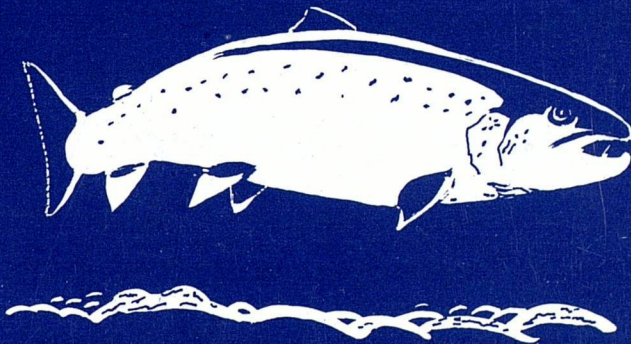




ATLANTIC SALMON TRUST

PROGRESS REPORT

June 1987



The Atlantic Salmon Trust
Moulin, Pitlochry
Perthshire PH16 5JQ
Telephone: Pitlochry (0796) 3439

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Mr. W. Shearer, B.Sc., M.Sc., C.Biol., M.I. Biol.
(Department of Agriculture and Fisheries for
Scotland)

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France: Association Internationale de Defense du Saumon
Atlantique

Belgium: Belgian Anglers' Club

Ireland: Irish Game Fish Protection Federation

Norway: Jeger og 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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FOREWORD

Since our last Report the Salmon Act has become law and we now await to see how active Ministers and their Civil Servants are in introducing the new measures, in particular those relating to dealer licensing. We also await the first court cases to see how magistrates in England and sheriffs in Scotland interpret the new clauses. The restrictions to the North East drift nets are in force and it will be of interest to see how they affect the runs of salmon in the Scottish east coast rivers.

The Salmon Advisory Committee, on which the Trust is represented by Dr. Solomon, have met twice. It is pleasing to note that a number of the Trust's Management Committee and Honorary Scientific Advisory Panel are also on the Advisory Committee. We wish them well and hope that common sense will over-ride the need for too much secrecy.

The Trust has always supported the main recommendation contained in Lord Hunter's Report. I would refer our supporters to the article on page 21 describing the aims and work of the Atlantic Salmon Conservation Trust (Scotland). They deserve to be supported as they very much complement the work of the Atlantic Salmon Trust.

Although our charitable status prevents us from becoming directly involved in the "Campaign for Countryside Sports" we attend their meetings as an observer. We believe that it is essential that the true facts concerning countryside sports are presented to the public.

I would recommend to our readers the two new Blue Books, "The Atlantic Salmon in Spain" and "Atlantic Salmon Facts". The latter is an update of a booklet produced some time ago. It is in the form of questions and answers and is very instructive.

We are hoping to prepare some interesting charts and educational packages for schools. A committee, under the chairmanship of Moc Morgan, has been appointed to this end.

The time of game fairs is upon us once more and I hope to see some of you visiting our display. We would be extremely grateful if any of our supporters would volunteer to man the caravan.

As many of you will know, Alex Prichard has not been at all well. I am glad to say that he is now on the road to recovery, and we wish him well. The Postal Auction was an outstanding success and our thanks go to all donors and buyers for their superb support.

David Clarke
Chairman

DIRECTOR'S REPORT

May I start with an appeal to our supporters to come and visit the Trust's caravan at the Game Fair and the countryside fairs at Holkham, Stratfield Saye and Moy. We have a good display and all our publications will be available. It is also hoped to have the Trust's tie on sale. This has been designed for us by Charles Jardine.

There are several articles this time showing the Trust at work. Much of our work is done behind the scenes, acting as a catalyst to spur others into action. An account of the Trust's radio tracking work in conjunction with Dr. Tony Hawkins of the Marine Laboratory at Aberdeen makes fascinating reading. The fully analysed results of the three-year project will certainly add much to our knowledge of the movements of adult salmon in a river.

As a result of Appeals in the past, many of you have donated to the Trust. All those who have ever given anything have been receiving the Progress Reports twice a year. To produce these and send them to you all costs money, and it was decided at the last Management Committee meeting that all those who contributed less than £25 before 1981 would receive no further Progress Reports after this one unless they chose to renew their subscription. I am enclosing a personal letter to all such subscribers. I would remind donors that as we are a charity the best way to subscribe is by Deed of Covenant. All those who have donated more than £25 and those who have signed a Deed of Covenant will continue to receive Progress Reports. Future donors of less than £25 will qualify for two years' Progress Reports only. I hope that as a result of this exercise the number of Progress Reports required will be reduced, but more importantly that some of you may be tempted to renew your support!

I am reliably informed that the 1986 catch returns indicate that the catches in Scotland, by all methods, show a considerable increase over the last few years.

Best wishes to you all, and I hope that you will find this Report of interest.

D. J. Mackenzie



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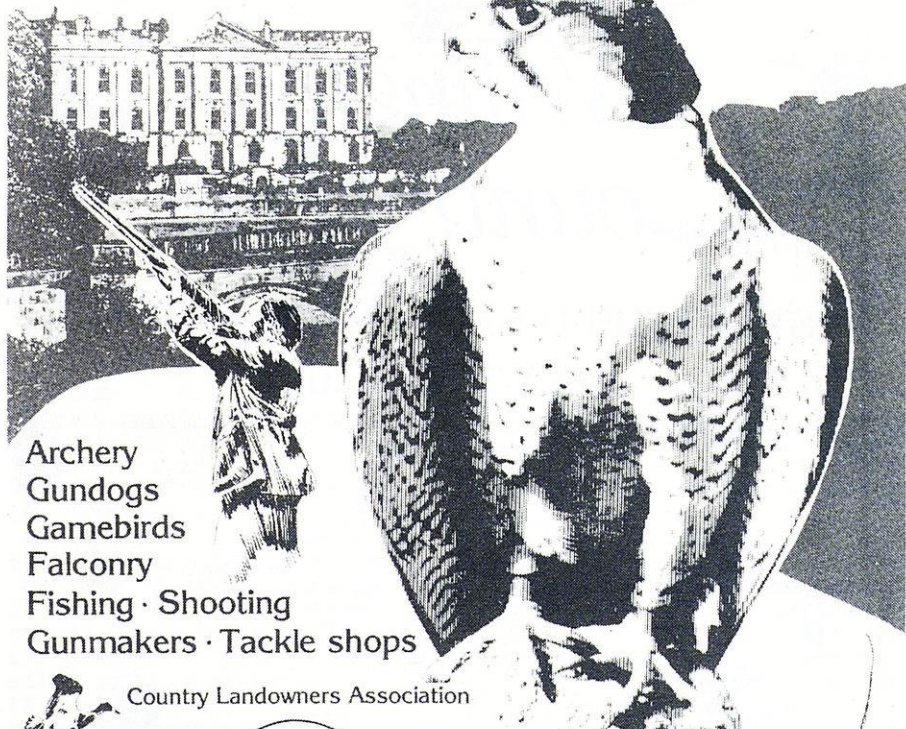
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EUROPEAN PARLIAMENT RESOLUTION

(By A. Prichard)

Supporters of the Trust will be aware that for some years the European Community and in particular the European Parliament has interested itself in the Atlantic salmon, and the Trust was instrumental in organising hearings before the European Parliament in 1982. The Trust has always encouraged both the Parliament and the Commission to adopt an "Atlantic Salmon Policy", and has made suggestions from time to time as to the content of such a policy.

This Progress Report contains a copy of a Resolution adopted earlier this year by the European Parliament. This is self explanatory and there is no need to take up the points one by one. Suffice it to say that although there are differences of emphasis between this document and what might have been drawn up in a perfect conservationist world, the Resolution is nevertheless of very great significance to all those interested in the plight of the Atlantic salmon in Europe. It is particularly interesting that the European Parliament does not simply turn over responsibility for everything to NASCO, but calls upon Member States and the Commission to undertake certain activities, and it is to these international and "Commission" activities that the Trust should address itself.

The effect of a Resolution of the European Parliament on the Commission is not of course one of law, but the Commission will not ignore a Parliamentary Resolution and the Trust will do what it can to encourage the Commission to address itself to the suggestions made.

This Resolution of the European Parliament is a matter of the very highest importance in Europe as far as the conservation of the Atlantic salmon is concerned, and the Trust will ensure that the opportunities afforded by this sympathetic approach from Brussels are not lost.

