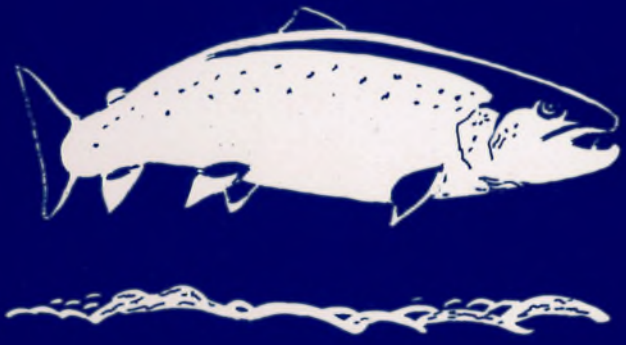
ATLANTIC SALMON TRUST

SALMON FISHERIES IN ENGLAND AND WALES

WARWICK AYTON



Price £3.50
June 1998

The Atlantic Salmon Trust
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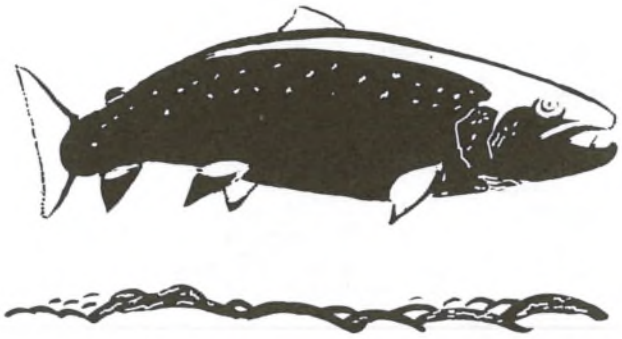

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Map of England and Wales showing the main salmon rivers
(Prepared by CEFAS Lowestoft)

Key

No.	River
1	Aln
2	Coquet
3	Tyne
4	Wear
5	Tees
6	Esk (Yorkshire)
7	Ouse
8	Thames
9	Itchen
10	Test
11	Avon (Hants)
12	Stour (Dorset)
13	Piddle
14	Frome
15	Axe
16	Exe
17	Teign
18	Dart
19	Avon (Devon)
20	Erme
21	Yealm
22	Plym
23	Tavy
24	Tamar
25	Lynher
26	Looe
27	Fowey
28	Camel
29	Torridge
30	Taw
31	Lyn
32	Severn
33	Wye
34	Usk
35	Taff
36	Ogmore
37	Afan
38	Neath
39	Tawe
40	Loughor
41	Gwendreath Fawr & Fach
42	Tywi
43	Taf
44	E & W Cleddau
45	Nevern
46	Teifi
47	Aeron
48	Ystwyth
49	Rheidol
50	Dyfi
51	Dysynni
52	Mawddach
53	Artro
54	Dwyryd
55	Glaslyn
56	Dwyfach & Dwyfawr
57	Llyfni
58	Gwyrfai
59	Seiont
60	Ogwen
61	Conwy
62	Clwyd
63	Dee
64	Ribble
65	Wyre
66	Lune
67	Kent
68	Leven
69	Duddon
70	Esk (Cumbria)
71	Irt
72	Ehen
73	Derwent
74	Ellen
75	Wampool
76	Eden
77	Esk (Border)

THE SALMON FISHERIES OF ENGLAND AND WALES

CONTENTS

ABBREVIATIONS

CMP	Catchment Management Plan
CEFAS	Centre for Environment, Fisheries & Aquaculture Science
DETR	Department of the Environment, Transport & the Regions
DOE	Department of the Environment
EA	Environment Agency
ESC	Environmental Services Charge
GIA	Grant in Aid
ICES	International Council for the Exploration of the Sea
LEAP	Local Environment Agency Plan
MAFF	Ministry of Agriculture, Fisheries & Food
NASCO	North Atlantic Salmon Conservation Organisation
NASF	North Atlantic Salmon Fund
NLO	Net Limitation Order
NRA	National Rivers Authority
PES	Public Expenditure Survey
SAC	Salmon Advisory Committee
SAFFA	Salmon & Freshwater Fisheries Act
SAP	Salmon Action Plan
SOAEFD	Scottish Office Agriculture, Environment & Fisheries Department
UDN	Ulcerative Dermal Necrosis
WOAD	Welsh Office Agriculture Department

INTRODUCTION

It is a pleasure to write an Introduction to this account of the Salmon Fisheries of England and Wales, as it completes our series on the salmon fisheries of the United Kingdom and the Republic of Ireland. It is also an important addition to a much larger series on the salmon fisheries of other salmon producing nations including Iceland, Norway, Spain and the Faroes. Reports of the salmon fisheries of Canada, the USA, France and Sweden are eagerly awaited.

Warwick Ayton is well qualified to write on the English and Welsh situation having spent his professional career in the water industry in these two countries. Firstly, as a fisheries and pollution inspector with the Somerset River Authority, then a fisheries biologist with the Severn River Authority, going on to an appointment as a principal fisheries officer with the Welsh National Water Development Authority. His career continued with posts as Regional Fisheries Officer with the Welsh Water Authority and Regional Fisheries Conservation Recreation and Navigation Officer with the Welsh Region of the National Rivers Authority. He has therefore experienced the Industry's gradual transition from relatively small river authorities to extensive regionalisation with the advent of regional water authorities and the privatisation of the water industry leading to the creation of the privatised water authorities and the public sector National Rivers Authority - the latter recently replaced by the all embracing Environment Agency.

Over this time there has been a major change in salmon exploitation, with the commercial fisheries being gradually reduced and more emphasis being put on salmon angling. At the same time we have witnessed a dramatic decline in salmon stocks, particularly those returning in the spring, and rivers such as the Wye have virtually lost their large spring fish for which they were renowned.

The increasing demand for more clean water has led over the years to more reservoirs and groundwater extraction with the associated increase in low water flows, exacerbated by frequent summer droughts. Consequently, there has been a need for stricter pollution control made ever more difficult with the advent of toxic substances such as, firstly, organo-chlorines, followed by organo-phosphates and now synthetic pyrethroids. Habitat degradation and an increase in the numbers of fish - eating birds have also added to the salmon manager's long list of problems. Over the years there have been major changes in both fisheries and pollution legislation to deal with these. Some have been good, others less effective. The various Acts and Reports of numerous Commissions are admirably summarised here.

It is with this background that we look forward to the Report in eighteen months time of the newly appointed Salmon and Freshwater Fisheries Review Group.

Derek Mills
Chairman, Honorary Scientific Advisory Panel

Lave nets–River Severn

PREFACE

The following account attempts to place the present day management of the salmon fisheries of England and Wales into their historical context. Abuse and neglect have characterised man's relationship with the salmon from at least the beginning of the industrial revolution and possibly earlier. Rivers were used as open sewers and cheap power sources and the fisheries were indiscriminately exploited but fortunately there came a belated comprehension that action was needed if the salmon was once again to reach its ancestral spawning grounds and enjoy a wholesome water environment.

Whatever the current status of salmon stocks may be, it is undeniable that the salmon is currently recovering much of its former range. Certainly a matter for contemplation is the widespread anecdotal 'evidence' that river environments, though intensively managed today, are not providing the environmental regimes or naturally generated diverse habitats that once supported salmon stocks in all their abundance and variety. It must be acknowledged however that there are both natural and anthropogenic factors influencing stocks outwith the river environment.

With a career in salmon and freshwater fisheries, to produce an account such as this has inevitably many personal resonances and a reminder of the privilege and pleasure of working with colleagues throughout this country and beyond. In the compilation of this report a number of colleagues have been most supportive. Its scope is essentially that as first conceived by Gordon Bielby. The burden of supplying information fell predictably in the first instance on my most immediate colleagues, Debbie Boulton, Alan Winstone and Charles Crundwell. David Willis and Martin Stark provided information on salmon rehabilitation in their respective catchments, the Trent and Thames whilst Cameron Durie and Keith Kendall elucidated the finer points of salmon management in the Solway and Border Esk as well as providing photographic material. Peter Hutchinson supplied details of the NASCO salmon river classification. I thank Phillip Parkinson for his generous loan of two Royal Commission Reports and a Parliamentary Select Committee Report. Production of this report was facilitated by Annette De Grandis and David Steer. I should also like to thank Derek Mills for the improvements arising from his seasoned editorial scrutiny. In conclusion, I owe a particular debt of gratitude to Guy Mawle and Ted Potter for reading and commenting on a first draft as well as providing additional information. Ted Potter also arranged for the production of the salmon rivers map by CEFAS.

