little rows instead of the Gordian jumble that currently lurks in my salmon bag. I must polish my waders, and wear a hat so that I can doff it. Would it be presumptuous to sport the Elliott tartan?

The whole thing has suddenly become fraught with complications. I mean, if the Queen Mother wanders along the bank, should I really continue fishing as if she were a casual onlooker? Should I bow before or after I get out of the water? And how do you bow anyway in chest-high waders, carrying a rod, a wading stick and a net?

I have mastered those tricky little points of etiquette like whether one should walk in front of or behind a woman when going downstairs. I would never say serviette, toilet or pardon. But where's the book which tells me if I should share my game pie and

my cheese and onion sandwiches with Prince Charles? Should I cut the crusts off the sandwiches just in case? Should he, as heir-elect, divide the pie? And what if he feels obliged, having eaten my lunch, to invite me back for tea? Should I refuse, knowing that he is just being polite, and risk our future monarch's wrath? Or should I accept and hang an albatross of fresh worries about my neck.

I am woefully short of Royal small-talk. I can probably manage to chat casually about favoured flies, the water level, the way to approach a certain pool. But can I hold my own if the talk turns to babies, polo, chatting to flowers, corgis and Dire Straits?

I knew I should have listened to the Queen's Speech this Christmas. Still, if the conversation flags, I can always slip in that I am the author of the Duke of Edinburgh's Award Scheme book on fishing.

And what if the Princess of Wales stops for a chat and admires my casting style so much that she begs for tuition, and a tabloid paparazzi snatches a picture? Will my wife back in East Anglia believe the lurid stories?

And what is the answer if I catch a salmon? Do I automatically assume that it is a Crown fish and as such should be offered to the hosts? That is easy if William or Andrew or Di or Anne is standing on the bank.

"Er, you should have this fish."

"No, really, we couldn't, you caught it."

"Oh no, I don't really like salmon anyway and I want to give you this for letting me fish your lovely water."

Inevitably, it will be the only fish I see all week. But surely the same principle applies even if there is not a Royal in sight. This means I would have to traipse up to Balmoral and turn my proud catch over to a flunkey with some throwaway line like "Oh, I just caught this for the Queen".

And when it is all over, I face the biggest problem of all. Traditionally, one sends a small gift to the host or hostess. But what do you send to the Queen? A pot plant? A case of decent wine? I suppose that I could offer a week's carp fishing on the lake in my back garden.

SOME RECENT ANSWERS TO PARLIAMENTARY QUESTIONS

(House of Lords Official Report, 6/12/88, Written Answer)

Salmon Dealer Licensing Proposals

Lord Moran asked Her Majesty's Government: Whether they still hope that the salmon dealer licensing schemes to be introduced under the Salmon Act 1986 can be introduced by the end of this year (Lord Sanderson of Bowden, 11.1 Deb. 20th January 1988, Col. 310) and if so when the schemes are likely to be laid before Parliament.

The Minister of State, Scottish Office (Lord Sanderson of Bowden): Preparation of draft Orders to introduce salmon dealer licensing schemes in Scotland, and in England and Wales, is at an advanced stage. The Government's proposals will be presented as soon as possible. Full account has to be taken of the responses we received in the consultations earlier this year and some technical points remain to be resolved.

(House of Lords Official Report, 20/4/89, Written Answer)

The Lord Moran: To ask her Majesty's Government whether they will confirm that the delay in introducing the salmon dealer licensing scheme (HL Debates, 20th March, Col. 569) does not mean that the proposals are to be weakened by, for example, exempting retail outlets such as fishmongers, hotels and restaurants from the need to be licensed, or relieving licensed dealers from the requirement to keep the full and detailed records necessary for effective enforcement.

Lord Sanderson of Bowden: The preparation of proposals has taken longer than we had hoped for the reasons given in my previous replies to the Noble Lord on 6th December 1988 (Official Report Vol. 502, No. 7 Col. 560) and 20th March 1989 (Official Report Vol. 505, No. 54, Col. 569). Technical aspects of drafting have proved more difficult than expected. We have also had to consider the way in which much larger numbers of farmed fish would be affected by the Scheme.

When we consulted about the introduction of schemes of salmon dealer licensing under the Salmon Act 1986, our proposals did not include any requirement for licences for hotels and restaurants which purchased salmon from licensed dealers. In the subsequent development of our proposals, revised in the light of many comments made in response to the consultations, the Government's present view is that retailers should be treated in the same way. The regulatory burdens of requiring all retail businesses to be licensed and to keep detailed records would be substantial and do not now seem to be justified in relation to effectiveness. However under our revised proposals, retailers would need to buy their salmon from licensed dealers if they are not themselves

licensed; their premises and trading records would be open to inspection under warrant; and retailers would be liable, as now, to prosecution for the offence of possessing or handling salmon in suspicious circumstances which was made law in the Salmon Act 1986.

The issues at stake are complex and difficult. We now envisage significant changes to the schemes. The importance of getting right the detailed provisions including those on record keeping, enforcement, and relationship between licences in Scotland and those which will be separately administered in England and Wales, require that those with an interest should be given an opportunity to comment before we proceed further.

Accordingly, we shall be issuing revised proposals for salmon dealer licensing schemes very shortly, inviting early comments.

(Hansard, 6/3/89, Written Answer)

#### Salmon

**Mr. MacLennan:** To ask the Minister of Agriculture, Fisheries and Food if he will make representations to the Republic of Ireland about the threat to salmon stocks caused by Irish fishermen in international waters; and if he will make a statement.

**Mr. Donald Thompson:** The Minister of State at the Scottish Office and I had informal discussions with our opposite number from the Irish Republic. The United Kingdom fisheries Departments regularly monitor the effects of the Irish salmon fishery and the relevant enforcement bodies of our respective countries, along with those of Northern Ireland, will continue to work in close co-operation against any illegal fishing for salmon.

(Hansard, 17/3/89, Written Answer)

#### Salmon: Illegal Fishery

**Lord Mason of Barnsley** asked Her Majesty's Government: To what extent Irish drift netting boats have been operating off the West Coast of Scotland in search of salmon and whether they have made approaches to the Irish Government on this matter.

**The Minister of State, Scottish Office (Lord Sanderson of Bowden):** We have been aware from various sources and especially from the airborne surveillance patrols and fishery protection vessels of the Department of Agriculture and Fisheries for Scotland that considerable numbers of boats from the Republic of Ireland were engaging in this illegal salmon fishery. Enforcement efforts yielded a successful prosecution and this will have provided a substantial deterrent effect. The Parliamentary Secretary, Ministry of Agriculture, Fisheries and



Food and I had informal discussions during 1988 with our opposite number from the Irish Republic. The enforcement bodies of our respective countries, along with those of Northern Ireland, have been working in close co-operation to stamp out the practice as detrimental to all our interests, and efforts for the coming season will be continued.

(Hansard, 6/3/89, Written Answers)

### Salmon Netting

Lord Mason of Barnsley asked Her Majesty's Government: What is their estimate of the numbers of Scottish bound salmon which are now being taken by the North East of England drift netters and whether they are now giving fresh consideration to stopping drift netting operations off the north-east Coast of England.

Baroness Trumpington: Section 39 of the Salmon Act 1986 requires the Minister of Agriculture, Fisheries and Food and the Secretary of the State for Scotland to prepare and submit to Parliament a report reviewing salmon netting off the coasts of north-east England and eastern Scotland. That report must be submitted as soon as practicable after November 1989. Work on the review is currently in hand and will cover such matters as salmon catches taken by drift netters and drift netting operations. It would not be appropriate to pre-empt that view.

Lord Mason of Barnsley asked Her Majesty's Government: What is the position of the fishing member states of the EC regarding the use of drift netting fishing methods, and whether representations have been made from the Commission about such methods still in use in Northern Ireland and England.

Baroness Trumpington: We have no comprehensive information on other EC member states' use of drift netting methods. There are no Community measures regulating the use of drift nets. No representations have been received from the Commission on drift netting in Northern Ireland or England.

### Nylon Monofilament Gill Nets

Lord Mason of Barnsley asked Her Majesty's Government: When they intend to ban the use of nylon monofilament gill nets in England.

Baroness Trumpington: We have no plans to introduce a ban on the use of nylon monofilament gill nets. However, there are national mesh size restrictions pursuant to the Salmon and Freshwater Fisheries Act 1975; the use of such nets is variously controlled in some inshore waters under by-laws made by local water authorities or sea fisheries committees; and we announced on 27th July 1988 our intention to introduce certain national restrictions on the use of gill and other nets whose mesh sizes fall between 65 and 89 mm.

Licensed Netsmen

1. Mr. Mullin: To ask the Minister of Agriculture, Fisheries and Food when he last met representatives of the licensed netsmen in the north-east of England; and if he will make a statement.

The Parliamentary Secretary to the Ministry of Agriculture, Fisheries and Food (Mr. Donald Thompson): I am planning to visit the area and meet local representatives of the licensed salmon netsmen soon. I have received a number of representations about this fishery. My colleagues and I will be reviewing it - and the east of Scotland net fisheries - and presenting a report to Parliament in due course, as required by the Salmon Act 1986.

Mr. Mullin: Is the Minister aware of the great hardship caused to salmon fishermen in my constituency and elsewhere by the failure to lay the T-nets order? Can he assure the House that he will do all in his power to secure the future of north-east licensed salmon netsmen against the ill-founded but well-financed angling and riparian interests?

Mr. Thompson: I know of no hardship being caused at present. However, when we review the matter in November, I hope that the hon. Gentleman and his right hon. and hon. Friends on both sides of the House will do their best to ensure that any new agreement is not destroyed or distorted, as the last one was, by people from the hon. Gentleman's own area.