RESOLUTION

On the Protection and Management of Salmon Stocks in the North Atlantic

The European Parliament,

- having regard to the motion for a resolution tabled by Mr. Guermeur on the protection and management of salmon stocks in the North Atlantic;
 - having regard to the motion for a resolution tabled by Mr. Provan on the Agreement in the form of an exchange of letters between the European Economic Community and the Government of Denmark and the Home Government of the Faroe Islands establishing measures for salmon fishing in the fishing zone of the Faroe Islands;
 - having regard to the report of the Committee on Agriculture, Fisheries and Food;
- A. whereas Article 66 of the Draft United Nations Law of the Sea Convention stipulates that states in whose rivers anadromous stocks originate shall have the primary interests in and responsibility for such stocks;
- B. having regard to the North Atlantic Salmon Conservation Convention and the Community's accession thereto;
- C. whereas salmon catch quotas for the Greenland and Faroes salmon fisheries have been laid down in the framework of bilateral agreements;
- D. whereas salmon fishing is a factor affecting the relationships with and between countries;
- E. having regard to the importance of salmon for the livelihood of certain regions of the Community;
- F. whereas salmon catches must be properly controlled if this species is to be protected;
- G. whereas the practice of fishing stocks of mixed origin (from various watercourses or different countries) is an important cause of the increased scarcity of salmon, which does not encourage authorities and governments of the "producer" countries to pursue or undertake salmon restocking programmes in their rivers, in particular as such programmes are expensive and restricting,
1. Points out that the absence of a proper scientific basis at Community level for monitoring stocks in the Member States

concerned makes it very difficult to formulate new policies for the management of the resource or determining the efficacy of current policies at Community, national, regional, or local level.

2. Calls on the Commission to undertake a study of stocks of salmon in the Community and of the different factors affecting salmon fishing in the Community.
3. Calls on the Commission to instruct NASCO and ICES to undertake a study of stocks of salmon in the Community and of the different factors (in particular catches off Greenland and the Faroe Islands) affecting these stocks.
4. Calls on the Council and the Commission to consider what measures are needed to conserve North Atlantic salmon stocks, so as, in the long term, to maximize employment and the economic benefits from this resource in the regions concerned and to safeguard traditional fisheries.
5. Considers that the Community has the responsibility to safeguard the Community's salmon stocks on the high seas, particularly through negotiations with third countries in the framework of NASCO, and also through bilateral negotiations; notes in this connection that for the third year running it has been impossible to achieve agreement through NASCO on the total catch for the Faroe Island and stresses the importance of achieving such agreement.
6. Considers also that it is in the general interest to halt fishing of stocks of mixed origin, or at least to reduce such fishing very considerably by comparison with the present situation, and that appropriate negotiations should be conducted in the framework of NASCO and bilateral agreements concluded.
7. Considers that as long as sea fishing of stocks of mixed origin continues, it is essential that the countries involved should make a financial contribution to a fund for the restoration of salmon stocks in the North Atlantic; considers that this contribution should be in proportion to the difference between the tonnage landed and the number of smolts produced and that it should serve mainly to encourage restocking by the rearing and release of smolts.
8. Believes that the Community should implement a provision of the Reykjavik Convention, which applies at present only to the North American Salmon Commission, and by which fishing patterns in salmon fisheries are not to be altered in a manner which results in the initiation of fishing or increase in catches of salmon originating in the rivers of another party except with the consent of the latter.
9. Believes the economic and social value of commercial salmon fishery for salmon and sea trout and the recreational and

tourist value of salmon fishing to be of considerable importance, particularly in more peripheral and less-favoured areas. Stresses the employment value of these activities.

10. Expresses concern at the decline in salmon stocks in the Community as a whole but which has particularly affected rivers.
11. Considers that the most important and urgent measures required are for the prevention of illegal salmon fishing which in certain regions accounts for more salmon taken than legal fishing and which present the most serious threat to salmon stocks.
12. Points out that it will be difficult to maintain cooperation with third countries on international measures to conserve salmon in the absence of any effective control of illegal salmon fishing in Community waters; stresses furthermore that effective legislation should be implemented to ensure that illegal fishing is more easily defined and thus that perpetrators are subject to due process of law, and believes that Community funds can be of help in providing the necessary surveillance with the Community being able to properly evaluate the use of such help.
13. Believes that Community funds should be made available to improve and coordinate national salmon fisheries inspectorates, and that greater uniformity of national legislation on the responsibilities of national inspecting and control bodies would facilitate such Community measures.
14. Feels it desirable that the Commission examine the feasibility of control of salmon fishing by means of monitoring amounts landed and sold, and that further work should be encouraged on a salmon-tagging scheme showing where and how fish are caught.
15. Considers that measures such as a licensing system, a restriction of the legal season for commercial fishing with particular reference to fishing in estuaries and the possibility of salmon quotas all need to be examined.
16. Stresses however that the Commission should seek to coordinate national approaches and make suggestions for improving the methods of managing and conserving salmon, rather than seeking to impose inappropriate uniform rules. The different and valid salmon fishing patterns and practices within Member States need to be taken fully into account.
17. Points out that the development of new fishing techniques such as monofilament drift nets enables salmon fishing to be carried out effectively and safely, and that it is the control of these new techniques, both to prevent illegal fishing in certain areas and over-fishing in other areas, that must be achieved in order to overcome the problems posed, rather than attempting to return to old-fashioned methods of fishing.

18. Believes that Community financing should be introduced for smolt rearing schemes for the restocking of rivers and sea ranching, so as to improve fish stocks.
19. Points out that problems are caused by engineering schemes, in particular dams which disrupt salmon spawning, and urges the Member States and other public authorities responsible for these matters to make the installation of effective fish passes on dams compulsory.
20. Urges that there should be no introduction of non-Atlantic species of salmon to Community waters without general agreement among the Member States; points out in this connection that particular attention must be given to ensure that farmed salmon are disease-free before being allowed into the sea.
21. Believes that the sound management of salmon in Community waters depends on greatly improved research on the migration of salmon, and the economic costs and benefits of each type of salmon fishing.
22. Points to the grave problem caused by pollution to salmon rivers, particularly by modern farming methods and accidental releases into rivers of farm waste and other pollutants as well as by damage to the river environment caused by river drainage, purification plants and engineering schemes; stresses in this connection the need to ensure the proper installation and working of appropriate purification plants and also points out that while it is local authorities which have the duty to prosecute polluters, it is also sometimes local authorities which are themselves the main polluters.
23. Stresses that salmon is particularly endangered by pollution and urges the Commission and the Member States immediately to increase their efforts to reduce forms of pollution.
24. Draws attention to the importance of educating the public - and in particular the young - about the need to conserve the salmon resources.
25. Instructs its President to forward this resolution to the Council and Commission.

SCOTLAND'S SALMON FARMS IN 1986

(from "Fish Farming International", May 1987)

Scotland's record production of 10,338 metric tonnes of farmed Atlantic salmon in 1986 was achieved by 113 companies on 157 cage and 11 on-shore tank sites. They employed 527 people full-time and another 208 part-time. These and other figures for the industry last year were compiled by the Department of Agriculture and Fisheries for Scotland. They show that 5,988 tonnes of the 1986 harvest were from the 1984 smolt intake and the fish averaged 2.49 kg in weight. Another 4,350 tonnes were from the 1985 intake.

Seven sites each produced over 300 tonnes in 1986, and they accounted for 30% of the output. Twelve sites producing between 201 and 300 tonnes gave 28.8%; 13 between 101 and 200 tonnes gave 17%; and 15 between 51 and 100 tonnes gave 11.2%. These 47 sites producing over 50 tonnes contributed 87.2% of the total.

Last year there were 38 broodstock sites. During the year, S1 smolts put into farms for on-growing totalled 6,695,000, and 473,000 S2 smolts were also put in. Another 179,000 smolts came from hatcheries in England and Wales. The estimated smolt supply this year is 15,118,800 and in 1988 this is expected to increase to 21,697,000.