Any remaining errors and deficiencies are solely attributable to myself.

Warwick J Ayton
Crickadarn. March 1998

Haaf net - Solway Firth

GENERAL REMARKS

This report is concerned with the management of the salmon fisheries in England and Wales and, in particular, developments in the last two centuries, although with so many salmon rivers it is not possible here to catalogue the succession of changes and responses that have taken place to each of them. In earlier times there were a succession of Acts of Parliament promulgated for the protection of salmon but with hardly any development of practical arrangements for their implementation. By contrast, there has been a rapidly developing change in management structures in the last half of the 20th century with only a very limited amount of original new fisheries legislation.

What follows is about the salmon fisheries rather than the biology of the salmon. Furthermore, there will be omissions, or insufficient emphasis of particular topics, but this reflects the wide range of issues embraced within the management of salmon stocks. The superscript numbers in the text refer to the sources enumerated in the reference section.

THE RESOURCE

The salmon is widely distributed throughout England and Wales, although not all former salmon rivers have yet been rehabilitated, principally because of poor river water quality and the presence of river obstructions. For some rivers in the south east of England there is no record of the existence of salmon fisheries in recent centuries. The map contained in this report provides details of the salmon's present distribution. It can reasonably be assumed that most of the former salmon rivers will eventually be rehabilitated, if not to provide salmon fisheries, then at least as a means of conserving salmon in the British Isles and securing improved environmental quality. Whether effective and economic mitigation for the acidification of freshwaters and the construction of estuarial barrages can be achieved is a matter for speculation.

The larger rivers have been characterised by the presence of the much prized spring runs and, in particular, the three and four sea winter fish. These runs have been in decline and the fisheries today rely on the increasing proportion of grilse as well as the summer and autumn runs. By 1995 the nominal catch for England and Wales ranked fourth in the list of thirteen states producing Atlantic salmon, as reported by the International Council for the Exploration of the Seas. In comparison with the 12 year (1984-95) average catch of 312.4 tonnes for England and Wales, the catch in 1995 was 307 tonnes.

River Eden Crib

HISTORICAL REVIEW

The following review of historical developments, apart from their own intrinsic interest, provides the background to the current system of management of salmon fisheries.

MAGNA CARTA to 1860

Both Cunliffe[1] and Howarth[2] have provided succinct accounts of over 700 years of fisheries legislation and management. Over this period four areas of concern have been addressed, namely, obstructions, close times, irregular netting and administration. The provision in Magna Carta for the removal of weirs from the Thames and Medway was of benefit to both navigation and fisheries, but it was not until 1472 (12 Edward IVc7) that explicit provision was made for the needs of fisheries. The concept of a free gap in weirs on the Eden, Esk and Derwent was graphically enacted in 1278 (6 Edward I) by the requirement for a gap which *'a sow with her five little pigs can enter'*. The continuing and fundamental importance of free passage is recognised in the current Salmon and Freshwater Fisheries Act 1975, which provides no less than thirteen sections relating to obstructions, thus maintaining over 500 years of legal protection against them.

Remarkably, the need for close seasons was also recognised as long ago as 1285 in the Statute of Westminster (13 Edward I.c.47) and by 1558 (Elizabeth I c.17) protection was extended by the introduction of a minimum size limit of 16 inches for salmon. The concept of 'authorised' nets was first recognised in 1376 (51 Edward III) presaging today's statutory regulations. The efficacy of the early fisheries legislation was however limited by the inadequate administrative support for its enforcement notwithstanding the assignment of overseers under the Statute of Westminster in 1285 or the employment by Justices of the Peace (JP) of under - conservators as provided for in the time of Edward III. This unsatisfactory situation continued until the introduction of the Salmon Fishery Act 1865. Tantalisingly our knowledge of the status and wellbeing of individual river stocks before the Royal Commission of 1860[3] is sketchy in the extreme. History records the passing observations, amongst others, of the Venerable Bede in the eighth century, the Doomsday book of 1086, Giraldus Cambrensis in 1188 in his 'Description of Wales', Daniel Defoe in 1724 in his 'Tour through England and Wales', Martin's account of the Mersey in his Natural History of England and Pennant, writing in 1775 about the Tees. Despite this paucity of formally recorded information it appears that with the advent of the Industrial Revolution in the late eighteenth century, together with the ongoing menace of river obstructions and excessive netting in some rivers and estuaries, the early nineteenth century witnessed the widespread diminution of stocks. Such was the condition of the salmon fisheries that in 1825 a Parliamentary Select Committee[4] on the Salmon Fisheries of the United Kingdom was appointed "to take into consideration the State of the Salmon Fisheries of Scotland and of the United Kingdom and the laws affecting the same". In the first of two reports published in that year, thirteen resolutions were made that can be paraphrased as follows:

- "The Salmon Fisheries of the United Kingdom of Great Britain and Ireland have for many years past rapidly decreased....."
- There should be a single national close season and weekly close time.
- It should be an offence to take, attempt to take, sell, purchase or molest salmon or sea trout during the close period.
- Mill owners and others taking water should be required to erect and maintain gratings.
- Guard against discharges inimical to fish.
- It should be an offence to use lights in the taking of salmon.
- Mesh sizes of nets should be regulated
- Appoint water bailiffs with powers of access, to be paid by proprietors or lessees of salmon fisheries
- Provide for the summary conviction of offenders
- The above resolutions be enacted in a bill for England, Scotland and Ireland

In a second report in the same year, evidence was considered about obstructions, a sensitive subject, given the rights of owners of obstructions; there was an apparent acquiescence to the primacy of manufacturing industry versus the maintenance of a salmon fishery. Interestingly Thomas Telford gave evidence to the Committee on the use and construction of gratings.

THE ROYAL COMMISSION 1860

One might speculate why no parliamentary action was taken following the Select Committee report, but the absence of a central authority responsible for fisheries may not have assisted matters. In fact progress was not made until 1860 when a Royal Commission was established *"....to enquire into the Salmon Fisheries of England and Wales, with the view of increasing the supply of a valuable article of food for the benefit of the public"*. The report published in 1861 followed examination of witnesses at key locations around the country. The decline of the salmon fisheries was affirmed and attributed as follows:

- Obstructions to the free passage of fish
- The use of fixed engines
- Defective regulation of close seasons
- Illegal fishing

- The absence of a management system for rivers and fisheries
- Pollution
- Confusion and uncertainty of the law

Thus the Commission reaffirmed the limiting factors besetting the country's salmon fisheries and identified additional key problems. Interestingly a number of observations were made about damage to fisheries in various parts of the country caused by pollution from mines, manufacturing industry and sewage. It discussed the necessity for establishing a body to effectively arbitrate between the respective interests of industry and fisheries, but failed to make any positive recommendation. Ostensibly it appears to have sidestepped the issue, acknowledging the paramountcy of wealth creating industry. Further reference to this is included in Appendix 1.

Following the report, Parliament was quick to legislate, passing the Salmon Fishery Act 1861. The Act addressed some of the Commission's recommendations, for example, in relation to obstructions, fixed engines, close seasons, illegal fishing, pollution and the establishment of a central authority, making the Home Office responsible for fisheries. In addition it authorised the appointment of two Inspectors of Fisheries who were required to make annual reports to Parliament. Significantly, no provision was made for the establishment and funding of local management, other than to continue the practice of 500 years of JPs appointing Conservators who had limited powers, undefined duties and no pay. With the passing of the Act the Royal Commission's reference to the confusion and uncertainty of the law was addressed by repealing in part or whole all previous legislation amounting to 33 Acts.

BOARDS OF CONSERVATORS AND FISHERY BOARDS

Some of the remaining deficiencies were subsequently remedied with the passing of the Salmon Fishery Act 1865. Justices could apply to the Home Office to establish Fishery Districts and set up Boards of Conservators, providing for jurisdiction over entire catchments for the first time. Water bailiffs could be appointed with the powers of a constable. To fund these provisions licence duties were introduced for all methods of fishing thus relieving a burden on central funds but requiring payment by the beneficiaries of the service. In addition Special Commissioners were appointed to enquire into fixed engines and were empowered to issue Certificates of Privilege for certified fixed engines, all of which remain in force today.