Sir Hector Monro: Does my hon. Friend agree that drift netting off the Northumberland coast poses the greatest threat to salmon conservation in the United Kingdom? When will he make it illegal, as it has been for years off the Scottish coast?

Mr. Thompson: The House now sees the two clear sides of that complicated matter. The November review, which is statutorily required by the Salmon Act 1986, probably will not abolish such netting, but we shall bring it before the House as soon as possible.

Sir Michael Shaw: Is my hon. Friend aware that there is a great deal of unjustified criticism against licensed drift net fishermen, and that much of the trouble is caused not only by the increasing seal population but by unlicensed fishermen and poachers generally? Would it not be of great assistance to those in the industry and in authority if more advice were taken from the official fishing organisations on how to control unlicensed fishermen?

Mr. Thompson: Unlicensed fishermen in all sectors of fishery are a great nuisance. Given the different flavours of the views that we are hearing from all parts of the House, I am already looking forward to the debate. As my hon. Friend says, good advice should always be taken.

Dr. David Clark: Is the Minister aware that despite the activities of north-eastern linesmen, the Tyne is the best salmon river in England? Have the representations that the Minister received from the north-east fishermen included the issue of sewage sludge dumped off the River Tyne? When the hon. Gentleman meets north-east fishermen, will he reassure them that sewage sludge does not involve the risk of their contracting meningitis, herpes or AIDS, as that matter is of great concern to them?

Mr. Thompson: The hon. Gentleman greatly exaggerates. I am going to the north-east to see that activity and to learn what I can. I have always found that the best way to learn is to listen.

TWEED TOWARDS 2000  
(by The Director)

The Tweed Foundation held a most successful two-day symposium entitled "Tweed Towards 2000". There were many excellent papers and the proceedings were opened by the Duke of Roxburghe and introduced by Mr. W. A. C. Thomson.

The Proceedings will be published in due course and a glance at the attendance list shows what a wide audience was attracted to the symposium. Lord Sanderson spoke after dinner and made it clear that he expected the Tweed Commissioners and District Fishery Boards to take advantage of the de-rating of salmon fisheries to strengthen their financial status and thus their own river stocks. This symposium gave many ideas as to what could and should be done to improve the river.

It is my personal view that in the past few Scottish rivers have had any real management plan, although it has been said that management of Scottish rivers has been so much better than elsewhere. Perhaps the reality has been the abundance of fish! Modern science is revealing more and more about the "king of fish". If it is to survive the increased pressures of overfishing by both rod and net, pollution, water abstraction, fish farm escapees, etc., etc. it is essential that rivers are well managed.

In Scotland the power to manage is split between District Fishery Boards, DAFS, River Purification Boards and the owners of fisheries. Tweed 2000 brought all these factions together and perhaps it has pointed the way to the future and will encourage other rivers to run similar symposia, albeit on a less grand scale. Certainly, there is a need for a greater understanding of the problems, both now and in the future.



THE  
**Tweed**  
FOUNDATION

**Saturday 6th May**

- 09.00-09.15 **Opening**  
*The Duke of Roxburghe*
- 09.15-09.45 **Introduction**  
*Mr W. A. C. Thomson, Chairman  
Tweed Foundation*
- Session 1 **AN INTRODUCTION TO THE  
RIVER TWEED**  
*Chairman:  
Mr J. McCarthy, Director Scotland, Nature  
Conservancy Council*
- 09.45-10.15 **The conservation of the river**  
*Mr C. Badenoch, Borders Regional Officer,  
Nature Conservancy Council*
- 10.15-10.40 **Tweed water quality**  
*Mr J. C. Currie, Director and River  
Inspector, Tweed River Purification Board*
- 10.40-11.00 **The hydrology of the Tweed**  
*Mr I. A. Fox, Hydrologist  
Tweed River Purification Board*
- COFFEE
- 11.15-11.45 **Tweed invertebrate life**  
*Mr J. W. Clayton, Biologist  
Tweed River Purification Board*
- 11.45-12.15 **Tweed fish populations**  
*Dr D. H. Mills, Department of Forestry and  
Natural Resources, University of Edinburgh*
- 12.15-12.45 **Discussion**
- LUNCH
- Session 2 **FISHERIES, EXPLOITATION  
- THE LOCAL SCENE**  
*Chairman:  
Dr A. D. Hawkins, Director of DAFS  
Marine Laboratory, Aberdeen*
- 14.15-14.45 **Tweed trout fishing**  
*Mr A. D. Jamieson, Secretary of State's  
Advisory Committee on Trout Protection*
- 14.45-15.15 **Tweed salmon catches analysed**  
*Mr W. M. Shearer, DAFS Freshwater  
Fisheries Laboratory, Pitlochry*
- 15.15-15.45 **Illegal salmon fishing**  
*Mr A. Veitch, Superintendent  
River Tweed Commissioners*
- TEA
- 16.15-17.00 **Discussion**

**Sunday 7th May**

- Session 3 **TWEED'S INTERNATIONAL  
CONTEXT**  
*Chairman:  
Dr R. Shelton, Officer in Charge, DAFS  
Freshwater Fisheries Laboratory, Pitlochry*
- 09.30-10.00 **The English north east drift-net fishery**  
*Mr A. Champion, Fisheries Manager, River  
Division, Northumbrian Water*
- 10.00-10.30 **The work of the Atlantic Salmon  
Conservation Trust**  
*The Hon. Lord Hunter, Patron, ASCT*
- 10.30-11.00 **The North Atlantic Salmon  
Conservation Organisation**  
*Dr M. Windsor, Secretary, NASCO*
- COFFEE
- Session 4 **FISHERIES MANAGEMENT**  
*Chairman:  
Dr D. H. Mills, University of Edinburgh*
- 11.15-11.45 **The economics of the Tweed and its  
fisheries**  
*Mr J. H. Leeming, Fishing Agent and Clerk  
River Tweed Commissioners*
- 11.45-12.15 **Tweed juvenile salmon and trout stocks**  
*Mr R. Gardiner, DAFS Freshwater Fisheries  
Laboratory, Pitlochry*
- 12.15-12.45 **Tweed caulds and fish passes**  
*Mr C. Carne, Crouch & Hogg  
Consulting Engineers*
- LUNCH
- Session 5 **THE FUTURE**  
*Chairman:  
Professor G. Dunnet, Regius Professor of  
Natural History, Aberdeen University*
- 14.00-14.30 **Genetics and salmonid restocking**  
*Dr E. Verspoor, DAFS Marine Laboratory,  
Aberdeen*
- 14.30-15.00 **A future fisheries management plan for  
Tweed**  
*Mr N. Yonge, Chairman, Technical  
Advisory Group, Tweed Foundation*
- 15.00-15.45 **General discussion**
- TEA
- 16.00-16.30 **Concluding comments**  
*Professor G. Dunnet, Regius Professor of  
Natural History, Aberdeen University*

After Dinner: Lord Sanderson of Bowden, Scottish Minister of State for Agriculture & Fisheries

## SEA TROUT AND BROWN TROUT

(by A. F. Walker, Freshwater Fisheries Laboratory, Pitlochry)

A major problem in sea trout stock evaluation and enhancement lies in the relationship of sea trout with brown trout, the wholly freshwater form of the same species, Salmo trutta. No way has been discovered to distinguish which parr will become sea trout and which will not. In law, however, sea trout are classed with salmon, perhaps reasonably enough since both salmon and sea trout go to the sea and have long-established commercial value. Biologically, however, sea trout and brown trout are by no means as conveniently separable. Modern biochemical genetics techniques have not detected any consistent difference between them and it appears that they often have the same parents.

Recent field studies and rearing and stocking experiments in the River Tay System support this view. The mature brown trout sampled at spawning time in the burns running into the Perthshire River Earn, a noted sea trout river, were almost all males. Yet the sea trout found in the same burns, taking the spawning season as a whole, were mainly females. This is partly because more female than male sea trout survive to spawn again, but it is not simply that, because the smolts migrating seawards in the spring were also mainly females and so were the maiden spawning sea trout.

A similar female bias has been observed in sea trout stocks in other areas. What happens is that some of the young male trout begin to mature sexually and remain in fresh water when their immature siblings migrate down towards the sea. Males tend to mature one year earlier than the females, and it seems that all, or nearly all, of these ripening males stay in fresh water for the remainder of their lives, retaining the appearance of brown trout. A similar phenomenon occurs in salmon. The so-called precocious male parr mature in the autumn but, unlike trout, many mature salmon parr turn silvery in the following spring and migrate to the sea. The age at maturity of both species, although under some genetic control, is influenced by growth rate, and the proportions of the parr which ripen may vary from place to place and between years.

The scarcity of ripe female brown trout in the River Earn burns suggests that the fry present there hatch almost entirely from sea trout ova. To test the hypothesis that sea trout ova could give rise to both forms, marked River Earn sea trout fry were stocked in the fishless headwaters of an upper tributary then were followed through to maturity. Some of the parr stayed in the burn, others dropped into the Earn and the rest moved off to the estuary and the sea. By their fourth autumn, the burn trout weighed only a few ounces, the returning ripe river trout were about half to three-quarters of a pound and the sea trout were about two pounds.