ATLANTIC SALMON TRUST STATEMENT TO NASCO COUNCIL

Articles in the March 1987 edition of "Fish Farming International" drew attention to the enormous increase of western European fish farm production, quoting a figure of just under 60,000 metric tonnes in 1986. In Scotland alone the increase was from 6,921 tonnes in 1985 to 10,338 tonnes in 1986, with an estimate of 16,000 tonnes in 1987. These increases will mean many hundreds of thousands of excess parr and smolts being given away or sold for re-stocking. Whilst it is possible that this could be of advantage to the wild salmon, the first step must be to ensure that the environmental conditions for a re-stocking exercise are satisfactory.

The Atlantic Salmon Trust does not want to be alarmist, but has for some time been concerned about the problem of re-stocking rivers with ex fish farm stock, and the effect on wild stock of escapees from fish farms. There are several areas of concern, including the genetic dangers of mixing stocks of different origin. The general view of geneticists is that only native wild stocks are likely to contain the genetic diversity that gives the species the flexibility to adapt to varying environmental conditions. In their view the introduction of alien stock can threaten the viability of the native stocks. The Trust published a Blue Book by Professor Noel Wilkins on this subject, and in it

there are many words of caution. Professor Wilkins also advises when re-stocking with ex farm fish may be acceptable.

There are other questions that need to be answered before fishery managers should undertake stocking with ex farm fish, for example:

- a) Is there enough food available to ensure the survival of both the new and the indigenous stock?
- b) Are farmed fish as well able to survive in the wild as wild fish?
- c) Will the induced smolts migrate like the native stock and return to the river in which they were planted?
- d) Are the ex farm stock as resistant to disease as the wild stock?
- e) Are the farmed fish free of all disease and parasites?

The Atlantic Salmon Trust, as an observer at ICES, has put forward proposals for discussion at the ANACAT meeting this year concerning the problems of escapees and the introduction of farmed stock. The Trust realises that NASCO is concerned primarily with the high seas, but in view of the seriousness of the situation urges delegates to take note of the problems and potential dangers of the introduction of excess farm stock into rivers. The Trust considers that more research must be done as a matter of urgency to establish whether or not there are dangers in stocking with ex farm fish.

THE CENTRAL FISHERIES BOARD, IRELAND
INLAND FISHERIES: STRATEGIES FOR MANAGEMENT AND DEVELOPMENT

(By G. Hadoke)

On the mainland, fishery conservators are inclined to dismiss anything arising from Ireland as regards the conservation of salmonid species, as Irish scientists have placed great emphasis on the dangers of excessive drift netting. This has tended to overshadow the considerable amount of investigative work on salmon which is carried out in Ireland, not only by the Salmon Research Trust of Ireland but also by the Department of Tourism, Fisheries and Forestry. The Central Fisheries Board (CFB), which was established in 1980 and which has responsibility for the management, protection, development and promotion of inland fisheries in the Republic, has published its "Strategies for Management and Development" for Inland Fisheries. It is a review of some 200 pages and is extremely well compiled and presented. It also deals, of course, with species other than salmon and covers such subjects as aquatic environment, hatcheries, aquaculture and research, among others. It contains ample statistical data, and as a result it is an excellent reference book for anyone who wants to know the facts of Ireland's salmon resource.

The Atlantic Salmon Trust has since its inception campaigned for the publication of a Government plan for the conservation and development of salmon in the United Kingdom, similar to that recently published by the Canadian Government. Until scientists and users of salmon fisheries in this country know what the Government expects the resource to provide for its users and the country at large, the District Salmon Fishery Boards and the Water Authorities must plan their own operations in a vacuum. Although this Review by the CFB is not a Government publication, it is the next best thing. It is a review of the state of the resource in Ireland and it contains, as a result of extensive and comprehensive discussion, a number of recommendations to put the management of the resource on a better footing. Unfortunately, Governments are not keen to react to recommendations of this kind, even from Government-established bodies. The Bledisloe and Hunter Reports of course come to mind, but the present review is a document which contains information and new recommendations which must give rise to great interest to everyone concerned with salmon.

Our Trust has for some time campaigned against drift netting, and more recently it has, by the publication of its outstanding Blue Book on salmon genetics by Professor Noel Wilkins, drawn attention to the possible dangers of restocking with foreign or farm-produced fry. This review by the CFB advocates the complete phasing out of drift netting and its replacement by a scheme for inshore salmon ranching on the Icelandic principle, in which the former drift netmen would be able to participate on cooperative principles. This idea formed the major feature of a video made by

the CFB called "Managing Ireland's Salmon" (a copy of which is available for hire from the Trust). It is an interesting concept and everyone hopes that the fishermen concerned might see the great advantages. Unfortunately it is hard to turn the clock back. Since the 1960's drift netting has developed into very big business, with the issue of more licences and the operations of inshore fishermen who have acquired a lion's share of the salmon harvest. It is ironical that these fishermen receive Government grants for their fishing (as they fish most of the year for white fish), unlike any other exploiter of the resource. The drift netmen in Ireland have completely upset the balance of exploitation since their entry into the salmon scene. Prior to 1960 small boats did some drift netting near to the estuaries, but nowadays large boats operate well out to sea and crop not only those stocks en route for local rivers but also those making for rivers much further afield. In 1960 drift nets took about 20% of the catch and rod and line took 15%. In 1980 drift nets took over 70% (this has now risen to 80%) while rods only managed less than 5%. For this reason it is not surprising that the CFB states:

"...the mix of stocks available to the drift nets is constantly changing. Therefore the stock from a particular catchment which is unfortunate enough to pass through such a fishery, at peak fishing times or under peak fishing conditions, may be severely exploited to a point where inadequate escapement results".

This fear about inadequate recruitment has been confirmed by the Salmon Research Trust of Ireland when it observed that only in two of the ten years prior to 1983 were runs in that system monitored by the Trust sufficient to maintain a self-sustaining salmon population.

As regards the genetic status of resident salmon stocks, about which the Atlantic Salmon Trust has expressed concern, the Board has made a clear recommendation:

"Genetic strains of salmon from different origins must be kept separate. Farmed strains must not be allowed to interbreed, in the wild, with native stocks".

The Review contains many points on the proper management of salmon fisheries. It is interesting to read again of the reservations which the CFB and its scientists have about restocking. Recently the Wessex Water Authority decided not to carry out any more stocking, and now the CFB have again drawn attention (as did Dr. Graeme Harris in in 1978 report, "Salmon Propagation in England and Wales") to the now established fact that restocking of rivers and streams with eggs of juvenile salmon is not guaranteed to cure all fishing problems. Restocking should only be carried out in clearly defined circumstances, e.g. to obtain the optimal density of spawning salmon by ensuring the utilisation of water for smolt production in areas where access is denied to adult fish, and in areas which are deficient or lacking in spawning gravels, etc. Although the review does endeavour, not very soundly, to estimate the cost of such restocking operations, the Board is honest enough

to quote the findings of Mr. Browne (the Trust's Bensinger-Liddell Memorial Salmon Fellow for 1985) to the effect that:

- a) Little benefit is accruing from a sizeable rearing programme; only the Salmon Research Trust's rearing programme costs are justified.
- b) The return on the investment may be doubled or trebled simply by making proper arrangements for the release of the reared smolts.

The Atlantic Salmon Trust welcomes the publication of this outstanding report and only hopes that very deep consideration is given by the Irish Government to its findings and recommendations.

THE IRISH SALMON REVIEW GROUP

The Irish Salmon Review Group was set up in the autumn of 1986 with terms of reference as follows:

- to examine and review the measures applied for the protection and conservation of salmon stocks
- to assess their effectiveness
- to identify the constraints impeding their operation
- to make recommendations on any changes considered necessary to improve the position

The Atlantic Salmon Trust made a submission to the Review Group and the Director met the Chairman of the Group, an Under Secretary in the Department of Tourism, Fisheries and Forestry, in London. The main comments of the Trust were as follows:

Drift Netting (a) The ban on the use of monofilament nets should be continued but the type of net to be permitted should be specified. (b) The size of boats used for drift netting should be restricted so that only open-decked boats such as half deckers are used. (c) Drift netting should not be permitted outside the three mile limit so that exploitation of salmon of mixed stock does not occur. (d) The catch of salmon by drift nets should be subject to a realistic quota.

Salmon Tagging The Trust suggested that the Salmon Review Group should consider a salmon sales tagging scheme.