During the remainder of the nineteenth century Boards of Conservators were appointed to an increasing number of fishery districts, so that by 1894, fifty three Boards covering three - quarters of England and Wales had been set up. Initially the Boards were made up of a mixture of conservators appointed by JPs and ex-officio members who were either local justices with property interests on rivers or persons paying above a certain sum in licence fees. This was modified by the

Salmon Fishery Act 1873, giving owners and occupiers of fisheries and netsmen a right to representation. By 1888 the role of the JP in fisheries after 600 years was transferred to County Councils. Not all was well however, if the following comments of the chairman of the Severn Fishery Board in 1898, quoted in Fort and Brayshaw's 'Fishery Management' are to be believed. "*At first it was to be expected mistakes would be made, the Boards were new to their work and had to learn their business, but a quarter of a century should have furnished ample time in which even the densest Board might have acquired a slight knowledge of the elementary principles of fishery management. This, however, does not seem to be the case. Boards, if they are to be judged by their work, are as ignorant of the rules to be followed in the management of fisheries, as they were thirty years ago. Their proceedings are based upon no system but that of how to do nothing. They do not promote the interest of the fisheries, except, perhaps in some slight degree by stopping illegal modes of fishing*". At the national level, the Home Office was superseded by the Board of Trade in 1896 and in turn it was replaced by the Board of Agriculture in 1903. The annual reports of the Inspectors of Salmon Fisheries which commenced after the 1865 Act recorded in detail the condition of the country's fisheries and the action taken to maintain and improve them.

In 1900, another Royal Commission[5] on Salmon Fisheries (the so-called Elgin Report, named after its chairman) was set up but this time to cover Great Britain. It had a five point remit including an assessment of the need for any further legislative change. Some of the principal points to emerge were:

- Reform fisheries administration, preferably on a Great Britain or United Kingdom basis with a specific remit for data collection, investigations and control powers.

- Create Watershed Boards embracing fisheries, pollution and water abstraction duties; alternatively reconstitute Boards of Conservators as Fishery Boards.

- Pollution and water abstractions were acknowledged to be serious limiting factors.

- Provide for funds from a special rate by assessments

- Identification of various fishery regulation measures.

- Assist the removal of obstructions by improving financial resources and compulsory approval of fish passes.

- Central funding to support fisheries research including fish culture.

Selective implementation of these recommendations was provided for in the later Salmon and Freshwater Fisheries Act 1907. The Act enabled Order making powers for the assessment of private fisheries and for the constitution of the Boards. By the third decade of the century there was again a need to consolidate

the original 1861 Act and the 18 subsequent amending Acts and this was achieved through the Salmon and Freshwater Fisheries Act 1923. Some of the Boards constituted by the Act had taken the opportunity to reconstitute themselves though the cost and cumbersome procedure may have deterred others. As a result of amalgamations and the inability of some Boards to continue to operate through lack of funds, there remained 45 Boards by 1948.

RIVER BOARDS AND RIVER AUTHORITIES

The Third Report of the Central Advisory Water Committee (1943) on River Boards proposed that one authority, a river board should take over the management of fisheries, prevention of river pollution and land drainage in a whole watershed. The succeeding River Boards Act 1948 brought into being the precursor to the present day multifunctional catchment management, realising the recommendations of no less than 13 previous commissions including Lord Elgin's. By 1951 thirty two river boards and two conservancies, the Thames and Lee (established in 1857 and 1868 respectively) covering the whole of England and Wales were in place. Interestingly, the two conservancies did not exercise any significant fishery powers until they were assimilated into the Thames Water Authority in 1974. The Boards produced annual reports, which included both fisheries statistics and accounts of management activity. These data were augmented by year books produced by the River Boards Association, a national body which provided a forum and focus for river management issues. This arrangement continued until 1973 under the auspices of the Association of River Authorities.

The Boards inherited the existing legislation, which was quickly augmented by reforming legislation on water pollution. Significantly, the Boards were given no water conservation function, although they undertook hydrometry. The Water Resources Act 1963 rectified this omission, creating 27 River Authorities (the Thames and Lee Conservancies continued as before) and the Water Resources Board, the latter being responsible for the strategic management of the country's water resources. These legislative changes were important and beneficial to the fisheries at a time of increasing demand for water. These developments were not accompanied by any updating of fishery law in recognition of changing circumstances. This was a cause for frustration given that the government had established a committee[6] under Lord Bledisloe to review the legislation including the River Boards Act 1948 and to make resolutions. The Committee reported in 1961, making 151 recommendations and conclusions. It was only as a result of a private member's bill that some of the uncontroversial elements of the Bledisloe Report were made law in the Salmon and Freshwater Fisheries Act 1972. A further consolidation of the legislation from 1923 took place, which resulted in the Salmon and Freshwater Fisheries Act 1975.

THE REGIONAL WATER AUTHORITIES

River management by the River Authorities was itself superseded by the desire to make one authority responsible for the whole hydrological cycle. This required the bringing together of three elements: water supply administered by the statutory water undertakers, sewerage and sewage disposal administered by local authorities and joint sewerage boards, and river and water resource management, administered by river authorities and the Thames and Lee Conservancies. Thus the integration of 187 water undertakers, nearly 1400 sewerage authorities, 27 river authorities and the two river conservancies came about. This was achieved through the Water Act 1973, which brought into being nine Regional Water Authorities in England and the Welsh National Water Development Authority. In addition the Act established the National Water Council which inter alia provided a forum for the development of policy. The advent of the water authorities saw the integration of river management and its regulation with the utility functions of water supply and treatment and disposal of dirty water. By this time the management of fisheries was becoming a more technically based function reflecting the need to protect the fishery resource and its utilisation at a time of increasing demand by other water users.

Despite a government consultation paper in 1981[7], it was not until 1986 that the government introduced a Salmon Bill which apart from two clauses was entirely concerned with Scottish salmon fisheries. Vigorous lobbying by the water authorities and fisheries interests resulted in substantial improvements which will be referred to later.

PRIVATISATION

By the mid eighties the government had further plans, for what was by now known as the "water industry", i.e. to float it on the stock market and thus obtain the essential funding that successive governments had been unable to provide in order to bring about the overdue refurbishment of the infrastructure and apply the philosophy of the market to a predominantly public utility organisation. However, the initial proposal to privatise all functions of the Water Authorities was modified to address the widespread criticism that the proposed new bodies would combine the dual roles of poacher and gamekeeper ie. regulating discharges and abstractions whilst being amongst the largest water abstractors and dischargers. Privatisation subsequently proceeded but with an independent regulatory body, the National Rivers Authority (NRA), a new national body, encapsulating the river management functions of the Water Authorities which was set up under the Water Act 1989. The change from ten autonomous regional organisations responsible for both policy and operations to a national body, with a policy making head office and ten (later eight) regional units was a further significant development.

THE ENVIRONMENT AGENCY

Further rationalisation and integration brought into being the Environment Agency, created by the Environment Act 1995 on April 1st 1996. It, like the NRA before it, is a Non Departmental Public Body (commonly known as a 'quango'), an organisation indirectly yet effectively controlled by government. It is sponsored by the Department of the Environment (DOE), now the Department of

the Environment, Transport and the Regions (DETR), MAFF and the Welsh Office who provide the policy framework for its operations. Its Board of 15 is appointed by the Secretaries of State of the above Departments. The EA was formed by the amalgamation of the NRA, Her Majesty's Inspectorate of Pollution, eighty three Waste Regulation Authorities and parts of the DOE. Its duties are not only those inherited from its predecessor bodies but new ones including making a contribution to sustainable development, having regard to costs and benefits, compiling reports on the state of the environment, producer responsibility and contaminated land. Its organisation comprises a Head Office and it operates through 8 Regions and 26 Areas with regional boundaries corresponding to local government boundaries, although the water management functions based logically on catchments are equivalent to the former NRA structure. In 1996/7 its expenditure was £536 million and employed 9450 staff, of which £22.4 million was expended on all fisheries including salmon, and 450 staff were directly employed on fisheries work including 247 fishery inspectors and bailiffs.

River Wye (Brockweir Bridge) Stop–Boat

ADMINISTRATION AND REGULATION

FISHING RIGHTS

Fishing rights are either private or public. In non-tidal waters ie. rivers, fishing rights are exclusively private, which can be bought, sold or leased. These rights may be attached to the ownership of the adjacent land or stand-alone. Furthermore, ownership may be held by individuals, syndicates, fishing associations or businesses. These owners in turn may lease their rights to individuals or groups on a fixed period or time-share basis. Thus on a single river system fishing rights may be exercised in a variety of ways. Fishing without the owner's or occupier's permission is an offence under the Theft Act 1968. Nowadays fishing in freshwater is exercised by rod and line although there remain some notable exceptions.