So it was confirmed that brown trout as well as sea trout resulted from stocking sea trout fry, the parents of which were

large, previously spawned fish. As anticipated, there were more male than female brown trout, but the numbers of female brown trout were greater than expected, perhaps because the stocked fry had matured earlier in the fallow headwaters, where they grew faster than the young trout in the main burn. In time, the brown trout remaining in the stocked zone, isolated from returning migrants by steep waterfalls, may establish a fully resident population, simulating the recolonisation of British rivers by sea trout towards the end of the last ice age, some 10,000 years ago. Having penetrated into the large lakes created by ice dams, many populations were left above impassable waterfalls when the glaciers melted. Stocks such as these may have lost the tendency to migrate through genetic selection, for the fish which did migrate were unable to return to spawn.

Sea trout are still common in many UK rivers and the question is often asked why some rivers seem to be preferred while neighbouring ones contain very few. We see this in the Tay System. Sea trout are very common in the Earn yet rare in the River Tummel, one of the other major tributaries, while, conversely, the Tummel provides much better brown trout fishing than the Earn. Both have mixed spawning stocks of the two forms, varying in proportion from place to place.

These varying proportions are likely to be due to local environmental conditions. Factors favourable to residence could be plenty of food and space and a generally "comfortable" existence, whereas overcrowding, a limited food supply and other factors resulting in a less comfortable life-style would favour migration. Migration to the sea happens to be the best tactic in the Earn; river residence is better in the Tummel. But it is not an all or nothing phenomenon; the young trout occupy the full range of habitats available to them. In some rivers there appears to be no clear-cut advantage favouring either sea trout or brown trout and their numbers are nearer to parity.

The direct influence of the nursery environment is unlikely to be the only factor which determines their relative numbers. Post-migration survival, growth and ease of return to spawn are also likely to play a part, so that through natural selection some populations will have a greater inherent tendency to migrate from or remain in fresh water. Contemporary scientific wisdom suggests that there is a threshold level in juvenile body condition, varying genetically from stock to stock, which determines whether or not smolt migration will take place. There are also likely to be genetic and environmental influences on the extent of migration in distance and in time. Not all smolts may go as far as the sea.

In general terms, it seems that better growing conditions lead to fewer sea trout and more brown trout, but as yet there is no handy rule of thumb to help forecast the outcome.

THE FIRST SALMON ECONOMIST!  
(Dr. Derek Mills)

The following extract from an article entitled, "Some hints on the nature of the salmon, and on conducting the salmon fisheries of the Tweed" by John Younger (the St. Boswells shoemaker and author of "River Angling for Salmon and Trout") which appeared in the Journal of Agriculture Vol. 11 (N.S.) for the period July 1845 - March 1847 (pp. 497 - 509), will be of interest to all those readers involved in the angling versus netting debate:

"If the net fishings are worth being rented by individual tacksmen, they are surely worth more in value, (overlooking the sport,) to the whole proprietors of seventy miles of the Tweed. Those rents would be, individually, a mere fractional consideration to the rents that might be drawn in letting mile-lengths to gentlemen rod and line anglers, who cannot, under present arrangements, be one-hundredth accommodated. The benefit, too, to the localities where the anglers would thus be attracted by their favourite amusement, would be worthy of consideration. The distribution of salmon, in the river generally, would depend solely upon casual floods throughout the year. There would always be plenty of fish for the rod; many would live to attain to a great size, and rod-fishing would then be one of the most pre-eminent, desirable, healthful, and exhilarating standard amusements of our country. It would beat Grecian games, as well as English horse-racing and hound-coursing, all to nonsense. The bodily exercise then would place the angler on the top of the calculation of the bill of health. The excitement would be one of the most nourishing principles of the mind, without the engrossment of the faculties from higher pursuits. It would be a charming relaxation from sedentary employments and severe studies, besides an honest source of livelihood for a few poor fellows like myself, who, living by the side of the waters, have, from observation and practice, acquired a taste and a use of hand in practical fly-dressing, and the preparation of other necessary tackle, rods, and lines, to dispose of to our richer amateurs of high fancy for the 'gentle craft'."



SALMON FARMING  
(by the Director)

The exchange of letters between the Chairman and Lord Sanderson shows the AST's position on salmon farming and the planners. The growth of the industry has been amazing, as the graphs on page 38 show. (These graphs have been reproduced by kind permission of the DAFS Marine Laboratory, Aberdeen.)

The article by the Director of the Scottish Salmon Growers Association gives the other side of the picture. I agree we must all live together and that co-operation is essential.

Having said this, there is still much with which to be concerned. Planning has not been sorted out, although we are assured that it is under active consideration by the SDD and DAFS.

\* \* \* \* \*

Recent correspondence between the Chairman and the Minister of State at the Scottish Office, Lord Sanderson, is reprinted below:

Lord Sanderson  
Scottish Office  
New St. Andrews House  
St. James's Centre  
Edinburgh

4th January, 1989

Dear Lord Sanderson

As you may know I recently succeeded David Clarke as Chairman of the Atlantic Salmon Trust while at the same time John Moran became Vice-Chairman. We both much look forward to working with you in the years ahead.

The Government has done much in the recent past towards the conservation and enhancement of Scottish salmon stocks, and we are very appreciative of these measures. However, there are a number of highly significant issues which are the subject of ongoing discussions between your officials and this Trust, and, of course, other organisations. Doubtless some of these will remain on our agenda for the foreseeable future! I hope that an opportunity will present itself sometime in the next few months when John Moran and I together with John Mackenzie, our Director, could meet with you to review both the Scottish and the wider national and international scene and perhaps to identify priorities where the Trust's work might best complement Government activities.

However, there is one matter which I believe does require urgent action, so please forgive me for writing to you at this early stage. I refer to John Mackenzie's letter to you of 24th June, 1988 and your reply of 19th July, on the subject of salmon farming activities in fresh water. The fact is that our concern at the lack of effective control over the establishment of smolt rearing cages in fresh water has increased over the last six months. We are well aware of the economic benefits that a healthy fish farming industry brings to Scotland. The industry continues to expand at a great rate. It is this rate of change that is causing such problems and necessitates, in our view, early steps by the Scottish Office to bring the position under tighter control.

Let me set out as briefly as possible the Trust's concerns:

1. The effect of smolt rearing in fresh water on wild salmon stocks is not known. The fears about disease and the long-term genetic consequences are widespread and serious. These fears are shared by scientists and laymen alike. Meantime, the pace of development is such that irreversible damage could be done before adequate scientific knowledge can be gathered to assess the seriousness of the problems. Subsequent attempts at corrective action might prove to be too late.
2. Up to now fish farming has largely been restricted to the west and north-west of Scotland. But it is the east coast rivers that hold 75% of the wild fish stocks. These have so far been largely unaffected.
3. Demand for smolt rearing facilities in fresh water is already heavy and increasing. You stated in your letter of 19th July that "it would be premature to consider any amendment to our existing legislation without firm evidence about the extent of any damage".

A contrary view would be that to permit an extensive increase in the establishment of smolt-rearing facilities in fresh water without assessing the potential effect on wild salmon stocks could be disastrous!

This has been the pattern of so many environmental problems in recent years - pesticides, fertilisers, chemical discharges into the atmosphere, to name but three.

4. It may be that some early amending legislation is the only solution, but may I urge you to see what can be done within the existing planning guidelines and the roles of the various departments and bodies responsible. It seems to us that the position is as follows:

## Scottish Development Department

The Scottish Development Department, with overall responsibility for planning controls, stated in a recent letter dated 13th December to the Trust that, in their view, "the establishment of cages for fish farming in freshwater lochs will normally require planning permission both as a change of use and as involving the carrying out of building or engineering operations for which no deemed consent is available". They accept that the relevant legislation is open to various interpretations and that the situation is unsatisfactory. They hope for a convenient opportunity to amend the legislation to put the position beyond doubt.

Meantime, they state that it is for the Courts rather than the Secretary of State to give an authoritative interpretation of the various provisions.

## Local Authorities

It therefore appears that the operation of planning controls depends on how Regional and District Councils interpret the law. The practice varies widely. Some Regional Councils, for example, Tayside, consider that any undertaking considered to be "agricultural" requires no planning permission. Others, such as Highland, have a different policy and consider all applications for fish farms come under planning controls. Practice among District Councils varies correspondingly.

## North of Scotland Hydro Electric Board

The North of Scotland Hydro Electric Board have a careful approach to allowing their reservoirs to be used for cages. At present they are allowing a controlled experiment on one reservoir and are carefully monitoring the results. They are particularly concerned about escapees and disease. The proposed privatisation and the consequent potential for commercial exploitation of reservoirs feeding major east coast rivers for smolt rearing is obvious. This requires careful consideration.

## River Purification Boards

The Purification Boards have a responsibility to ensure that discharges from cages or farms is within certain approved limits but they have no responsibility for possible escapees or disease. Any objection on those grounds to consent being granted is dismissed as not being within the Purification Board's remit, and a recent appeal to the Secretary of State by the AST was similarly dismissed.

## District Fishery Boards

The thrust of the Government's policy as enacted in the Salmon Act 1986 and in subsequent measures such as the removal of rates from April 1989 where District Fishery Boards are in existence has been to strengthen the powers and to rely upon the initiatives of District Fishery Boards for the conservation of wild salmon in their areas.

But so far as the establishment of freshwater cages is concerned, with serious potential but as yet unquantified risks to the health and wellbeing of the stocks for which they are responsible, District Fishery Boards are frequently not consulted, and have no powers.

## The Department of Agriculture and Fisheries for Scotland

DAFS has overall responsibility for both fish farming and wild salmon in Scotland. Interests concerned with both have been encouraged by the Government's concern and support in recent years. It is important that both should continue to prosper within a framework of mutual understanding and co-operation. It is understood that the salmon farming industry itself would welcome a lead by the Scottish Office to establish clear planning guidelines for the establishment of future fish farms and cages in fresh water.