Genetics The Trust drew attention to the genetic dangers of indiscriminate stocking of ex farm stock.

The Chairman of the Salmon Review Group was very pleased with the Trust's constructive approach to the problems of the Irish salmon fisheries.

NOTE - The Department of Tourism, Fisheries and Forestry has now become the Department of Marine, responsible for ports, shipping (other than ferries) and fisheries. The future of the inland fishery organisations such as the Central Fisheries Board is under review.

NEWS FROM NORWAY

A group of Norwegian scientists has proposed that a wide-scale research project be mounted to chart the salmon's life pattern and distribution in the oceans. The Norwegian Government took the initiative to establish the group, which consists of scientists from the Ocean Research Institute and the Directorate for Nature Management.

Several hundred thousand marked smolt (young fish) will be released every year for five years in four salmon rivers. This will be followed by extensive deep-sea fishing on a scientific basis, which can make the project self-financing. Head of Research, Johannes Hamre at the Ocean Research Institute, says that the project will be of fundamental importance for fishing of both natural reserves and of the fish resulting from so-called sea grazing sometime in the future.

The scientists plan to set out the smolt from 1988. Ocean fishing will start in 1991 and continue until the late 1990's.

A systematic study of the salmon's migratory patterns in the ocean has never before been carried out on the scale now proposed. The Norwegian ministries of fisheries and environment will decide this spring whether to give financial support to the project.

PARLIAMENT

The following questions and answers are of interest.

A. (House of Lords, 17th December, 1986)

LORD MORAN: To ask Her Majesty's Government whether, in saying in the House on 30th October (col. 879) that "in Scotland the use of drift nets and other hang nets for salmon fishing is already prohibited", Lord Glenarthur was referring only to drift netting at sea and to hang nets in estuaries; whether hang nets in the form of stake and long nets are not still used extensively by interceptory coastal netting stations in Scotland; and if this is so, whether they will now phase out these nets in the light of the recommendation by the Third International Atlantic Salmon Symposium, to which Lord Glenarthur was referring, that "all methods of enmeshing salmon, such as drift nets and fixed hang nets should be phased out".

LORD GLENARTHUR: I was referring to drift nets and other gill nets. Bag nets, fly nets and other stake nets are the lawful methods of fishing for salmon in Scotland outwith estuary limits. Net and coble is the only permitted method of netting salmon within estuary limits. None of the lawful nets are designed to catch fish by enmeshing them. Accordingly, they do not fall within the terms of the Symposium's recommendation and the Government have no proposals to phase them out.

B. LORD MORAN: To ask Her Majesty's Government whether they think that the current widespread restocking of Scottish rivers with farmed salmon parr and smolts may damage the genetic distinctiveness and so the long-term viability of salmon stocks in such rivers; and if so, whether they will take steps to halt such restocking until the facts are established and invite the Advisory Committee on Atlantic Salmon Conservation to study the problem and report on the desirability or otherwise of introducing into rivers stock originating from fish farms.

LORD GLENARTHUR: The stocking or restocking of salmon rivers is a subject which is being studied by the Department of Agriculture and Fisheries for Scotland. Research is being carried out at the Department's Freshwater and Marine Laboratories into genetic sub-divisions in Scottish salmon stocks. In the circumstances I do not at present consider it would be appropriate to invite the Salmon Advisory Committee to study the subject. Meantime, the advice given is always to restock with indigenous stock only.

From 7th January 1987 it will be an offence under section 24(1) of the Salmon Act to intentionally introduce salmon or salmon eggs into inland waters in the area of a district salmon fishery board without the board's consent.

C. (House of Commons, 19th February, 1987)

LORD MORAN: To ask Her Majesty's Government how consultations for the introduction of dealer licensing under sections 20 and 31 of the Salmon Act 1986 are progressing, whether they can yet say what form these arrangements are likely to take, and how soon they expect the arrangements to enter into force.

LORD GLENARTHUR: We are currently considering the arrangements for the salmon dealer licensing schemes in Scotland and in England and Wales. There will be consultation with interested bodies, including those which will be responsible for enforcement and fish trade organisations, before finalising our proposals. It is not possible to indicate when the arrangements are likely to come into force but the intention is to produce, as quickly as possible, schemes which will be practical, in terms both of the effective deterrence of trade in illegal salmon and of the needs of those who will have the responsibility for operating the schemes.

D. (House of Lords, May 1987)

LORD MORAN: To ask Her Majesty's Government how they propose to make known to the House details of the advice they receive from the Salmon Advisory Committee set up in October 1986.

LORD BELSTEAD: The Salmon Advisory Committee will report to Ministers on the various stages of its work as they are completed, in whatever form it considers appropriate to the subject. Ministers will have to decide the extent to which these reports should be published, and the form in which any decisions based on the reports should be announced.

E. (House of Lords, May 1987)

LORD MORAN: To ask Her Majesty's Government whether, in the light of the statement by the Minister of State, Ministry of Agriculture, Fisheries and Food on 28th July 1986 (H.L. Debates col. 712), the Government would endeavour to ensure that statutory procedures were completed in time for all the measures to restrict drift netting for salmon announced on 7th November 1985 (H.L. Debates col. 129) to be in force by the start of the 1987 season, they can confirm that all these measures are now in force.

LORD BELSTEAD: I can confirm that the measures to restrict drift netting for salmon in the English north-east fishery which my Rt. Hon. Friend the Minister of State announced on 7th November 1985, were in force by the start of the 1987 season.

THE ATLANTIC SALMON CONSERVATION TRUST (SCOTLAND)

In November 1985, the Atlantic Salmon Conservation Trust (Scotland) was constituted by a Deed of Trust, central to which were two "reform" principles. First, the endorsement of the proposal contained in the 1965 Hunter Report on Salmon Fisheries - that, if practical, all exploitation of wild salmon should take place within and upstream of each river's estuary. Second, that the net fisheries intercepting salmon before they enter their estuaries and rivers be acquired by the Trust and permanently closed. The only exception to permanent closure was the operation of estuarial and river nettings for research purposes and for stock culling under the supervision of local fishery boards, once stocks on that particular river reached satisfactory levels.

To ensure the Trust's independence, no-one holding the position of Trustee is allowed to have any personal interest in the ownership of salmon fisheries, net or rod.

Research

While focusing initially on acquisition and closure of nettings, the Trust will be involved with appropriate research projects.

Ownership

Ownership of netting rights by the Trust guarantees that the conservation principles deeded by Trust are exercised in perpetuity by independent Trustees.

Patronage

The Trust is under the patronage of the Hon. Lord Hunter who chaired the last major review of the Salmon Fisheries of Scotland by an independent Government Committee. The Trust believes the independence of that Committee's membership lends unquestioned authority to the Committee's final recommendation for a national salmon conservation policy based on the phasing out of all interceptory commercial netting.

Funding

To maintain momentum, the continued generosity of everyone interested in improved salmon conservation methods is required. The Trust therefore is seeking to raise funds on a river-by-river basis and by public appeal. In launching the Appeal on February 19th 1987, Lord Hunter declared it to be a "vital initiative to secure for all times the health of Scotland's wild stocks of Atlantic salmon".

Activity to Date

So far the Trust has purchased for permanent closure 283 coastal netting points in the north-east of Scotland directly affecting

rivers from Ross-shire to Aberdeenshire, including the Conon, Beauly, Ness, Nairn, Findhorn, Spey, Dee and Don. This will cost £750,000. All coastal nets will be closed permanently.

Of the nets the Trust now owns, 106 have already been closed, 152 will close at the end of the netting seasons in 1987 and 1988 and 25 will close in 1990.

It is estimated that the closures will release a further 40,000 salmon into north-east rivers, the equivalent of 35% of the most recent coastal net (fixed engine) catch reported by DAFS (114,500 fish in 1985 - DAFS. Stat. Bull. No. 1/86).

Netting operations elsewhere are now under review by the Trust and further negotiations are in hand. The projected costs of buying up all interceptory nets in Scotland are put in the £5 million bracket. The Trust believes this to be a small price to pay if the result is a modernised fishery based on generally-accepted principles of sound conservation management and backed up by updated financing arrangements that reflect contemporary market conditions.