As a general rule fishing in tidal waters is a public right. These waters extend into estuaries and out to 6 nautical miles measured approximately from the normal low tide around the coast. Exceptions to this general rule exist, usually in the form of pre Magna Carta rights conferred by the crown on individuals or by ancient grant charter or immemorial usage. Magna Carta prevented the Crown from continuing to confer private rights on individuals. Today, private rights exist in several estuaries, most notably in the Severn and Wye and Bristol Channel. These rights operate under the authority of Certificates of Privilege or are acknowledged if it can be demonstrated that they were lawfully employed in the open season of 1861.

Despite the public's general right to fish in tidal waters, for reasons of good fishery management or conservation, the right to fish with nets has been limited by local Net Limitation Orders made under the 1975 Act which define the area of operation and the number and type of nets that may fish. Where the demands of conservation require it, fishing can be prohibited under byelaw. Most recently, some NLOs have been drafted to provided for a progressive reduction in coastal netting eg. the North East coast and Usk drift net fisheries, where as licences become vacant, they are not replaced. This reflects a recognition that fisheries that do not exploit predominantly a single stock make management of stocks difficult. In recent years virtually all coastal and estuarial fishing has become subject to limitation or byelaw control. The situation in tidal waters is therefore one of predominantly limited public rights together with some localised private rights with all instruments regulated under byelaw.

ADMINISTRATION OF THE FISHERIES

Fisheries are administered at four levels viz: the owner/occupier, the Environment Agency, the Ministry of Agriculture Fisheries and Food (MAFF) with the Welsh Office, and the European Union (EU). It has previously been shown that there has been a long involvement by the public agencies in the supervision of salmon fisheries.

To varying extent owners or occupiers manage their fisheries within the statutory framework. On many rivers there are associations of owners who collectively determine their position in respect of regulatory and administrative proposals

4

promoted by their membership or the statutory public agencies. Latterly there has been the emergence of 'river trusts,' founded to bring about improvement to the river environment.

The EA, which has inherited from its predecessor body the duty 'to maintain, improve and develop' fisheries is the principal public body currently responsible for fisheries administration. In addition it has responsibilities for integrated river management and integrated pollution control of land, air and water. In relation to its fisheries function it is required to establish and maintain regionally based Fishery Advisory Committees and consult them on the carrying out of its duties and the use of its powers. Its jurisdiction extends seawards by 6 nautical miles and exercises powers in the Border Esk (see below). In tidal waters, local Sea Fishery Committees established under the Sea Fishery Regulation Act1966 have an incidental but important role in protecting salmon and preventing interference with their migration.

Overall responsibility for salmon fisheries rests with MAFF and the Welsh Office. Fishery powers were first devolved to the Welsh Office in 1978. They are jointly responsible for setting the statutory framework under which salmon are managed and within which the EA carries out its duties. MAFF, together with other UK Fishery Departments, is also responsible for the development and implementation of UK policy on fish diseases and for all aspects of the European Union single market trade and disease control measures. The Minister of Agriculture, Fisheries and Food and the Secretary of State for Wales have statutory responsibility to consider the acceptability of all new fishery regulations and fishing licence duties proposed by the EA and can approve or reject them with or without a public inquiry. They are responsible for handling international matters in conjunction with other Fishery Departments and are involved in the affairs of the North Atlantic Salmon Conservation Organisation (NASCO) through the EU. Officials contribute to the development of international measures for the regulation of salmon fisheries by participation in the work of NASCO and the International Council for the Exploration of the Sea (ICES).

Lastly, the Council and Commission of the EU regulates the fisheries beyond the 12 mile limit and requires submission of all national fisheries legislation for its approval.

BORDER RIVERS AND THE SOLWAY FIRTH

The border between Scotland and England is in part delineated by the rivers Tweed and Border Esk, and in the west continues into the Solway Firth. The Tweed rises in Scotland but its catchment crosses the border and extends along the English coast as far south as Lindisfarne; the whole of this area is treated as if it was in Scotland for fishery purposes. It is administered under the specific Tweed Fishery Acts1857-59 and 1969 as well as being largely subject to the general Scottish fishery legislation. Where offences are committed in the English part of the catchment, they must be prosecuted in English courts and in accordance with their rules of procedure. By contrast the Border Esk, which also rises in Scotland but crosses into England, falls within the jurisdiction of the EA for fishery

purposes, although previously powers were confined to the river, its banks and tributary streams. This caused operational enforcement problems in respect of 'handling offences' and bailliffs' powers of arrest and search away from the river bank. The Environment Act 1995 rectified this, providing EA staff with powers throughout the whole of the catchment.

The northern shore of the Solway Firth lies in Scotland, whilst the southern shore lies in England, but because the position of the border has not been defined, the jurisdiction of the respective national legislation and of the courts is uncertain. In a recent Salmon Advisory Committee Report[8] five areas of management difficulty were identified and it stated *"these problems have vexed successive management organisations on both sides of the border for well over 100 years"*. It concluded resolution of the problem by one of two means: to define the border or remove the significance of the border. These options were considered preferable to the status quo, but would require the establishment of a Solway Commission and adoption of a common management system. Interestingly, a commission had been proposed in the committee stage of the Salmon Bill in 1986. Most recently the Bill setting out the Government's proposals for Scottish devolution may provide for a fixed border in the Solway Firth subject to safeguards for existing fishing rights. The Bill may also resolve which country has jurisdiction over fisheries for the Border Esk catchment.

REGULATION OF THE FISHERIES

Beyond the 6 mile limit and out to 12 miles all fishing is prohibited under Order by MAFF, outside this zone fishing is a matter for international agreement and is referred to later when considering mixed stock fisheries. The present extensive array of both mandatory controls and discretionary powers has been comprehensively reviewed by Howarth[2] and it is therefore only necessary to highlight the principal features of the current regulatory regime. Firstly there is the control over the use of legal fishing gear and secondly other measures dealing with prohibited methods of taking or destroying fish, obstructions, unclean and immature fish, the sale of salmon and finally the enforcement of these provisions. In increasing order of effectiveness, angling, netting and trapping represent the three principal means of fishing legally which are subject to compulsory control by byelaw, order or statute and sometimes by voluntary codes of practice introduced by fishery owners or the fishermen themselves. The interplay of licensing fixed numbers of fishing gears, defining their configuration, their method of use, together with the times when they can be used, provides a powerful and effective means of regulation.

LICENSING

Although the original purpose of licensing rod and net fishermen was to fund the then emerging management of salmon fisheries, Section 25 of the 1975 Salmon and Freshwater Fisheries Act requires that fishing for salmon shall be regulated by licensing and duties levied. Thus unlicensed fishing by means not otherwise prohibited under statute e.g. groping, can be prosecuted. Also it is possible for the courts to refuse to issue licences to persons disqualified from fishing or to order the forfeiture of a licence. Licensing has also provided a means of estimating

trends in fishing effort and facilitates the collection of catch returns from fishermen and because all fishing must be licensed, participation in the public fisheries can be regulated. There is of course no limitation on the number of rod licences.

FISHING GEAR AND METHODS OF OPERATION

The effectiveness of fishing by rod and line is influenced by a number of factors including the type of lure used and in the manner of its presentation. In the case of an upland spate river, worm fishing may be the only practicable method to fish, whereas on other rivers alternative lures may be effective. In recent years when it has been acknowledged that rod exploitation of early running salmon has exacerbated the ability of these runs to recover it has been necessary to introduce limitations on the fishing methods used ie fly, spinner or worm and/or adjust the beginning of the fishing season. By contrast, fishing in tidal waters is characterised by the use of a variety of gears which require an array of regulations to tailor fishing effort to the local circumstances. For example, in the case of the most commonly used method, seine netting, the net must be both 'shot' without pause and delay and must not extend across more than three-quarters of the channel width fished. In addition, the statutory defined minimum mesh size is 2 inches, although this may be varied by byelaw to accommodate particular needs. In public fisheries, fishing effort may be determined in a number of ways, firstly by determining the number of participants, second by gear specification and lastly by defining the method of operation. The determination of the optimum number of participants that should be in the fishery, is a function of the number of fishermen and the efficiency of their gear in order to realise the appropriate level of exploitation. Fortunately the range of regulatory mechanisms available, can accommodate nearly all circumstances and consequent management requirements.

CLOSE SEASONS AND CLOSE TIMES

Earlier, reference was made to the antecedents to the present day close period regulations extending back some hundreds of years and represents another control in the mix of mechanisms available to ensure protection from overexploitation. The statutory minimum annual close season for salmon of 153 days for nets and 92 days for angling emanate from the 1861 Act. In addition, specific provision of a close period of 242 days is stipulated for putts and putchers. For methods other than angling and putts and putchers there is also a statutory minimum weekly close time of 42 hours and the period and timing of its duration is also defined and cannot be modified other than by extension.