May I therefore summarise the views of the Atlantic Salmon Trust. The planning controls for fish farming are in a mess! They differ between one part of the country and another. They certainly do not provide effective control. The Trust does not wish to see unnecessary curtailment of the fish farming industry, but it is concerned at the threat to wild fish. If something is not done soon it will be too late and the prime east coast rivers will suffer.

We believe that any measures must embrace the following three essentials:

1. Planning permission for the establishment of fish farms or freshwater fish cages must be made a requirement and clear guidelines issued.
2. District Fishery Boards must be involved in this process and their consent, subject to any suitable qualifications, must be a requirement.
3. River Purification Boards must have similar powers within their own terms of reference.

All are agreed that the wild salmon is a prime asset to Scotland. The Atlantic Salmon Trust asks you to give urgent attention to a situation that is rapidly becoming serious and uncontrollable.

Sir David Nickson  
Chairman

17 March, 1989

Dear Sir David

Thank you for your letter of 4 January about issues of concern to the Trust arising from development of fish farming in inland waters of Scotland. I apologise for taking until now to consider the points you have made.

Some of the issues you raise have been the subject of previous exchanges with the Trust and other wild salmon interests in Scotland. At the risk of repeating points which may be familiar to you already, I do think the problems need to be set in their wider context. As you acknowledge, we have made a number of significant improvements in the legislation affecting conservation and management of wild salmon stocks in and since the Salmon Act of 1986. Some of the major issues are under consideration by the Salmon Advisory Committee and I would not wish to rush into major new initiatives until we have had a chance to take stock of the significant steps which have been taken in recent years.

There is one general point I would like to make about the development of fish farming in Scotland. The salmon farming industry has brought much needed investment and employment to some of the most economically disadvantaged remote parts of the Highlands and Islands. The infrastructure and stocks have already been laid down for major expansion this year and next year, and there are now over 2,000 people directly employed - part-time or full-time - in the industry. The expansion of both salmon and trout farming has benefited from the advantages of clean waters and the high reputation of fish from Scotland. Good standards of husbandry are critical for success in production as well as reputation in the market. The industry will not serve its own interests if its husbandry practice or standards of control can be called in question.

The salmon farmers, in particular, have done a great deal to improve their collective expertise and understanding of other interests. I am sure that a great deal more can be achieved if there is constructive dialogue between the industry and other interested parties to understand each other's concerns and to resolve issues without recourse to statutory regulation.

I do not think it is fair to say that the situation is out of control. There has been a very rapid expansion, particularly in salmon farming, but much of this has been achieved by increased yield from existing marine and freshwater sites. For marine fish farms, we announced last December new arrangements for consultation on the proposals for leases which are considered by the Crown Estate Commission. The new Advisory Committee should be established quite soon and this should ensure that various

interests including marine ecology are more fully considered. I will be watching its performance closely to make sure it does indeed fulfil our hopes.

In relation to planning controls, the Scottish Development Department has issued guidance to planning authorities confirming its view that the establishment of new fish farms - such as cages in freshwater lochs - will normally require planning permission both for change of use and for the carrying out of building or engineering operations for which no deemed consent is available. As with other aspects of planning law, however, it is for the planning authority to decide whether or not planning permission is required in individual cases. In the event of disagreement between the planning authority and the applicant or any objectors, it is for the courts rather than the Secretary of State to give an authoritative interpretation of the current provisions.

I accept that planning authorities have differed in their views about the extent to which planning permission is required at present. The present legislation does not deal specifically with fish farms as a category of use or of development. We are looking at this issue again though I have to say that even if the legal position is clarified, this is unlikely to be a panacea. At the end of the day individual cases have to be considered on their merits.

I think it is unlikely that we could give any formal right of veto to District Salmon Fishery Boards or indeed the other potential objectors to particular kinds of planning case. It is important that planning authorities should take account of the views of interests which could be directly affected by new development and that planning authorities should seek the best available advice on matters such as fish management. Much will depend on the willingness and ability of District Salmon Fishery Boards to make their views known to planning authorities in clear and informative terms.

In relation to discharges from fish farms, James Douglas-Hamilton announced on 10 January that we will seek powers to ensure that these discharges can be controlled as trade effluents by river purification authorities. It is hoped to include proposals from amendment of the Control of Pollution Act 1974 in the Water Bill which is under consideration by Parliament this session. Meantime, there has been continuing dialogue between the river purification boards and salmon farming interests to clarify existing requirements and to try to improve the present situation by agreement. A seminar is taking place this week, under the auspices of the River Purification Boards, to which a wide range of fish farming and fish management interests have been invited.

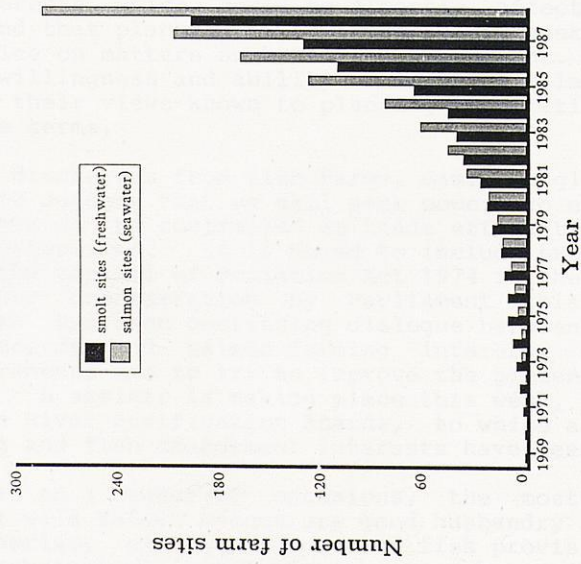
As I have said on a number of occasions, the most important safeguards for wild salmon stocks are good husbandry in the fish farms and hatcheries, and the diseases of fish provisions. Both are backed by substantial investment in research and development,

a good deal of which is now being funded by the industry. On fish deases monitoring work and regulatory inspections are undertaken by scientists from the DAFS Marine Laboratory, Aberdeen and the Freshwater Fisheries Laboratory at Pitlochry. We are reviewing the programme of research to ensure that work continues to focus on issues of greatest concern and makes the best use of the available resources. I know that there is considerable interest in work on genetic diversity of farmed and wild salmon stocks and further studies are under consideration at present.

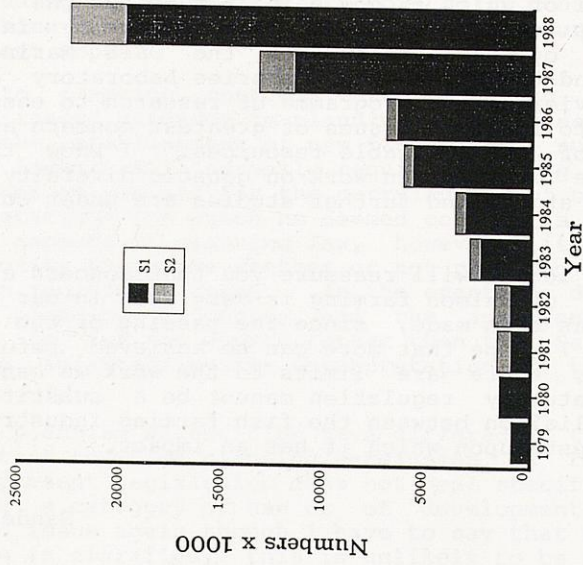
I hope this letter will reassure you that concern about the scale and impact of salmon farming is very much in our minds. Good progress has been made, since the passing of the Salmon Act in 1986, and I hope that more can be achieved before too long. Nonetheless, there are limits to the work we can take on and further statutory regulation cannot be a substitute for more effective liaison between the fish farming industry and the many other interests upon which it has an impact.

Sanderson of Bowden

Number of Atlantic salmon farm sites in operation in Scotland 1969-88.



Annual production of farmed smolts in Scotland 1979-88.





## "COMMON GROUND OR POLES APART?"

(by William Crowe, Director  
of the Scottish Salmon Growers' Association Ltd.)

Arriving recently as a newcomer to the Scottish salmon farming industry, it is reasonable to assume that a fresh mind could be invoked to analyse the great debate between the pro-farming lobby and the anti-farming lobby. A questioning mind was duty bound to probe deeper into the issues which seem to have set salmon conservation organisations and the salmon farming interests off on different paths, and strangely one does not find convincing arguments for the divisions where they appear to exist. After all, both camps exploit the same species, Salmo salar, for economic and social benefit. Both, presumably, maintain an interest in the survival of the species, its health and welfare, its genetics and breeding cycles, and so forth. Furthermore, agreements exist between riparian owners and fish farmers which require the latter to release smolts into rivers - so co-operation has existed in some areas.

Indeed, the debate appears to be characterised by much conjecture and emotion, rather than scientific reasoning and practical evidence. For example, in arguments on the contentious subject of the genetic interaction, or lack of it, between wild and farmed salmon the words often used are, "catastrophe", "genetic pollution", or "genetic contamination" - phrases which were more aptly coined by the nuclear protestors of some years ago.

This article tries to seek the middle ground, to eschew the polarisation and to clarify SSGA policy on a number of issues where there is more common ground than the opposite.

### Genetic Interaction?

On possible genetic interaction, there is a willingness in the SSGA to co-operate with the Atlantic Salmon Trust on jointly funded research to identify if there is a risk or not to wild stocks from genetic interaction. It is early days yet, but first the methodology of identifying and proving interactions has to be developed and this is now under way.