Timing

Significant changes have occurred in the 24 years intervening since the Hunter Report: greatly increased extraction of Scottish salmon by other nations; more predators (notably seals with greater restraints on their control); more acidity and more forestry; more destabilising drainage; and more efficient illegal fishing and distribution. To these must be added more angling pressure and more effective legal netting practices. Of great economic significance has been the rapid build up of farmed salmon production, which effectively removes the necessity of netting wild salmon for all but balanced stock-control purposes.

Effects of Change

The ripple effect of changes in ownership of coastal nettings and their closure will be far-reaching. In return for the fundamental prerogative of controlling their own fish stocks, District Fishery Boards will, for the first time, take over full responsibility for a number of key management functions which at present are exercised by commercial netsmen.

Anglers' Conservation Responsibilities

Netsmen have often been criticised for allowing commercial considerations to outweigh conservation practices. As the Trust addresses this concern, it will also be calling on angling proprietors and tenants to observe conservation considerations with a greater degree of responsibility.

These responsibilities include the control of the exploitation rate of fragile salmon runs allied to appropriate research.

Improved controls on afforestation planning and practice are also seen as an urgent necessity.

Far-Reaching Reform

Reform of so deeply entrenched a system of administration and exploitation of salmon raises other issues. These include the rating of unworked net fishings, representation on District Fishery Boards, and financing, and the over cutting of redds (though no longer considered a problem by most DAFS scientists concerned). The Trust is already addressing these areas and is confident of reaching mutually satisfactory resolutions.

A combination of circumstances and a clear need to bring a full measure of rationalisation into our management of salmon stocks - in line with past departmental commendation and contemporary international resolutions - commend the Trust's objectives to the support of everyone committed to wild Atlantic Salmon conservation.

Trustees are grateful to the Atlantic Salmon Trust for the opportunity to outline the Trust's programme. All enquiries concerning the Trust should be addressed to:

Colin Whittle, FRICS

Secretary

The Atlantic Salmon Conservation Trust (Scotland)

121 High Street

Forres

Moray IV36 0AB

STATISTICS 1985

UK

The catch statistics for 1985 which are the latest available published data are summarised below.

Scotland

Total number of salmon and grilse caught - 272,660.

Comment - This was the lowest catch recorded since records started in 1952. The number of salmon and grilse caught by rod and line (76,090) was 30% up on 1984 whereas the numbers caught by net and coble (82,033) and by fixed engine (114,537) were down by 19% and 29% respectively. This was thought to be almost entirely due to weather conditions.

Numbers of Salmon

	5 year average 1980-1984	Numbers (thousands)		Percentage change 1985 on 1984
		1984	1985	
Rod and line	64.7	58.7	76.1	+30
Net and coble	115.9	101.4	82.0	-19
Fixed engine	148.8	160.2	114.5	-29
All methods	326.4	320.3	272.7	-15

Numbers of Sea Trout

	5 year average 1980-1984	Numbers (thousands)		Percentage change 1985 on 1984
		1984	1985	
Rod and line	40.3	42.1	51.5	+22
Net and coble	85.7	77.6	50.6	-35
Fixed engine	38.9	36.9	21.2	-43
All methods	164.9	156.6	123.3	-21

STOP PRESS - It is reliably reported that the total catch for 1986 is substantially higher than that of the last few years.

England and Wales

Salmon and grilse caught by rod and line	19,601
" " " commercial catch	75,930
	<hr/>
Total	95,531
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(of which N.E. coast drift nets caught 55,943)

Sea trout caught by rod and line	32,379
" " commercial catch	68,191
	<hr/>
Total	100,570
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(of which N.E. coast drift nets caught 35,977)

Eire

No. of grilse	498,333
No. of multi sea-winter fish	19,608
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Total	517,941
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Northern Ireland

Total catch	30,004
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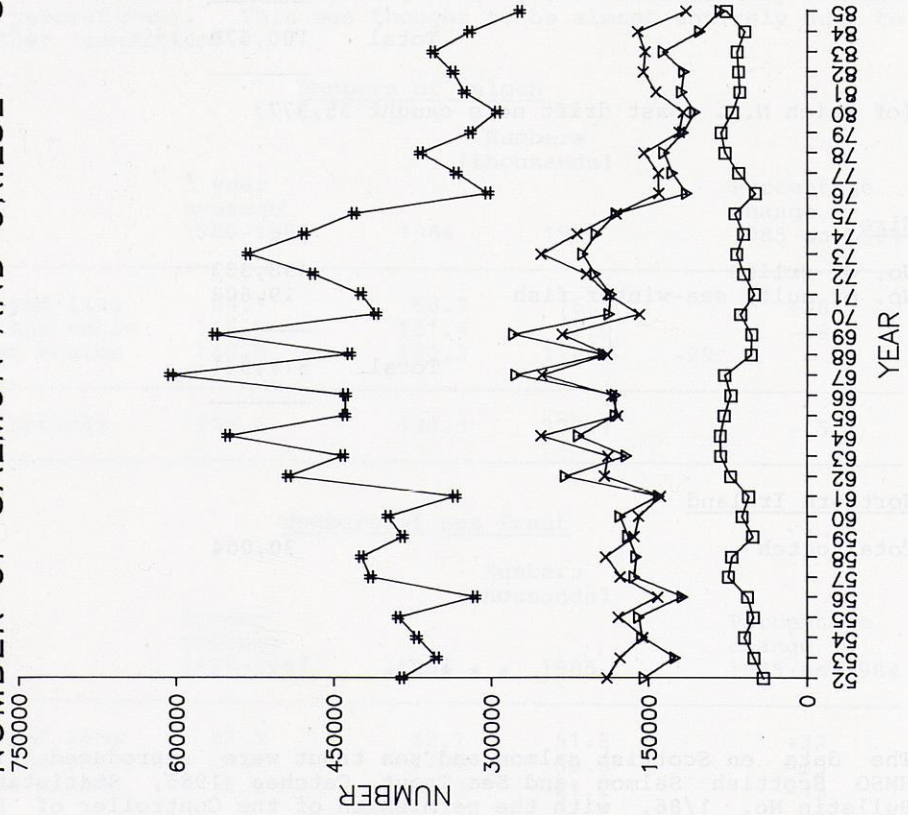
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The data on Scottish salmon and sea trout were reproduced from HMSO Scottish Salmon and Sea Trout Catches 1985, Statistical Bulletin No. 1/86, with the permission of the Controller of Her Majesty's Stationery Office.

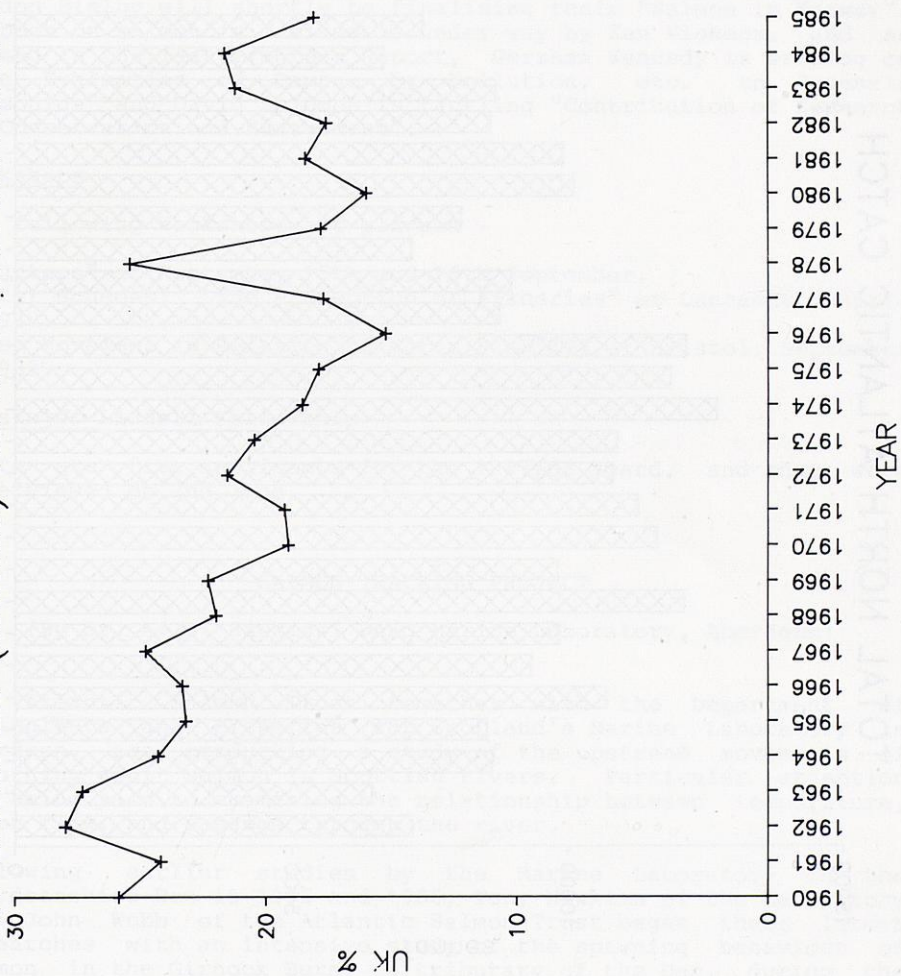
The following graphs are derived from information supplied by DAFS, MAFF, and the International Council for the Exploration of the Sea (ICES).