PROHIBITED METHODS

The use of unauthorised fishing gear or methods and the improper use of authorised methods is colloquially referred to as poaching and extensive provision is made in SAFFA 1975 to address this age old problem. Further reference to this will be made in a later section.

OBSTRUCTIONS

Preoccupation with the threat posed by obstructions has been evident since Magna Carta and despite the significant reduction in the number of obstructions following the 1861 Act there remains comprehensive statutory provision in relation to fixed engines, fishing weirs, fishing mill dams, fish passes, sluices and screens to prevent a resurgence of these impediments. In fact the former requirement for screens has been extended by the Environment Act 1995 to include fish farms and this will come into force in 1999. Howarth[2] gives an extensive exposition of the historical and legal aspects of the subject. Reference here will only be made to the placing and use of fixed engines (section 6, SAFFA1975). Consolidation of earlier legislation into the SAFFA 1975 brought about an unintentional change in the law, whereby the placing of a fixed engine became an absolute offence irrespective of whether or not there was intent to take salmon. This was confirmed a few years later in the landmark case of Champion v Maughan (1984). At a stroke the time-honoured practise of setting fixed nets to take white fish became illegal. This caused considerable operational difficulties between the then water authority fisheries staff and the sea fisheries committees. Despite the pragmatic approach subsequently adopted by the respective local managers in permitting sea fishermen to continue to fish for white fish in 'authorised' areas, it was essential that the government redressed the situation, which it did in the passing of sections 33 and 37 of the Salmon Act1986, which enabled fixed engine fishing to be authorised in agreed areas under specific byelaws.

UNSEASONABLE AND IMMATURE FISH

Prohibition of the sale of unclean and immature fish (section 2, SAFFA1975) has its origins in the 1861 Act too. It was considered that prohibiting the sale of these fish would be a disincentive to taking and selling for profit and this would assist with the conservation of the stocks. Another control over sale is set down in section 22 of SAFFA 1975, which prohibits the buying selling or offering for sale fresh salmon between August 31st and February 1st, although there are exceptions and perhaps because of them, eg the universal ability to freeze fish nowadays, there are well established evidential problems associated with this section. Unusually this section requires, contrary to the main body of English law, an onus on the defendant to prove the lawful origin of any fish when buying, selling or exposing it for sale.

ENFORCEMENT OF REGULATIONS

It is self evident that the effectiveness of the regulatory regime described above is dependent on a professional and adequately resourced enforcement capability. This is undertaken by water bailiffs who are appointed with the powers of a constable under the SAFFA 1975, in addition they exercise powers contained in the Police and Criminal Evidence Act 1984 and the Theft Act 1968.

FISHERIES FINANCE

Direct expenditure on the management and protection of salmon and sea trout fisheries by the EA in 1997/98 is about £10 million (another £10.8 million is spent on coarse and trout fisheries). This is funded principally by two sources: income

from the sale of fishing licences and government grant in aid (GIA). Since the inception of the NRA and the consequent introduction of a national fisheries agency it has been necessary to replace the previous local funding sources by GIA. During the Water Authority era expenditure in excess of licence income was supported by income derived from the Environmental Services Charge (ESC) levied on rateable properties ie. water rate payers. Usually this was a small amount per bill and because it was collected along with the comparatively large sum for water and sewerage services it attracted little attention.

Resolving the means of funding the management of the country's fisheries has been a continuing concern since the deliberations of the 1860 Royal Commission. It was perceived then that governmental funding would not be forthcoming and, given that historically conservators had not been paid, it obliged the Commissioners to report *"as to the principle to be adopted there is little doubt those who benefit by protection should pay for protection"*. Despite this there remains today a school of thought that law enforcement, like other policing activity, should be a charge on the exchequer. The Commissioners reported that the necessary funds could be obtained by *"a rate on private fisheries"* and by *"licence duty on engines of all kinds"*. It was suggested that exceptional expenditure associated with the then predominant problem of obstructions should be raised by loans. The 1861 Act for whatever reason did not include any financial provisions but this was remedied by the 1865 Act which introduced licensing for the first time and provided for fund raising by mortgaging licence duties. In fact licence duties remained the sole source of income for nearly 40 years. It was not until the Elgin Report which recommended *"---- assessment in some form or another"* that the government acknowledged the need and provided order making powers to this effect in the 1907 Act. This power continues today in section 142 of the Water Resources Act 1991. Assessment Orders were made right up to the inception of the river boards including some catchments in SW and NW England as well as parts of Wales. Today those orders have been repealed except in Wales, at least for the time being. The fact was that fisheries income continued to be derived overwhelmingly from the sale of fishing licences. The difficulties experienced by some of the fishery boards, of whom some amalgamated to remain operational or simply dissolved through lack of funds, was remedied by the ability to fund any shortfall in income by precepting local authorities following the River Boards Act 1948. The constitution of the Boards by predominantly local authority members ensured that expenditure was contained.

It was inevitable that following the reorganisation of the water industry in 1989 and the consequent loss of local ESC support there would be pressure on government funding. This arose because the NRA (and later the EA) was subject to the annual public expenditure survey (PES) in which the government must balance the competing demands of all public funded agencies. This is reflected in the progressive reduction in GIA shown below.

GRANT IN AID £M

91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/2000
13.4	12.6	12.8	9.1	8.4	7.5	7.5	7.5	7.5

As a result it became necessary, probably for the first time, to determine the expenditure specifically in relation to salmon fisheries in order to identify the amount to be recovered. The EA has inherited the strategy produced by the NRA in response to the need to minimise GIA. The central thesis of this strategy[9] is the identification of the beneficiaries of the fisheries services and the equitable recovery of costs from them. The implementation of the strategy is ongoing with some modification to meet changing circumstances. To date, the objective allocation of costs against beneficiaries has enabled cost recovery from anglers assisted by active marketing of fishing licences. The remaining groups: netsmen, fishery owners, the general public, other EA functions and scheme promoters are providing their identified cost contributions to varying extents. The proposal to introduce assessments of private fisheries in 1992/93 failed for a number of reasons including the fact that the cost benefit of obtaining the contributions was not favourable. This was because it was proposed to assess both game and coarse fisheries; experience elsewhere suggests that assessment of salmon fisheries alone can be cost effective. This failure is particularly unfortunate because one of the other impediments to the proposal was the objection to 'double rating' which was addressed by the 'Moran' amendment to the Local Government Finance Act 1988 and has now been removed by the derating (1.4.97) of sporting rights by local authorities (under the Local Government and Rating Act 1997). There is, however, an active ongoing debate supported by the Atlantic Salmon Trust to explore other ways that private fisheries may contribute to the management of these fisheries. To date some initiatives have been taken to set up trusts, some of whom have obtained charitable status to undertake river management works that inter alia will be of benefit to fisheries.

In relation to the other groups of water users there is growing acknowledgement that their ecological and fishery damaging activities and associated costs must be redressed by appropriate mitigation. For example, in the case of civil engineering schemes which impinge on the river environment, such as publicly funded road schemes or private developments like barrages, then the principle of the 'promoter pays' has been adopted. In other cases such as the impact of flood defence schemes or water resource development, recovery of costs incurred by the fisheries function in protecting the fishery are sought.

In conclusion, it should be noted that expenditure by the EA and its predecessors in respect of pollution control and water resources has been and continues to be of major significance and benefit to the protection and improvement of salmon fisheries. More recently collaboration between the flood defence and fisheries functions has minimised habitat change detrimental to fisheries and in some cases has achieved a net benefit.

Mr. Robert Pashley on the River Wye in 1950

THE FISHERIES

ANGLING

The popularity of salmon angling increased dramatically from the 1940s to the 1980s as indicated by the sale of licences on salmon rivers which more than doubled. This, for example, is shown very clearly for the Wye, Usk and Dee[10]. By 1995 the sale of migratory salmonid licences exceeded 35000[11]. It should be noted, however, that this number does not equate to the number of anglers because some purchase more than one licence. Due to successive changes in licence structure, including the introduction of a national licence, trends since the 1980s are unclear. Over the last few years, since 1994 at least, the number of salmon licences sold has declined slightly, no doubt reflecting recent poorer catches on many rivers, and increases in licence duties.