Furthermore, the SSGA Smolt Group has reiterated its policy to members on smolt placement in rivers, namely:

1. Non-native smolts should not be used to stock rivers.
2. The District Fisheries Board Certificate acknowledging an intended placement should be furnished before any smolt delivery takes place.

It also seems odd that fish farmers would willingly tolerate escapes from sea or freshwater cages on a prolonged basis without doing anything about it. Barring unforeseen accidents or freak storms, there is every financial incentive for salmon farmers to avoid escapes and, therefore, take every precaution to avoid

mishaps. Fish insurance policies are rather demanding on prevention and record keeping.

So, do these escapees from unfortunate accidents really pose a threat to wild stocks as some angling interests claim? The answer to a neutral observer must be "not proven", in Scots parlance at least.

The "threats" perceived are that a cross-fertilisation of farmed and wild fish will undermine the ability of the progeny to complete its life-cycle in its specific river and to continue its species and type. In the case of the east coast rivers of Scotland we hear little comment about any significant numbers of farmed fish being caught by rods. Equally, on the west coast it appears the stocking of the Clyde by non-native fish has not "harmed" a river system whose native stock had been wiped out many years ago by other factors. Does this suggest that some perceived threats are reversible? And, how "pure" are river stocks anyway? In how many cases has this purity been affected by the introduction of other stocks, long before the advent of fish farming?

So, the many unknowns provide fruitful thought for Atlantic salmon buffs whether of the wild or farmed varieties. The advancement of scientific proof to allay fears, misconceptions, prejudices, or vested interests, can be one way to progress.

#### EEC Proposals on Fish Health

The increased activity in the EEC towards 1992 brings another common interest. The SSGA considers that any proposals which would weaken the health status of Scottish salmon should be vigorously opposed. Traditionally the UK has had a policy of exclusion of various animal diseases while the other Member States have operated a philosophy of living with diseases and using vaccination, e.g. rabies, and foot and mouth.

The same policy applied to fish could pose a serious threat to salmon in Scotland, whether wild or farmed. It is widely believed in the SSGA that VHS could decimate the industry if it was ever imported into the country with live fish. The industry is, therefore, seeking to reinforce the higher DAFS' standards (i.e., higher than MAFF's) on trade in live fish being brought into Scotland. This could be a long battle with the EEC Commission and already the concept of zoning has been floated to allow the UK to exclude fish from affected areas. Perhaps this is another area where the SSGA and the AST could fruitfully share common ground?

#### Funding Research and Development

The charge is often raised against the fish farming industry of spreading disease to wild stocks. Dissenters would argue that the infection route is the other way round. Whichever belief is true, it is pertinent to note that SSGA-funded research

programmes are seeking a vaccine for the major diseases such as furunculosis and BKD. Work is also being undertaken on pancreatitis, and Nuvan and its possible alternatives. The technical programme is also investigating the behavioural characteristics of salmon, particularly during feeding, and this might provide some interesting reading in due course. It will help us to understand salmon a little better.

But it should be remembered that fish farming is having to fund this research out of its own resources - the days of Government funding have long gone.

### Industry Development

The development of fish farming is often criticised as being out of control. A Crown Estate's seabed lease application usually involves consultation with about 30 different interested parties. The River Purification Boards are flexing more muscle over discharge consents, which effectively reduce stocking rates. Highland Regional Council applies planning controls on freshwater sites.

With so much apparent opposition to fish farming, it is a wonder that any projects get off the ground at all!

Perhaps those who do grant permission are a little more open minded that we credit them for and are better placed to take a balanced view. The SSGA opinion is that planning should be a positive philosophy rather than an excuse to stop everything in its tracks or to create stagnation in the Highlands and Islands economy. With this goes the acceptable strictures placed on sites and their good husbandry and management dictated by the common purpose - the successful rearing of Atlantic salmon. Co-existence with other interests is, therefore, paramount in the SSGA's aims.

### Theft of Salmon

The SSGA has also recognised the poaching problem experienced by riparian owners. Indeed, the industry itself now spends a considerable sum on the installation and use of various surveillance and alarm systems. This is a reflection of the considered view that a proposal such as that mooted in the proposed salmon dealer licensing scheme is unlikely to achieve its aim. A statute which is unworkable, however well-intentioned, is likely to be flouted and to fall into disrepute and disuse. Witness the case of dog licensing, now abandoned by the Government.

The burden of administration on the customers of the salmon industry must not be such that it serves as a deterrent to purchase. Salmon farmers have assumed the task of protecting their own stocks from theft, and are not expecting the Government to achieve very much by the introduction of a costly licensing system.

## Humane Slaughter of Salmon

Fish farming has come under the scrutiny of the Farm Animal Welfare Council, and the SSGA has financed an independent study into a number of practices. The end result is a Code of Practice for humane slaughter, and although the angling fraternity may feel safe at the moment from such an imposition - how long can this last? Some of the work of the SSGA might be of interest to fishers as well as farmers.

## Non-Destructive Control of Predators

In answer to the continued criticism by environmental organisations, the SSGA has invited them all to contribute to an agreed Code of Practice which should be available shortly. The Code deals with the legal methods of control of birds, seals and other predators such as mink.

An interesting point arose in the discussion on seals, both common and grey. The arguments against the fish farming industry do not hinge on true conservationist grounds, as seal populations are considerably larger than they were some years ago, but simply on the "idea" that shooting seals is a bad thing. The SSGA has been at pains to point out that if all other methods of deterrence fail, than a rogue seal might have to be shot if it is continuously savaging salmon in cages. Strangely, the animal welfare lobby have no compassion for the victims of seal attacks, i.e. the salmon!

These are but a few of the subjects which may have some aspects of commonality between the wild and farmed salmon interests. The proximity of the AST organisation at Pitlochry to the SSGA in Perth can only be exploited for the better; where we can agree - we will; where we agree to differ - we no doubt will do so on better terms and with more understanding.

ATLANTIC SALMON IN RUSSIA  
(by Lord Moran)

Last February my wife and I had a brief holiday in Leningrad and Moscow. It occurred to me that it might be interesting to take the opportunity to see someone in Moscow who knew about Atlantic salmon. For, though few people in the West know anything about the runs of salmon in Russian rivers, the statements (which NASCO's Secretary, Dr. Malcolm Windsor, very kindly sent me) made by Soviet delegations since the Soviet Union joined NASCO (as an observer five years ago and as a full member since 1986) make it clear that the country is an important Atlantic salmon producer. Their average catch between 1931 and 1960 was 1,000 tons - just about the average annual catch of wild salmon by all methods in Scotland. Since 1960 the catch has declined, in the sixties to an average of 624 tonnes and in the seventies to 542 tonnes. Later figures are:

Year	tonnes
1980	631
1981	450
1982	351
1983	436
1984	593
1985	652
1986	608
1987	559 (provisional)

But the Atlantic salmon is still judged to be "of great economic significance for the Soviet people". The Soviet statements ascribe the post-1960 decline to "increasing intensification of sea fishing and interception fishing on migratory routes". They themselves follow what appears to be an enlightened policy - more so in some respects than that of our own Government. Sea fishing for salmon is prohibited, they hold that "salmon fishing should, as a general rule, be prohibited in areas of the high seas outside 12 miles from baselines", and stand "firmly on the principles contained in the 1982 United Nations Convention on the Law of the Sea and, in particular, that countries in whose rivers salmon originate should have the primary interest in and responsibility for .... stocks of the anadromous species and that other states have the obligation to cooperate with the state of origin to conserve these stocks". The only discouraging note from the point of view of a salmon fisherman is that "sport and game salmon fishing is prohibited in all areas with the exception of strictly limited licensed fishing in three rivers of the Kola Peninsula".

I thought it would be interesting to try to find out in Moscow a little more about Soviet salmon policies. So I first found out from Dr. Windsor the names of recent Soviet delegates to NASCO and the address of the Ministry of Fisheries in Moscow, and then asked the Soviet Embassy if they would try to arrange a meeting with one of them. I think that until recently an

unofficial descent of this sort on a Soviet Ministry would have been difficult to imagine. And even now, in this era of glasnost, the Ministry of Fisheries must have been a little surprised to be asked to receive an itinerant peer and his wife to discuss salmon problems. But persistence, reminders to the "House of Friendship", numerous telephone calls and a helpful intervention by the British Embassy finally brought success and we had an hour with Dr. Vladimir Ikrianikov at his office on the Rozhdestvinsky Boulevard on 17th February.

I asked him first for details about the high seas interception of migrating Soviet salmon. He said that they passed through the economic zone of the Faroe Islands, then through Scottish waters, returning along the Norwegian shore. They were fished for by the Faroese and the Norwegians, who took substantial numbers. He gave me a copy of an article he and Professor Bakstanskij had written in August 1984 for a Norwegian magazine, "Villmarks Liv", entitled "The demise of the salmon - seen with Eastern eyes", which gave details of this. My son-in-law was good enough to translate this for me, and the following points seemed to me of interest:

- (i) The Soviet salmon experts Bakstanskij and Nesterov had concluded between 1970 and 1973 that two out of every three salmon caught off the coast of Finmark (the most northerly county of Norway) originated from Soviet rivers.
- (ii) Among the factors required for the conservation of salmon was "the discouragement or prevention of the location of industrial undertakings in the immediate vicinity of salmon rivers".
- (iii) The analysis of data on salmon migration up fish ladders in the Tuloma and Kolvitsa rivers over many years had led to the conclusion that an adequate spawning escapement "for the maintenance and even increase of the stock" was 50% of the run. As a result, after 1959 catches on all rivers were restricted to this 50%.
- (iv) Despite these restrictions, salmon runs and catches had been substantially reduced - in the Petsjora river, for example, there had been a reduction of two thirds in the last 30 years. The average size and sea age of the fish had also fallen, as had the "reproduction coefficient" (the ratio between the number of offspring and the parents). There had been increasing evidence on fish of net and line markings. All salmon stocks were affected, but particularly the largest fish.
- (v) Soviet enterprises in the Barents and White Seas had bred some two million salmon fry, and more hatcheries were being established.