NUMBER OF SALMON AND GRILSE - SCOTLAND

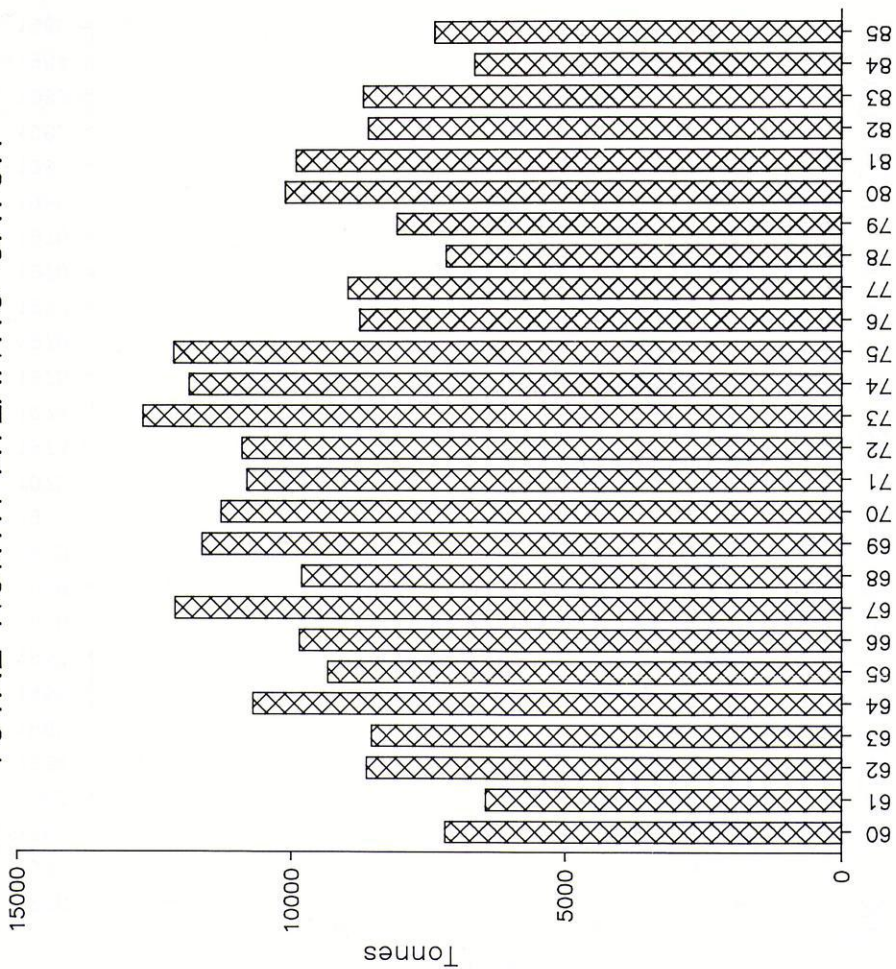
- ROD & LINE
- *— FIXED ENGINE
- ▽— NET & COBLE
- #— ALL METHODS



UK CATCHES (tonnes) AS % TOTAL N. ATLANTIC



TOTAL NORTH ATLANTIC CATCH



HONORARY SCIENTIFIC ADVISORY PANEL

Blue Books

A list of the Blue Books available from the Trust is printed on the back cover. There are several more in course of preparation. John Solbe is writing one on water quality and Lars Hansen and Gordon Bielby will shortly be finalising their "Salmon in Norway". A book on salmon in Ireland is under way by Ken Vickers, and as stated in the last Progress Report, Gersham Kennedy is writing on "The Evaluation of Damage by Pollution, etc. to Juvenile Salmonids" and David Solomon is tackling "Contribution of Research To Conservation and Management".

Workshops

The following Workshops are planned -

"Counters" at Montrose, 15th and 16th September.

"Water Schemes: The Protection of Fisheries" at Lancaster, April 1988.

"Fish Movement in Relation to Water Flow" (?) at Bristol, September 1989.

Bensinger Liddell Fellowship

There are five applicants for the 1987/88 award, and they were interviewed on 2nd June.

SALMON TRACKING PROJECT

(By Dr. A. D. Hawkins, DAFS Marine Laboratory, Aberdeen)

The Atlantic Salmon Trust together with the Department of Agriculture and Fisheries for Scotland's Marine Laboratory in Aberdeen, are conducting a study of the upstream movements of returning adult salmon in Scottish rivers. Particular attention is being paid to examining the relationship between temperature, water flow, and passage through the river.

Following earlier studies by the Marine Laboratory on the Aberdeenshire Dee in 1985 and 1986, Tony Hawkins of the Laboratory and John Webb of the Atlantic Salmon Trust began their latest researches with an intensive study of the spawning behaviour of salmon in the Gironck Burn, a tributary of the Dee, during the winter of 1986. They have followed this with further observations on the movements of spring salmon in the Dee, and are presently tracking over a dozen radiotagged fish which are distributed between Aberdeen at the river mouth and Dinnet, some 30 miles upstream. Later this year, the study will be moving to the Tay for a preliminary examination of fish moving through the lower

reaches, but will subsequently return to the Dee in autumn to examine the movements of fish within the confines of the estuary. Various recording instruments have already been placed in position on the estuary, to monitor flow and temperature conditions throughout the year. Full cooperation is being obtained from the Dee and Tay District Salmon Fisheries Boards, from Aberdeen Harbour Board, the Dee Salmon Fishing Improvement Association, the Atlantic Salmon Conservation Trust and the proprietors, anglers and netsmen on the Dee and Tay.

A RIGHT ROYAL FISH

(By Dr. A. D. Hawkins)

Fish B/86 came into the Aberdeenshire Dee at about midday on March 6th, 1986; a sleek and silver spring cock-fish. The water was cold - only a few degrees above freezing - but a thaw was under way and the ice which had cluttered the estuary the previous week had gradually been flushed away. Caught in a sweep net, the salmon was marked with a yellow plastic tag, a radio transmitter pushed gently down the throat into the stomach, and the fish then slid quickly back into the river. With a flick of the tail "Billie" was off on his long journey upstream.