Apart from the recreation salmon fishing provides, its significance is in its force for the conservation of salmon stocks (albeit one of self interest) and its associated economic value. Parliamentary consideration of draft legislation or debates in the House of Lords on salmon demonstrates unequivocally the force and determination that anglers and proprietors of fishing bring to the protection of salmon stocks. This was demonstrated for example by the lobby of anglers seeking to strengthen the provisions of the Salmon Bill in 1986 when a rarely used procedural device a 'Public Petition of Parliament'[12] with 23,000 signatures was submitted. Anglers and fishery owners have contended for a good many years that angling should be the principal method of exploitation of salmon. Economic factors are invoked in support of this claim particularly when revised fishery regulations or licence duties are periodically submitted for ministerial consent. This is one of the most important and fundamental issues confronting the future management of salmon stocks and it is right therefore that this should have been addressed by the NRA's Salmon Management Strategy, inherited now by the EA. The Strategy drew on the earlier MAFF commissioned evaluation of rod and net fisheries[13] which came to a cautionary conclusion that *"while it appears that for Great Britain as a whole (although it is also true for England and Wales) the recreational fishery is significantly more valuable than the commercial fishery, this does not constitute the case for a change in the current balance. In order to make a judgement about the most valuable balance between the two sectors in the exploitation of a particular salmon stock, the effects of a change in the catches of one sector on the catches in the other sector would need to be confidently predicted. Our appreciation of the biological literature suggests that this would be difficult".*

The Strategy also responds to the widely held belief that the closure of a net fishery will bring about a commensurate improvement to rod catches. Angling is an inefficient means of taking salmon (although this has been shown not to be the case for some early run stock components) and is usually unable to fully exploit river stocks. It is also a fact that the impact of angling (and netting) is mitigated by the occurrence of runs outwith the end of the fishing season. The effect on a rod fishery by the closure of a net fishery is dependent upon its relative size, location and time of operation. The Strategy cites two examples which support the need to

judge each case on its merits: when the Wye net fishery closed in 1984, rod catches in the ensuing eight years decreased by 10% compared with the eight years preceding closure. Whereas closure of the Dee net fishery would, it is estimated, bring about a 25% increase in rod catch. Furthermore, the Strategy quotes evidence[14] that with increasing stock size, exploitation rates by angling can decrease. For the stock, additional escapement where there is under-recruitment because of insufficient egg deposition would be desirable provided that there was not an increase in an unwanted or plentiful stock component, otherwise this could lead to the depression of a scarce or preferred component. Such a scenario would apply to the present low stock levels of early running fish, which if they interbred with enhanced numbers of grilse might generate a genetic profile favouring the latter running stock components. The favouring of angling with its acknowledged greater net economic value would make some individuals (the netsmen) worse off and this should not be ignored. Finally a move to optimise economic and social benefits is presently outwith existing legislative powers and would therefore require a policy initiative from the Government.

The practice of catch and release is a matter of personal conviction, with its protagonists asserting that it promotes the conservation ethic at the same time as allowing fishermen access to the fishery. Conversely, it is asserted that if stock levels cannot sustain a particular level of exploitation it is better to reduce fishing effort. The EA encourages the practice and now reports in its annual fisheries statistics the numbers of fish released, which in the1995 season amounted to 3187 or 20% of the declared rod catch. There are also varying opinions on the ethic of selling fish taken by the sport fishery with its implication for stock conservation. Interestingly, the Bledisloe Committee concluded that "what a man can legally catch he should legally be able to sell", which contrasts with a recent SAC report[8] which recommended that a ban should be considered.

NETTING AND TRAPPING

As noted in the Historical Review, fishing by nets and fixed engines was brought under control as a result of the 1861 and 1865 Acts. In 1868 it was reported by the Inspectors of Salmon Fisheries that over 2100 men were employed in the coastal and estuarial fisheries[15], today the estimated number has fallen to below 1200. Despite this these fisheries are characterised by the use of a variety of fishing gears, often associated with particular areas and whose origins are generally obscure. Their ethnological aspect has been extensively described by Geraint Jenkins[16] whilst a more succinct description of the gears currently in use is given by Russell et al[17].

The fisheries are predominantly found along the south-west, west and north-east coastlines and for convenience are described under four headings:

DRIFT NETTING

Apart from coracle netting, this method requires the net to be shot from a boat with one end attached to a floating buoy or staff and the other end to the boat. The net hangs from the surface with a floating head rope and weighted foot rope with either a single wall or armoured (trammel) netting. The principal fishery operates

between Spurn Head and Holy Island off the NE coast. Other fisheries are found in the SW in the Camel estuary and off the river Looe, off the Usk and Clwyd estuaries in Wales (in the latter they are known as sling nets), in the estuary of the Welsh Dee as trammel nets, in the NW near the Ribble and Lune (where they are referred to as whammel or hang nets) and off the Cumbrian coast. Specialised armoured nets are used in the remaining three coracle fisheries in the Towy, Taf and Teifi in SW Wales. On these rivers, the net is held between two coracles and is fished drifting downstream. Formerly the coracle was extensively used throughout Wales and the river Severn.

SEINE NETTING

The seine or draft net, paid out from a boat to enclose a body of water, is extensively used in the estuaries of the SW and Wales as well as to a lesser extent elsewhere eg Poole and Christchurch harbours on the south coast and the river Lune in the NW. Similar to the seine is the wade net, operated by two men who enclose a body of water by walking the net and landing it. It is of necessity relatively short and its use is confined to the S Wales coast.

PUSH NETTING

There remain only two types in use, the lave and haaf or heave net. They are both fished by one man, with the lave net used in shallow water and the haaf net in deeper chest high water. The lave or dip net is held on a Y-shaped frame with the fisherman holding the hand-staff which supports the arms of the Y. The haaf net is much bigger, up to 18 feet wide, with the net supported by a horizontal beam and three vertical sticks. The lave net is found principally in the Severn estuary but also in the Parrett, Wye, Leven and River Kent estuaries, whilst the haaf net is fished mainly in the Solway Firth (in both the English and Scottish jurisdictions) but also in the Lune estuary.

FIXED ENGINES

These vary in form but their common feature is that they are fixed structures attached to the ground. They can be particularly effective in taking salmon and in consequence have been strictly regulated. Off the NE coast there are two types: in Northumbria it is the T-net, which comprises a leader set at an angle to the shore at the end of which are two traps with funnel entrances. In Yorkshire T and J-nets are used, but these have no traps and are set from the shore in a J or P configuration. The Bristol Channel is the only location where the putcher is fished; it is a conical shaped basket traditionally made from willow and fished in tiered ranks to form a weir and set at an angle to the ebb and flow of the current. A possible precursor to the putcher is the putt which is much larger, conical shaped but more finely woven enabling a wide range of species from shrimps to salmon to be caught. It is now found only in the Severn estuary. Both of these instruments operate under Certificates of Privilege. A unique form of fixed engine in England and Wales, which remains in use, is the compass net, found in the Daucleddau estuary in West Wales. It is boat mounted and set in a V-shaped cantilevered frame which operates over the side of the boat. The boat is held stationary across the current by poles driven into the river bed. Until 1990 this method was also used in the Severn, which is considered the home of this type of fishing, but here

the boats were kept on station by a steel hawser. Interestingly, whilst the Severn stop nets as they are called are regarded as fixed engines the compass nets are not. At one time as many as 37 stop boats operated under Certificates of Privilege in the lower Wye as well as a further number in the Usk estuary. Another fixed engine right that is no longer exercised is the fishing weir on the river Avon in Devon, it is now owned by the EA and has not been used since 1983. In N Devon outside the estuary of the river Lyn is a fish trap which remains in operation, as well as a small basket trap on the river Lledr, a tributary of the river Conway in N Wales. On the rivers Eden and Derwent in the NW are two cribs which are formed by buttresses set across the river and between which are set traps with in-scales. The Eden trap dates from the 12th century. Another type of fixed trap that continues in use is the fishing baulk on the Esk, where it is known as a garth; formerly they were also found on the Lune.

It has already been noted that participation in the net and fixed engine fishery has declined since the last century and this has continued in more recent times, with the number of licences issued falling by 30% in the period 1962-1994 if the NE coast fishery is excluded, although even here it is anticipated that there will be a 50% reduction in the number of licences issued in the period 1992 to 1998[18]. Three factors are responsible for the decline in net and fixed engine fishing: firstly sociological, in some localities the same family operated the fishery over generations, but there is now alternative employment and a variety of leisure activities which has resulted in reduced recruitment by either natural successors or outsiders. Secondly, the exponential increase in the production of farmed salmon in recent decades has meant that the real price of salmon has fallen by more than 50% in real terms since the 1970s as shown in figure 1 whilst expenditure associated with fishing has increased.