- (vi) Soviet workers were also seeking to acclimatise the pink salmon (Oncorhynchus gorbuscha), which were being caught in quantity in Soviet rivers and in Norway, where in some years the catch of these fish had reached 25 tonnes.
- (vii) The sharp reduction in the Soviet Atlantic salmon runs was attributed to intensive fishing in Norwegian and Faroese waters and in the North Sea. The increase in drift net fishing for salmon in Norway had had a particularly marked effect, though Norwegians must know from their own experience how irrational it was.
- (viii) Whereas the salmon catch had been roughly the same in the Soviet Union and Norway, the intensification of fishing off the Norwegian coast in recent years had had the effect of reducing the Soviet catch to about one third of the Norwegian catch.

I told Mr. Ikrianikov of our general decline in spring runs and of the substantial runs of grilse and summer salmon in some of our rivers last year. They had had no increased runs of Atlantic salmon in 1988 - but this was something which their scientists could discuss at NASCO.

I mentioned pollution. He said there was not much industry in the northern area but they had problems with timber coming down the rivers. The general problem of cleaning up rivers had been raised in the Communist Party Congress. It was one of the most acute problems being tackled in the Soviet Union. Tagging, he said, was being developed in the NASCO framework. He was aware of progress being made on fish farming but though they had purchased some equipment from Norway, now being assembled at Murmansk, generally speaking their waters were too cold for the technology to be applied in Russia.

We asked about their organisation. He said that the laboratories of the Polar Scientific Research Institute (PINRO) under Dr. Luka were at Murmansk. They were extending sport fishing but this was "more complicated in our country", with wild forests and no infrastructure. Generally, as with us, barrages were a serious problem "against which we are fighting". Fallout from Chernobyl had not been a problem on the northern salmon rivers, only on the Dnieper.

I said that we in the Atlantic Salmon Trust welcomed the line they were taking on high seas interceptory fisheries and the responsibility of originating states. He said that for them the main problem was the need to limit the Faroese take. (They had the same aims in the Pacific where they and the Americans had secured a reduction in the Japanese harvest.) When I asked how he thought we could best make progress in reducing the Faroese high seas fishery he said that the Soviet Union would like very much to see changes. There was a need to be realistic.

We had to recognise that the Faroese fishermen were "making use of our altruism and kindness". But this kindness was to the detriment of our own interests. We should, he said, be more firm and insistent. We should think of ways of limiting the Faroese catch. There had been valuable consultations with Canada and the United States about Japanese fishing in the Pacific. This was a useful precedent for efforts on Atlantic salmon in the framework of the NASCO convention. Japan now paid for the right to fish for salmon - another way might be the prohibition of the fishing with the right to purchase fish we caught.

Dr. Ikrianikov was not directly concerned about the Greenland fishery. The evidence, he said, was that only a few Soviet salmon migrated as far as that.

He said that he himself would not be coming to the next NASCO meeting. Dr. Luka would be there, with Dr. Zubchenko of PINRO and probably his own assistant, Dr. Gusev (who speaks excellent English and interpreted for us). The Soviet delegation would be glad to see representatives of the Atlantic Salmon Trust. I mentioned NASCO's wish to send a small delegation to the Soviet Union in July. He said this had not been forgotten. The response would be positive and soon (I so informed Dr. Windsor).

Since returning to England I have sent Dr. Ikrianikov details of the Norwegian Government's January announcement prohibiting drift net fishing for salmon and the use of monofilament, and introducing restrictions on rod fishing in various rivers, since he did not appear to be aware of this.

In general I think this was a useful contact. The Soviet authorities clearly take salmon conservation seriously and are worried about the effects of high seas interceptory fisheries. They will clearly be ready to use their influence to work towards a substantial reduction of the Faroese high seas catch. But the reference in the 1984 article to introductions into Soviet northern rivers of an alien Pacific species on a large scale seems to me intrinsically worrying and something which we and NASCO ought to go into with our Soviet colleagues.



## NEWS FROM NORWAY

The new regulations concerning fishing in Norway have been obtained from Svein Mehli, Directorate for Nature Management. These are pretty draconian measures to combat a shortage of salmon in many Norwegian rivers due to Gyrodactylus salaris and acid rain. The measures restricting rod fishing are also regarded by some as a political move to appease the drift netmen who have been stopped from fishing altogether. The Director has no comment on this, but would be interested to hear from anyone who fishes in Norway just how effective these measures are in practice. The task of policing a coastline like Norway's against illegal drift netting is indeed formidable.

### NEW FISHING REGULATIONS FOR ANADROMOUS SALMONID FISH

#### SEA FISHING

Annual Close Season: The annual close season for bend net fishing is extended so that fishing is only permitted from 1 July to 4 August.

#### Exceptions:

- Finnmark County, where bend nets may be used from 1 June to 15 July.
- Møre og Romsdal County; inner reaches of the Trondheim Fjord and the southern part of Nordland County where bend nets may be used from 1 July to 21 July.

Weekly Close Time: The weekly close time for bend net fishing is extended so that fishing with such tackle is only permitted from 6 pm on Mondays to 6 pm on Wednesdays.

#### Exceptions:

- Finnmark County, where the weekly close time for bend net fishing remains as before: from 6 pm on Mondays to 6 pm on Fridays.
- Møre og Romsdal County; inner reaches of the Trondheim Fjord; and the southern part of Nordland County; where the weekly close time is also extended to cover fishing with bag nets and manually-closed nets so that fishing with such tackle is only permitted from 6 pm on Mondays to 6 pm on Wednesdays.

Rod Fishing: Rod fishing in the sea for anadromous salmonid fish is permitted throughout the year when such fishing takes place from land. No such fishing is permitted closer than 100 metres to river mouths during the close time for a particular watercourse.

Types of Line: It is prohibited from the 1990 season to use monofilament line in the catch part of bend nets and in the guide nets of bend nets and bag nets. It is also prohibited from the 1990 season to use line with a smaller diameter than 0.70 mm

(210/4x3) in the catch part of bend nets. It is further prohibited from the 1990 season to use line with a smaller diameter than 1.1 mm (210/8x3) in the guide nets of bend nets and bag nets.

### FISHING IN WATERCOURSES

Close Season Extension: In watercourses with salmonid fish the close season will be extended in the autumn by 14 days in relation to the date that has been stipulated by law or in the regulations governing the particular watercourse. This extension does not apply to watercourses in Oslo and Akershus County and the following watercourses in Rogaland County:

Suldalslagen  
Figgjo  
Varhaugelvene  
Fuglestadelva  
Kvassheimselva

The County Governor has the authority to exempt specific watercourses from the close season extension where it is not natural to classify a watercourse as salmonid, despite occurrences of individual salmon. Furthermore, the County Governor is empowered to permit fishing with specific types of tackle during the days the close season has been extended in watercourses where there are considerable stocks of sea trout/marine char.

The annual close season is hereby extended in Numedalslagen so that fishing is permitted from 1 June to 14 August inclusive, below Hoggtveitfossen, and from 1 June to 31 August above Hoggtveitfossen.

Fishing Ban: All fishing for anadromous salmonid fish is prohibited in the following watercourses:

Finnmark	Nord-Trøndelag	Eidsdalselva	Rogaland
Sandfjordelva	Mossa	Norddalselva	Lyseelva
Smørfjordelva		Korsbrekkelva	
Brennelva	Møre og Romsdal	Aureelva	Oslo and
	Usma	Vikeelva	Akershus
Troms	Bøvra	Taffjordelva	Lysakerelva
Skibotnelva	Batnfjordelva	Hustadelva	
	Skorga		
Nordland	Mana	Hordaland	
Bjerka	Valldalselva	Blaelva	
		Anvikely	

This fishing ban is to remain in force for up to 5 years.

**Salmon Fishing Ban:** All fishing for salmon is prohibited in the following watercourses; fishing is permitted for sea trout/marine char using flies and worm bait, where the fishing line is to be the only weight in fly fishing and plummets are prohibited in worm fishing.

Troms	Isa	Akraelva	Feda
Spansdalselva	Glutra	Modalselva	Kvina
Signaldalselva	Driva	Ekso	Lygna
	Rauma		Audna
Nordland	Istra	Rogaland	Mandalselva
Lakselva i		Rødneelva	Sogndalselva
Misvaer	Sogn og Fjordane	Frafjordelva	Otra
Drevja	Mørkridselva	Dirdalselva	Tovdalselva
Beiarelva	Aurlandselva	Nordelva	
Røssaga	Fortunselva	Storeelva	Aust-Agder
		Soknedalselva	Nijelva
	Hordaland	Ulla	Gjerstadelva
Nord-Trøndelag	Matreelva	Vikedalselva	Storelva
Byaelva	Haugsdalselva	Hellelandselva	
Ogna	Romarheimselva	Ardalselva	Oslo and
Figga	Frøysetelva		Akershus
	Austdøla	Vest-Agder	Akerselva
Møre og	Norddøla	Sira	
Romsdal			
Litledalselva			

This fishing ban is to remain in force for up to 5 years.

**Banned Baits and Tackle:** It is prohibited to use prawn, imitation prawn, prawn tackle and similar baits and gear/tackle during the fishing of anadromous salmonid fish. It is also prohibited to use gear/tackle with more than three hooks. A triple hook is regarded as three hooks. The distance between the shaft and tip of the hook is not to exceed 12 mm (hook no. 2/0). Gear/tackle with a single hook is exempted from this.