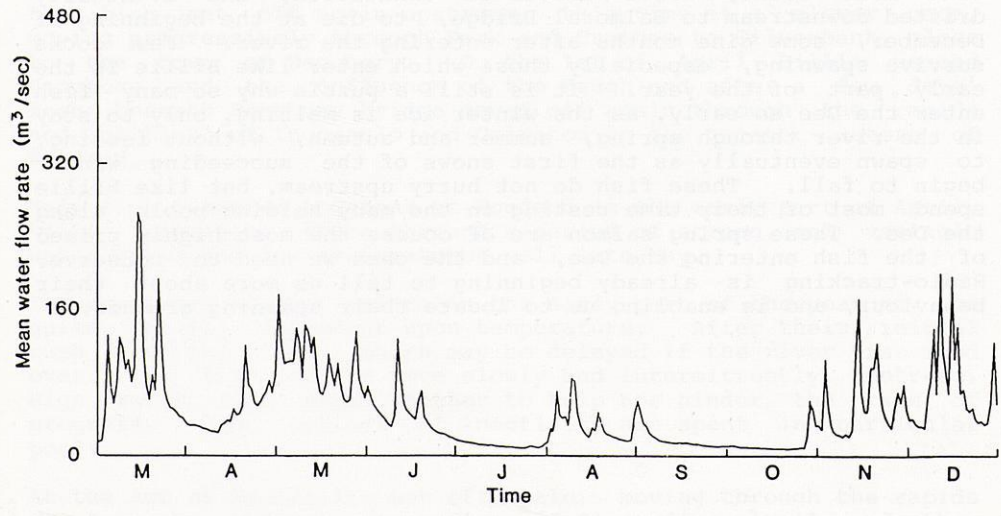
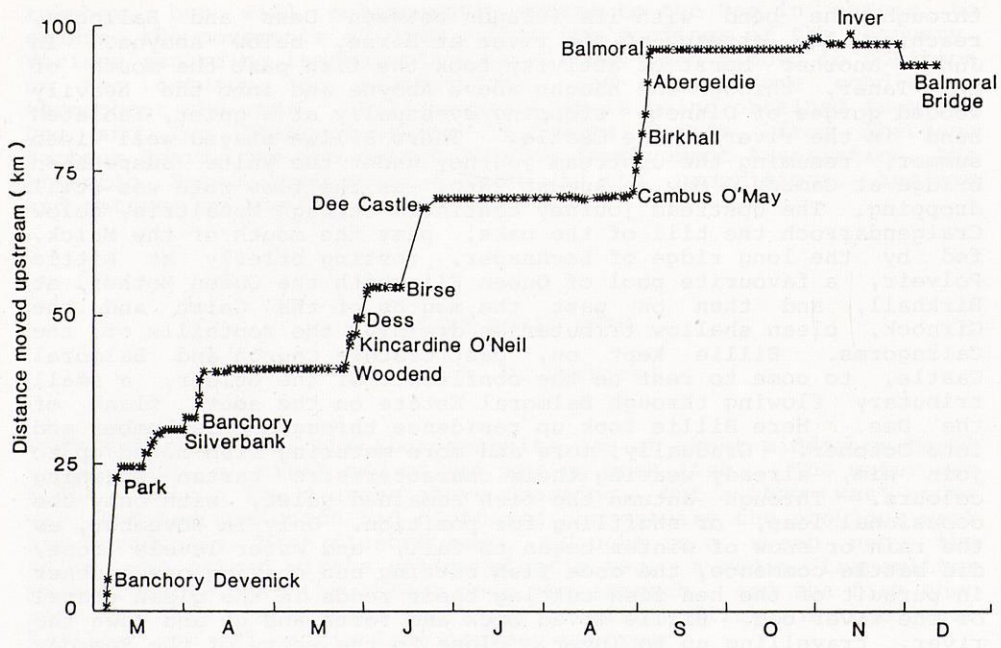
The estuary and lower reaches of the river were quickly traversed, the fish travelling through the city and suburbs of Aberdeen and into the open lower valley of the Dee. Billie covered the first 15 miles to the Long Pool, Park, in less than five days. Later, after several days' rest during a period of very high water flow, the fish set off again upstream, this time at a slower pace, moving progressively through Park and Crathes to Silverbank, close to the town of Banchory. On the 1st of April Billie passed Banchory and the confluence of the Feugh and after a few days' rest beneath Banchory Bridge moved off again through the rapids and riffles of Inchmarlo and Cairnton to the quieter waters of Woodend.

Many fish gathered together at Woodend in the early part of April, Billie remaining there through a period of strong and variable water flows and low temperatures well into May.

The movements of most salmon in the early part of the year may be quite heavily dependent upon temperature. After their initial rush into the river, which may be delayed if the river is iced over, the fish tend to move slowly and intermittently upstream. High water flow seems neither to help nor hinder the rate of progress. Long periods of inactivity are spent in particular pools.

At the end of May Billie set off again, moving through the rapids at Potarch, through the village of Kincardine O'Neil and then

through the bend with its islands between Dess and Ballogie, reaching the stretch of the river at Birse, below Aboyne. In June, another burst of activity took the fish past the mouth of the Tanar, through the haughs above Aboyne and into the heavily wooded gorges of Dinnet, stopping eventually at a quiet, isolated bend in the river at Dee Castle. There Billie stayed well into summer, resuming the upstream journey under the white suspension bridge at Cambus O'May on August 28th, as the flow rate was still dropping. The upstream journey continued through Monaltrie, below Craigendarroch the hill of the oaks, past the mouth of the Muick, fed by the long ridge of Lochnagar, resting briefly at Little Polveir, a favourite pool of Queen Elizabeth the Queen Mother, at Birkhall, and then on past the mouths of the Gairn and the Girnock, clean shallow tributaries draining the foothills of the Cairngorms. Billie kept on, past Crathie Church and Balmoral Castle, to come to rest on the confluence of the Gelder, a small tributary flowing through Balmoral Estate on the south flank of the Dee. Here Billie took up residence throughout September and into October. Gradually, more and more maturing fish moved up to join him, already wearing their characteristic tartan spawning colours. Through autumn the fish remained quiet, with only the occasional leap, or shuffling for position. Only in November, as the rain or snow of winter began to fall, and water levels rose, did battle commence, the cock fish butting and chasing one another in pursuit of the hen fish cutting their redds in the clean gravel of the river bed. Billie moved back and forth and up and down the river, travelling up to Inver, close to the entry of the Feardar Burn, and then returning to the spawning grounds at the mouth of the Gelder. We do not know whether Billie was successful in finding a mate or not, but we like to think that he did, and that some of his offspring have now hatched, and are inhabiting the runs and riffles just above Balmoral Castle. Billie, however, like most cocks, drove himself to exhaustion, and eventually drifted downstream to Balmoral Bridge, to die at the beginning of December, some nine months after entering the river. Few cocks survive spawning, especially those which enter like Billie in the early part of the year. It is still a puzzle why so many fish enter the Dee so early, as the winter ice is melting, only to stay in the river through spring, summer and autumn, without feeding, to spawn eventually as the first snows of the succeeding winter begin to fall. These fish do not hurry upstream, but like Billie spend most of their time resting in the many holding pools along the Dee. These spring salmon are of course the most highly prized of the fish entering the Dee, and the ones we need to conserve. Radio-tracking is already beginning to tell us more about their behaviour, and is enabling us to locate their spawning grounds.



A BIOLOGICAL SURVEY OF THE TWEED TRIBUTARIES

(By G. Hadoke)

The Atlantic Salmon Trust has already brought to the attention of its supporters the establishment in 1983 of the Tweed Foundation, a special Trust set up to finance the carrying out of biological surveys to aid the conservation and development of the salmon and trout stocks of the Tweed basin. It is of great satisfaction to the AST that one of its most energetic members, Dr. Derek Mills, is one of the Trustees of the Tweed Foundation. Dr. Mills has already carried out a number of studies into fish populations on the Tweed, the results of which can now be compared with his recent findings, and the increase or decrease of the standing populations of salmon and trout in the intervening period examined.

In 1985 the Foundation published the first of its reports, which contained the population levels of juvenile salmon that were found by extensive electrofishing operations. Some 47 tributaries were fished over 89 sites. The result of the survey showed that since the 1970 survey stocks of salmon fry and parr had declined in a serious fashion. The figures quoted in that earlier report are as follows:

Densities (no/m²) of salmon fry and parr in the Tweed River system in the summers of 1970 and 1984

Upper Tweed System	0.90	0.25
Middle Tweed System	0.24	0.14
Ettrick System	-	0.59
Teviot System	0.45	0.29
Lower Tweed System	0.02	0.03
Till System	-	0.08

The 1985 report went to great lengths to indicate where in each river the stocks were deficient and whether such deficiencies were major or minor. Thus, for the 47 tributaries, and the River Tweed itself, a picture was built up as to exactly what restocking was required and where. The low density of juvenile salmon in many areas is confirmed by many other assessments of such standing populations. For instance, Dr. Cragg Hine (now with the North West Water Authority) wrote in the 1978 Foyle Fisheries Commission Annual Report that in 1972 he had found parr populations of between 0.15 and 0.40 per square metre of river bed in tributaries of Lough Neah in Northern Ireland.