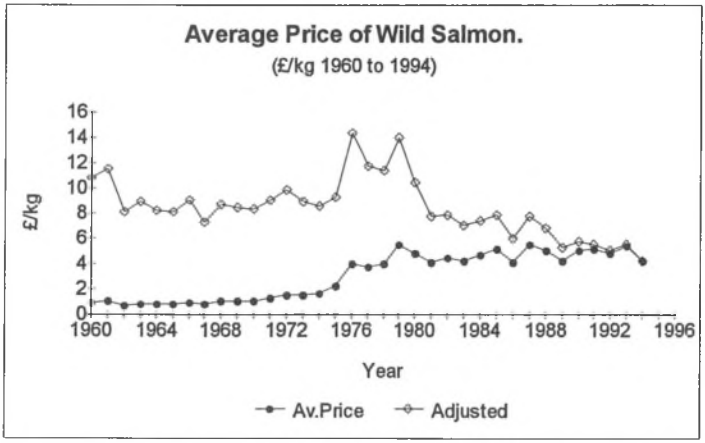

Figure 1. Average Price of Wild Salmon (£/kg) as sold by the Fisherman - 1960 to 1994 (Source:Jos Johnston and Sons, Montrose)

Finally, fishing effort has reduced as a result of regulation to accommodate diminishing runs brought about by either adverse environmental conditions or overexploitation. Private initiatives to further reduce fishing effort beyond that legally authorised are limited by the public right of fishing in tidal waters. There is some precedent for the purchase of the privately owned fisheries around the coast such as the Usk Stop Net Trust, but in recent years only occasional 'buy-outs' have been undertaken eg the Avon fishing weir in Devon. Some fishing rights lie dormant such as the fixed engines formerly operating in the NW, the Severn estuary or on the lower Wye. There is however scope to 'buy-back' fishing rights, ie payment to fishermen for not exercising their licences, and this was first undertaken on the Taw and Torridge in 1988 and the Camel in 1989. It remains to be seen whether the ongoing decline in estuarial fishing will eventually bring about a demonstrable increase in spawning escapement or whether it will be considered necessary by private interests to accelerate the process by implementing 'buy-back' schemes or the purchase of private rights.

MIXED STOCK FISHERIES

The development of the West Greenland fishery which started in 1957, followed by the Faroese fishery in the 1970s, resulted in the taking of salmon originating in countries in the NW and NE Atlantic. Because these fisheries are derived from migrants from a number of individual rivers the significance of fishing over these mixed stocks on each contributing river stock cannot be assessed without continuous scientific investigation. These developments provided the impetus for a diplomatic conference which adopted the final version of the Convention for the Conservation of Salmon in the North Atlantic Ocean. The Convention came into force in 1983 and under it the North Atlantic Salmon Conservation Organisation (NASCO) was established with the objective of *"contributing to the conservation, restoration, enhancement and rational management of salmon stocks in the North Atlantic Ocean"*. The participating parties to the Convention agreed that there should be no fishing beyond the 12 mile limit (except in specified areas at W Greenland and the Faroes). Since 1984 NASCO has provided a forum for negotiating catch quotas for the Greenland and Faroese fisheries. Agreed catch quotas for the Greenland fishery have existed since 1976 and for the 1993 and 1994 seasons the North Atlantic Salmon Fund (variously funded by organisations, individuals and some governments) had agreed compensation payments with the fishermen not to fish their quota, but since 1995 no agreement has been reached and in 1995 a catch of 83 tonnes was declared [19]. In 1997 the declared catch was 57 tonnes. In the case of the Faroese fishery the estimated exploitation rate of one, two and three sea winter fish from England and Wales is less than 1% for each age group[19]. Since 1991 NASF and the Faroese fishermen have agreed compensation for the quota not to be fished and after 1996 provision was made to negotiate a renewal. The NASCO Convention recognises the continuance of these two fisheries and it remains for catch quotas to be regularly negotiated based upon biological principles relevant to stocks in each contributing country.

As a result of collaboration between Ireland and Britain on a smolt tagging and recapture programme it has been established that there are mixed stock fisheries operating in the coastal waters of Northern Ireland and Ireland. Drift nets

operating up to 12 miles from the shore are taking salmon on their homeward migration to rivers in Great Britain. Tagging studies indicate that these nets take a significant, though, variable, proportion of the stock of salmon destined for English and Welsh rivers. For rivers in the south and west (e.g. Test, Taff and Dee) about 10-20% of the stock is thought to be taken by the Irish drift nets. For stocks from rivers in the north (e.g. Eden and Wear) the level of exploitation is likely to be less, perhaps 5%[20]. The SAC[19] recommended that "ministers continue to apply pressure on the Irish Government and on the Department of Agriculture, Northern Ireland to phase out fisheries, particularly the offshore drift net fisheries, which exploit fish returning to Great Britain". Some two years before, in 1995, the Irish Minister of the Marine had set up a Salmon Management Task Force whose remit inter alia was *"to examine and review the management of wild salmon in Ireland..."*. Following receipt of the Task Force report the Minister announced[21] the first phase of the implementation of its recommendations, including a reduction in the number of drift net licences to be issued, a reduction in the fishery area to be fished from 12 to 6 miles offshore and deferring the opening date for fishing. The fact that there was no commitment to the phasing out of this mixed stock fishery is a matter of concern to salmon conservationists[22]. Subsequently[23] the new Minister for the Marine and Natural Resources has undertaken to review the new conservation measures introduced for the 1997 season, indicating that these will continue together with development of further management initiatives.

Evidence of the high level of interception of salmon destined for Scotland's east coast rivers by the English NE coast fishery gave rise to a provision in the Salmon Act 1986 requiring a report on the salmon and sea trout fisheries off the east coast of England and Scotland. This was published in 1991[24] and addressed the issue of spawning escapement to the rivers whose stocks were intercepted by the English NE coast fishery. The report gave no evidence of an immediate threat to stocks, although it reported that about 80% of the catch was destined for Scottish rivers, but it did suggest that better management of individual east coast salmon stocks would result if the English drift net fishery were to come to an end. A gradual phase-out was considered desirable in order to prevent unnecessary hardship to existing licensees. There was also reference to a policy of encouraging movement of fishing effort from the off shore drift net fishery to inshore nets which would be more directed to local stocks. The NRA was asked by the Government to consider how the regulation of the NE coastal fishery could be changed to meet the report's recommendations. The NRA's response in 1992 included the phasing out the drift net fishery by not renewing licences as licensees left the fishery and undertook to investigate the possibility of increasing the number of inshore T and J-nets, giving priority to drift net licensees who surrendered their licences. A reducing Net Limitation Order came into force in 1993, and at the time of writing (1998) there has been a 37% reduction in the number of licences issued. In a further report[18] it is projected that by the year 2006 there may be around 30 nets remaining, exploiting ~10% of the mixed stock.

CATCHES

Notwithstanding their acknowledged shortcomings (see below) the use of catch statistics remain one of the principal management tools used when regulating rod and net fisheries and remain an accepted performance indicator for individual fisheries. In England and Wales there is a legal requirement on all rod and net fishermen to be licensed and to make a catch declaration including the submission of a nil return when no fish have been taken. For some rivers catch records extend back to the last century, but modern records are considered to start from 1951 when the River Boards were set up. Catch records for the period 1951 to1990 previously published by the river boards and their successors have been consolidated by MAFF and published[17]. Since there are disparate organisations responsible for publishing the data, there are both gaps and inconsistencies in the record as a result. The earlier autonomous catchment or regional authorities issued their own categories of rod licences, making subsequent consolidation of national statistics impossible. Since 1989 the NRA and now the EA publish annually comprehensive statistics for the whole of England and Wales.

Whilst catch statistics will remain an important component in determining management action, the EA and MAFF are committed to the development of spawning targets for each major salmon river. This will provide an estimate of the number of spawners required to maintain each fishery and any excess above this number will be available for exploitation. Spawning escapement targets for rivers in south west and north west England and Wales were recently made to support proposals for revised NLOs.

The use of declared catches in the interpretation of catch records must be undertaken in the full knowledge of their limitation. Harris[25] commented on the shortcomings of the collection and production of catch statistics and reviewed the pre-requisites for reliable statistics thus:

a. they must be accurate
b. the number of fishermen must be known
c. the proportion of fishermen making a return must be known
and d. there must be a degree of consistency between b and c above.