**Ban on Fishing Tackle Other Than Rod and Handline:** Only rods and handlines are permitted for salmon and sea trout fishing in all watercourses in the counties of Vest-Agder, Aust-Agder, Telemark, Vestofld, Buskerud, Akershus and Østfold and the municipality of Oslo.

The following by-regulations for Numedalslagen remain in force as long as salmon ascend the river:

- Float fishing, handnets and traditional forms of fishing such as drift netting are permitted from 15 June to 10 August from 6 pm on Tuesdays to 6 pm on Thursdays.
- The ban on fishing tackle other than rod and handline (plus otter in west Norway) is hereby extended and applies until 30 April 1999 in the fishing regulations for watercourses in west Norway, mid-Norway, Nordland, Troms and Finnmark counties.

The above provisions are stated in the regulations of 14 April 1989 governing fishing for anadromous salmonid fish in watercourses and the regulations of the same date governing fishing for anadromous salmonid fish in the sea. These regulations come into force as of 1 May 1989. Exceptions to this are the provisions concerning types of line/line diameters which come into force on 1 May 1990.

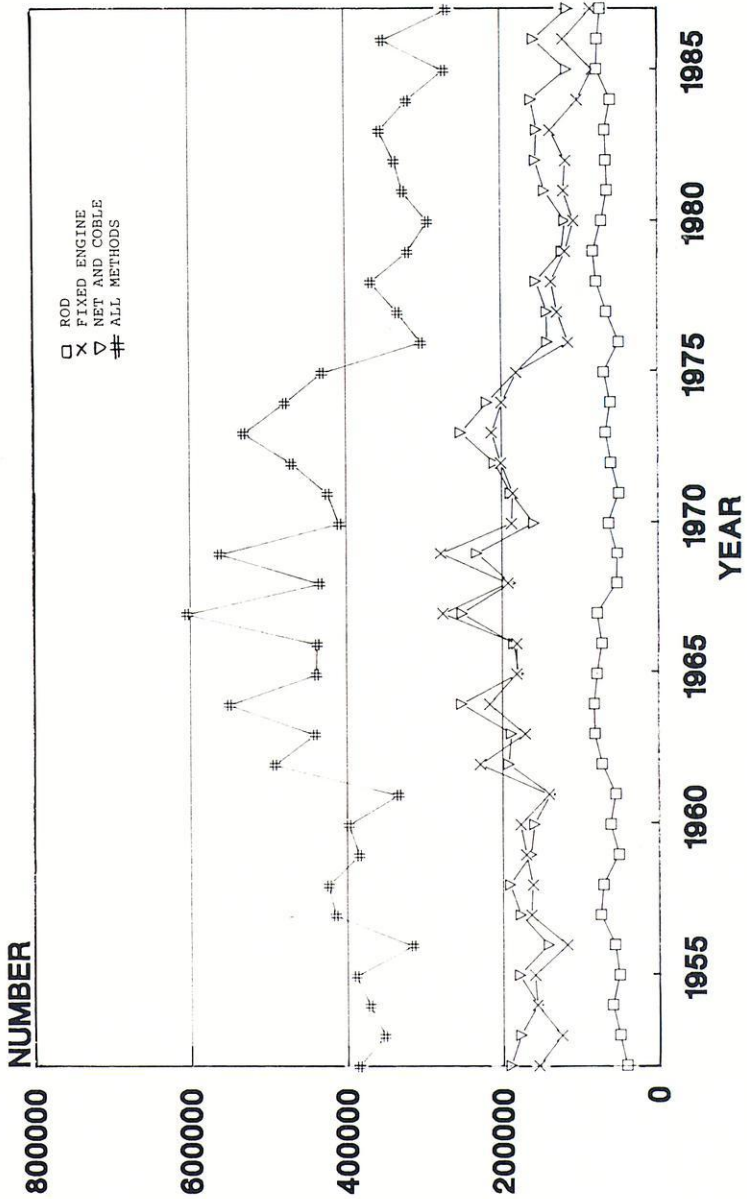
\* \* \* \* \*

### STATISTICS

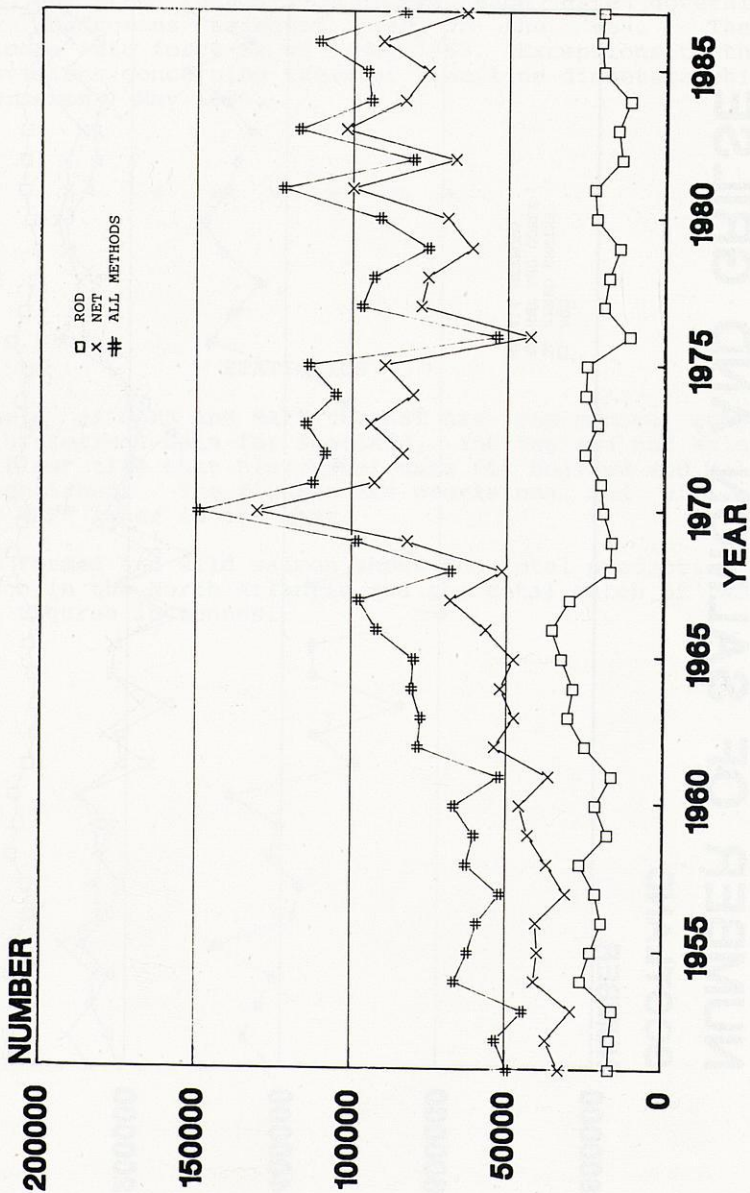
With the help of DAFS and MAFF the AST has reproduced graphs showing the historical data for Scotland, and England and Wales. This is the first time that historical data for England and Wales has been published. The figures are provisional and will be confirmed by MAFF later in the year.

The graph on farmed and wild salmon shows the total production of farmed salmon in the North Atlantic and the total catch of wild salmon, both figures in tonnes.

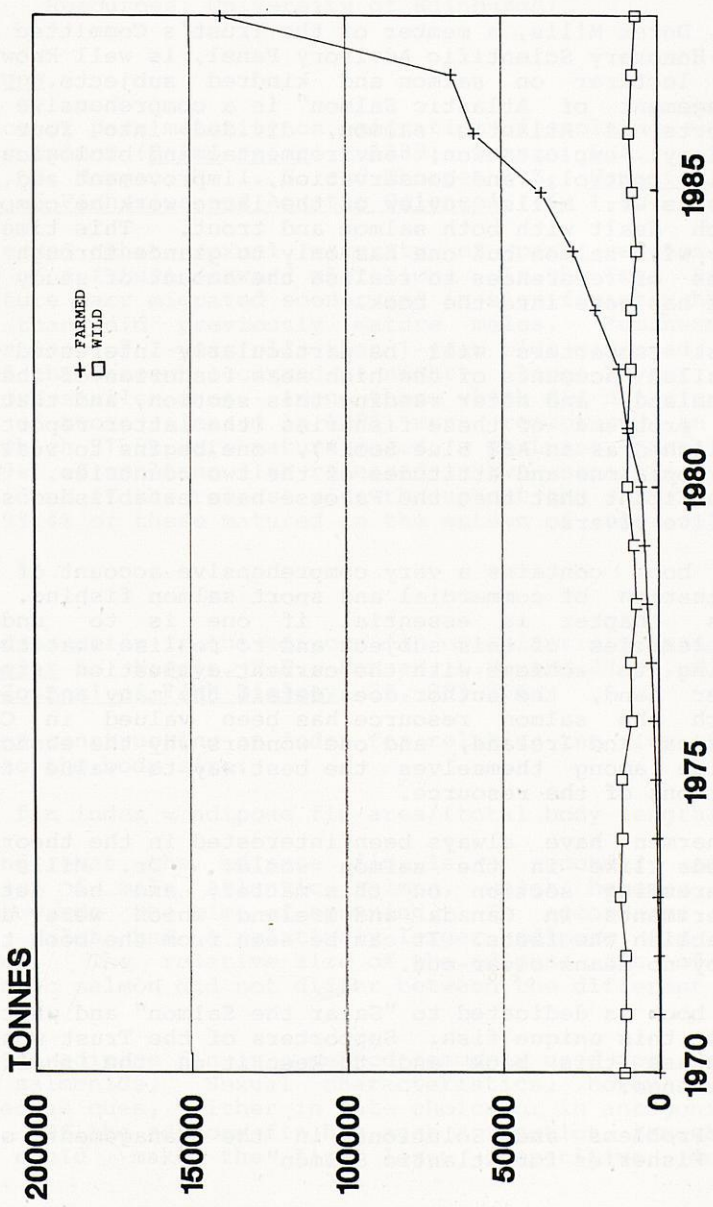
# NUMBER OF SALMON AND GRILSE SCOTLAND



# NUMBER OF SALMON AND GRILSE ENGLAND AND WALES



# FARMED & WILD ATLANTIC SALMON IN THE NORTH ATLANTIC OCEAN



"ECOLOGY AND MANAGEMENT OF ATLANTIC SALMON", BY DEREK MILLS  
(Chapman and Hall, London 1989. 351 pp.)