In its latest (1987) report the Foundation has indicated, in great detail, the restocking levels that should be made throughout the river system. Dr. Mills has of course borne in mind his own experience of this kind of exercise, but he has also been guided by the excellent report by Dr. Egglisshaw and others entitled,

"Principles and Practice of Stocking Streams with Salmon Eggs and Fry" (1984). A study of these reports will show the reader that every aspect of the river's characteristics and environment have been taken into account before recommendations are made for the number of eggs, unfed fry or fed fry that should be planted out. Dr. Mills has also taken note of the dangers of planting out foreign or farmed fish into river systems and has advised the use of progeny from spawners taken from natural stock which enter the Ettrick River of the Tweed System. He estimates that plantings should be in the range of between 250,000 and 500,000 eggs or unfed fry, the product of between 35 and 70 hen salmon of about 10 lb in weight each. Dr. Mills, knowing full well the adversities that juvenile and adult salmon have to contend with at sea and in estuaries and rivers, bravely estimates that if these recommendations are followed some 750 to 1500 adult salmon should eventually return to the river annually.

These two reports which, like many scientific reports, have had only brief mention in the National Press and angling journals, are nevertheless of great significance in the salmon conservation world and will be appreciated by the supporters of the Trust. Here is a case of a very good salmon authority concerned not only with the allocation of stock among its users, but undertaking to improve its stock in a most efficient way, using all the established criteria for a worthwhile survey.

A POTENTIAL NEW METHOD FOR STOCK IDENTIFICATION

(by Dr. Sheila E. Hartley, Department of Biological Science, University of Stirling)

A stock is "a population that differs genetically from other populations of the same species" (Wilkins, 1985). Stock identification has been studied by a variety of methods including population parameters such as abundance, growth and mortality; marking; physiological and behavioural characteristics such as reproduction and migration; morphometrics and meristics such as size, shape, number of fin rays and vertebrae; cytogenetics; study of calcified structures such as scales and otoliths; and biochemical characteristics (Ihssen et al., 1981).

In recent years the most commonly used technique has been the biochemical genetic technique that utilises gel electrophoresis of proteins to detect differences in the frequencies of particular genes to different populations. This technique has been used to distinguish between North American and European populations of Atlantic salmon (Nyman & Pippy, 1972) and to provide evidence for the existence of two races of salmon in the British Isles (Child et al., 1976).

Although protein electrophoresis provides genetic data for stock delineation, it may fail to identify genetically discrete stocks. This is because only those changes in the DNA that result in alteration of proteins, rather than all the changes that take place in the genetic material, will be detected. An additional problem involves the large numbers of individuals that must be examined in order to ascertain a true estimate of a particular gene's frequency in a population.

A genetic technique that directly examines DNA and requires screening of only a few individuals from a population to detect population differences would greatly facilitate the identification of individual stocks. The technique that utilises restriction endonuclease analysis of DNA from mitochondria fulfils these criteria.

Mitochondria are found in all cells where they are involved in the release of energy from carbon compounds. They contain a small circular molecule of DNA that can be isolated separately from the bulk of the cellular DNA, namely that which is contained in the nucleus. This mitochondrial (mt) DNA has several other interesting features in that it does not appear to undergo genetic recombination, it appears to evolve rapidly and is inherited through the maternal line.

Restriction endonucleases are a group of enzymes that recognise short, specific sequences within DNA molecules and then cut the DNA into fragments at these sequences. The fragments thus generated by an enzyme can then be separated by electrophoresis into a pattern which is specific for that enzyme.

To use this technique for population studies, mtDNA is isolated from various tissues (such as liver, heart or gonad) of individuals, digested with the restriction endonucleases and, following electrophoresis, the fragment patterns are compared. Any alteration in a recognition sequence for a particular enzyme will be detected as a change in the fragment pattern. Because mtDNA is a circular molecule, the number of fragments generated by a particular enzyme is the same as the number of recognition sequences present. Thus alterations to the recognition sequence will alter the number of fragments obtained. Therefore, if a particular enzyme generates different fragment patterns in individuals from different populations it can be used to assess these differences.

This technique is particularly appropriate for animals with strong homing instincts and has already been used to distinguish populations of rainbow trout, steelhead trout and cutthroat trout in North America (Wilson et al., 1985) and brown trout in Sweden and Ireland (Gyllensten & Wilson, 1987). At Stirling we are beginning an investigation of Atlantic salmon from different river systems in Britain to see if this technique will differentiate between them.

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REVIEW OF CURRENT LITERATURE ON SALMON RESEARCH AND DEVELOPMENT

(By Dr. D. H. Mills, Department of Forestry and Natural Resources, University of Edinburgh)

Behaviour

1. Feeding behaviour of wild Atlantic salmon, Salmo salar L., parr in mid - to late summer in a Scottish river. Stradmeyer, L. and Thorpe, J.E. (1987). Aquaculture and Fisheries Management, 18(1): 33-49.

From underwater observations carried out on salmon parr in the River Tilt it was noticed that their territories comprised one or more preferred stations on or just above the substrate, from which the fish intercepted drifting particles, or foraged on the substrate. Fish of 12 - 15 cm long fed more frequently at the surface, while 10 cm fish fed in mid-water or at their stations. Surface feeding decreased proportionately during rainfall. Frequency of feeding increased with temperature. Feeding was depressed in the presence of large salmonids.

2. The responses of hatchery-reared Atlantic salmon, Salmo salar L., parr to pelleted and wild prey. Stradmeyer, L. and Thorpe, J.E. (1987). Aquaculture and Fisheries Management, 18(1): 51-61.

Juvenile hatchery-reared Atlantic salmon parr were offered choices of pelleted or four types of wild prey (chironomid larvae, ephemeropteran nymphs Ecdyonurus and Baetis, and trichopteran larvae Hydropsyche) of the same particle widths, in a test flume. Preference for wild foods increased over 16 trials, and was greatest for Ecdyonurus and Hydropsyche. It is concluded that acceptability of wild prey should not limit performance of pellet fed salmon released into the wild.

3. Different adaptation strategies of Atlantic salmon (Salmo salar) populations to extreme climates with special reference to some cold Norwegian rivers. Jensen, A.J. and Johnsen, B.O. (1986). Canadian Journal of Fisheries and Aquatic Sciences, 43: 980-984.

Some of the salmon rivers on the western and northern coasts of Norway are very cold, and the sea temperature outside these rivers is almost always higher than that in the river. Growth rates of Atlantic salmon parr and smolt ages and sizes were examined in three such cold rivers. Indications were found that the lower temperature limit for growth of Atlantic salmon is not a fixed temperature, but varies from population to population according to the temperature regime of the environment. Smolts are small and females dominate among the smolts. Strategies used by Norwegian salmon in cold rivers are therefore different from those employed by salmon in northern extremes of the salmon's range in Canada.

Predation

1. Predation on salmon smolts, Salmo salar L., in the estuary of the River Surma, Norway. Hvidsten, N.A. and Møkkelgjerd, P.I. (1987). Journal of Fish Biology, 30: 273-280.

Predators and their predation on smolts were studied in the River Surma estuary. Cod were found to prey heavily on smolts, and a total mortality of up to 24.8% was found in a small restricted area. Cod are thought to assemble in the Surma estuary in the spring, foraging on the smolt run.

Genetics

1. Growth and genetic variation of Atlantic salmon (Salmo salar) from different sections of the River Alta, north Norway. Heggberget, T.G., Lund, R.A., Ryman, N. and Stahl, G. (1986). Canadian Journal of Fisheries and Aquatic Sciences, 43: 1828-1835.

Growth of young Atlantic salmon from three different sections of the River Alta was correlated with estimated growth differences among adult salmon caught in corresponding sections of the river.

Young salmon grew most quickly each of the 3 years investigated in the upper section of the river; further downstream pre-smolts had a significantly lower growth rate. Growth calculations based on scale samples from adults indicated corresponding river growth patterns from the three sections. Salmon caught in the upper section of the river had significantly lower smolt age and better pre-smolt growth than salmon caught further downstream. Genetic analyses of pre-smolts indicated that local populations exist. Allele frequency differences at 3 electrophoretically detectable protein loci give independent support for the existence of genetically differentiated local populations within the River Alta.

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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.