Dr. Derek Mills, a member of the Trust's Committee of Management and Honorary Scientific Advisory Panel, is well known as a writer and lecturer on salmon and kindred subjects. "Ecology and Management of Atlantic Salmon" is a comprehensive study of all aspects of Atlantic salmon, divided into four main parts: ecology; exploitation; environmental and biological hazards and their control; and conservation, improvement and restoration. This is Dr. Mills' review of the large work he completed in 1971 which dealt with both salmon and trout. This time he has dealt only with salmon but one has only to glance through the nearly 40 pages of references to realise the amount of study and research that has gone into the book.

Trust supporters will be particularly interested to read the detailed accounts of the high seas fisheries of the Faroes and Greenland, and after reading this section, and that dealing with the problems of these fisheries (the latter report is already published as an AST Blue Book\*), one begins to realise very well the opinions and attitudes of the two countries. It is perhaps significant that that the Faroese have established salmon stocks in five rivers.

The book contains a very comprehensive account of the economic evaluation of commercial and sport salmon fishing. A study of this chapter is essential if one is to understand the complexities of this subject and to realise what the Ministry is trying to achieve with the current evaluation study. On the other hand, the author does detail the many and varied ways in which the salmon resource has been valued in Canada, North America and Ireland, and one wonders why the economists cannot decide among themselves the best way to value the different sections of the resource.

Fishermen have always been interested in the theory that like breeds like in the salmon world. Dr. Mills has a most interesting section on this matter, and he details various experiments in Canada and Ireland which were undertaken to establish the facts. It can be seen from the book that the issue is by no means clear-cut.

The book is dedicated to "Salar the Salmon" and what a tribute it is to this unique fish. Supporters of the Trust would be wise to purchase this book and to keep it on the shelf for future reference.

\* "Problems and Solutions in the Management of Open Seas Fisheries for Atlantic Salmon"



REVIEW OF CURRENT LITERATURE ON SALMON RESEARCH AND DEVELOPMENT  
(by Dr. Derek Mills, Department of Forestry and Natural  
Resources, University of Edinburgh)

Juvenile Stages

1. Influence of parr maturity on emigration of smolting Atlantic salmon (Salmo salar). 1989. Hansen, L.P., Jonsson, B. Morgan, R. I. G. and Thorpe, J.E. Canadian Journal of Fisheries and Aquatic Sciences, 46, 1-6.

It was observed that sexual maturity of parr reduces the probability of a future seaward migration. In the Imsa River, Norway, immature parr migrated sooner and in significantly higher proportions than did previously mature males. Furthermore, higher proportions of 2-year olds than 1-year olds migrated, and 86 - 92% of the descent occurred at night. Large 2-year olds migrated before smaller ones. Among those which did not migrate, some (3.2% of those released in 1986) were recaptured in the autumn, of which 91.9% were mature males. At Lussa, Scotland, 5.6 and 5.9% of smolting fish released in two separate years remained resident at the release site throughout the summer, and 91.8% and 93.4% of these matured in the autumn of the release year.

Morphology

1. Sexual dimorphism in the adipose fin of Atlantic salmon, Salmo salar L. Naesje, T.F., Hansen, L.P. and Järvi, T. 1988. Journal of Fish Biology, 33, 955-956.

As a result of constructing an index for relating the size of the adipose fin to the body size:

$$\text{adipose fin index} = \text{adipose fin area}/(\text{total body length})^2$$

it was found that the adipose fin is a secondary sexual characteristic of male Atlantic salmon, which becomes more pronounced towards the time of spawning. In accordance with this, large males had a relatively larger adipose fin than smaller males. The relative size of the adipose fin of the female Atlantic salmon did not differ between the different size groups.

Removal of the adipose fin is a method commonly used for group-marking of salmonids. Sexual characteristics, however, are generally used as cues, either in mate choice or in antagonistic interactions. If the adipose fin has such a function, removal of this fin could make the fish less competitive during reproduction.

## Smolt Tagging and Release

1. Effects of Carlin tagging and fin clipping on survival of Atlantic salmon (Salmo salar L.) released as smolts. 1988. Hansen, L.P. Aquaculture, 70, 391-394.

The adult return to the river was highest for unmarked and lowest for Carlin-tagged fish. The main reason for this is probably a mortality of smolts due to handling, anaesthesia and tagging.

2. Salmon ranching experiments in the River Imsa: effects of dip-netting, transport and chlorobutanol anaesthesia on survival. 1988. Hansen, L.P. and Jonsson, B. Aquaculture, 74, 301-305.

Dip-netting just prior to release reduced the survival of 1- but not 2-year-old smolts. Adding an additional transport stress lasting 4 hours gave similar results. Handling and chlorobutanol anaesthesia immediately before release reduced the survival of both smolt groups.

3. Increased recapture rate of adult Atlantic salmon, Salmo salar L., stocked as smolts at high water discharge. 1988. Hvidsten, N.A. and Hansen, L.P. Journal of Fish Biology, 32, 153-154.

From experiments carried out at two rivers in Norway it was found that there was a positive significant correlation between total adult recapture rate and maximum water discharge. This demonstrated that water discharge at release is of great importance for survival of hatchery-reared smolts.

## Movements of Adult Salmon

1. Within-river spawning migration of Atlantic salmon (Salmo salar). 1988. Heggberger, T.G., Hansen, L.P. and Naesje, T.F. Canadian Journal of Fisheries and Aquatic Sciences, 45, 10, 1691-1698.

The migration pattern of adult spawners of Atlantic salmon in two Norwegian streams was analysed by ultrasonic and mechanical tagging to investigate within-river migration. Salmon were tagged in the estuary as they approached the river before spawning. They displayed a systematic and directional upstream pattern of movement in the river. Seventy-one percent of the fish transplanted 6 km downstream from the capture site about 2 months before spawning returned to the donor area. Fish transported 7 km upstream from the capture site exhibited a low degree of backtracking to the donor site (1 of 7 fish). Mechanical tagging of salmon on spawning grounds showed that both male and female spawners released 150 and 600 m upstream from the spawning area were able to return to the original site of spawning with a mean precision of 87%. In both streams, the

migration pattern and the return to original site of capture support the hypothesis of local homing of Atlantic salmon, although some fish stray to other areas of the stream.

### Genetics

1. A review of genetic variation in Atlantic salmon, Salmo salar L., and its importance for stock identification, enhancement programmes and aquaculture. 1989. Davidson, W.S., Birt, T.P. and Green, J.M. Journal of Fish Biology 34, 547-560.

This is a useful review of the subject and stresses the need for continued genetic studies on Atlantic salmon and the relevance and importance of the results of such research for stock identification and enhancement programmes.

2. Genetic effects of age distribution when stocking fish. 1988. Nyman, L. and Norman, L. Salmon Research Institute Report, 2 (English abstract).

Hatchery salmon smolts of each year class should be distributed over several years instead of, as is the current practice, releasing each year class in the same season. The methodology of this procedure is given in general terms, but salmon are used as concrete examples. The changed culture routines imply that the release of cultured fish is adapted to the natural population structure, with a spreading of maturity or smolt development over several years, but also that the risks of inbreeding decrease and a greater evenness in spawning migration may be expected.

### Fish Counters

1. Swimming height of Atlantic salmon, Salmo salar L., crossing a Crump weir. 1989. Dunkley, D.A. and Shearer, W.M. Aquaculture and Fisheries Management, 20, 193-198.

A closed-circuit television system was used to determine the height in the water column at which salmon swam when ascending and descending over a Crump weir. The swimming depth distribution of fish ascending the weir was very skewed with 88.1% of the fish seen swimming within 10 cm of the weir surface while the descending fish seen were scattered throughout the available water column. The distribution of water velocities over the downstream face of the weir showed that the velocity was lowest near the weir surface and highest at the water-air interface except at the weir crest where high velocity water was found at the weir surface, often causing fish to rise as they crossed the crest. This has important implications in choosing the position of electrode arrays in open-channel counters, as the upstream electrode must not be too close to the weir crest or fish may be missed as a result of being too far from the electrode to produce a large enough signal.

...and the return to ... support the hypothesis of local ... although ...

... W.S. Ditt, R.P. and Owen, R.M. ...

... \* \* \* \* \*

Attention all game fishing clubs

"FLY FISHING FOR SALMON"

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\* \* \* \* \*

... swimming height of Atlantic salmon ...

A closed-circuit television system was used ... height in the water column at which salmon swim when ascending ...

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A Review of Irish Salmon and Salmon Fisheries	by K. Vickers	1.50

## 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)

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.