Inaccurate or incomplete catch data arises for several reasons; for example accuracy is compromised by under declaration induced by the imperatives of secrecy and financial considerations or the misidentification of salmon and sea trout. Another factor to be considered is the dramatic increase in the proportion of rod catch declarations made since the 1950s and the fact that rod fishing effort has increased substantially. Since the introduction nationally of catch return reminders in 1994, more than 70% of anglers now make a return, resulting in the declaration of about 90% of the total rod catch.

Angling Catches

Rod catches for salmon and grilse for the period 1952 to 1996 are shown below in figure 2.

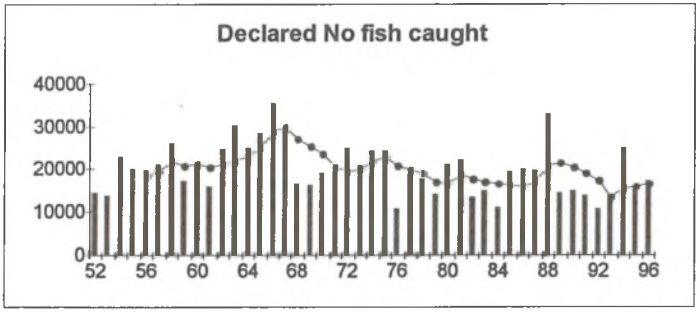

Figure 2: Declared Rod Catch of Salmon and Grilse between 1952 - 1996.

Bearing in mind the caution expressed above and, in particular, variable reporting rates, and increasing fishing effort coupled with improved fishing tackle, some tentative observations can be made about the catch record. Clearly the 1960's witnessed an increased abundance in stocks, which was reflected by the highest recorded catch in the period under review. It is also evident that extreme climatic conditions can have a dramatic effect upon catches, as seen in the 'dry years' of 1959, 1976 and 1989. Less equivocal is the qualitative change in catches that has taken place in the last 45 years. A number of rivers are characterised by runs in the early months of the year of large spring fish. Several reports[26,27&28] have catalogued the change in the sea age composition of catches, illustrating the progressive decline in both the number of spring fish and their proportion to the total catch since the 1950s.This decline, witnessed in many spring salmon fisheries, is illustrated for example in figure 3 for the Welsh Dee.

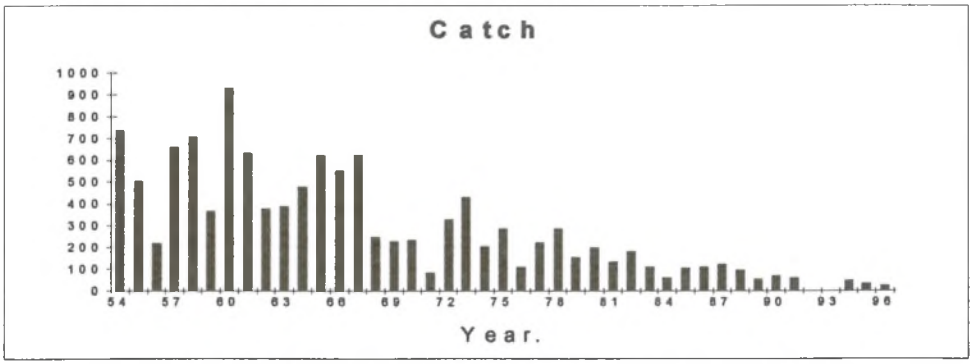

Figure 3: Welsh Dee - Spring Salmon Rod Catch between 1954-1996

It is reported[26,29&30] that in some instances the underlying decline in the stock of spring fish has been hastened and deepened by exploitation by the rod fishery eg the rivers Wye and Hampshire Avon, and as a consequence it has been necessary to conserve the remaining stocks by a number of initiatives including restrictions on rod fishing. Another factor responsible for the decline in spring stocks was the outbreak of UDN in the late 1960s which had a marked effect on some rivers eg Exe and Eden, from which spring stocks have not recovered but are being replaced by grilse. A cautionary note on the management of currently depleted spring stocks is made by Youngson[28].

Net and Fixed Engine Catches

From 1956 catch statistics were recorded for all fisheries and are illustrated in figure 4 below.

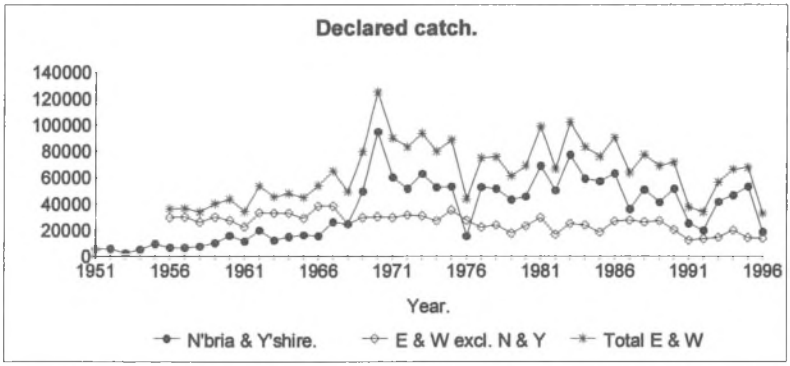

Figure 4: Declared Net and Fixed Engine Catch of Salmon and Grilse from 1951-1996

From 1968 the net and fixed engine fishery operating off the NE coast has dominated the reported catch for England and Wales. This arose because during the 1960s the introduction of synthetic net twine and eventually monofilament nets which dramatically improved the effectiveness of the fishing gear resulted in an increase in fishing effort. Earlier, reference was made to this mixed stock fishery, which led to persistent calls for its closure and this resulted in the enactment of section 39 of the Salmon Act 1986, which generated the report on the fishery. As a result, action was taken to reduce fishing effort and culminated inter alia in the introduction of a reducing NLO and reduced fishing times, and by 1996 the reported catch dropped to approximately 18600 fish, a level comparable to that of the early 1960s. Elsewhere catches have declined progressively since the 1960s, which in part arises from the aforementioned contraction of the estuarial and coastal fisheries, as reflected in the reduction of licences issued.

If the catch of the NE coast fishery is excluded from the England and Wales catch on the basis that the overwhelming proportion of fish caught are destined for Scotland's east coast rivers then the proportion of rod catch to the total catch declared by all methods is increasing as shown in figure 5 below.

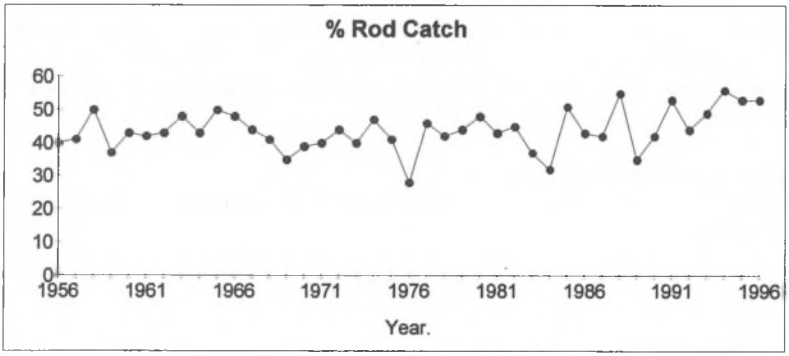

Figure 5: Number of Rod Caught Salmon Expressed as a Percentage of the Total Catch (excluding the NE Coast Net and Fixed Engine Catch)

Severn Estuary – Putts

LIMITING FACTORS AND RESOURCE MANAGEMENT

LIMITING FACTORS

It is a remarkable fact that in England and Wales, where virtually all rivers are heavily utilised and subject to significant abstraction regimes and extensive discharges (albeit of unsurpassed quality) as well as diffuse pollution from run-off, salmon are still found in so many rivers. It is testimony to the past and present work of public and private bodies as well as individuals that salmon now frequent more rivers than at any time since before the industrial revolution. A summary of the principal rivers exhibiting a staged recovery to their former status as salmon rivers is shown below.

THE STATUS OF SOME FORMER SALMON RIVERS

	Recovering[1]	Developing runs	Sightings/Captures
Tyne	1236[2]		
Wear	272[2]		
Tees		100[1]	
Y'shire Esk	32[2]		
Y'shire Ouse,			3
Swale, Ure,			*
Wharfe &			*
Trent			* +5[4]
Thames		22[3]	
Medway			*
Taff	67[2]		
Rhymney			*
Ely			*
Ebbw			*
Ogmore	50[2]		
Afan	10[2]		
Neath	16[2]		
Tawe	146[2]		
Avon (Bristol)			*

1 Reported rod catch 1995
2 Comparable or greater reported rod catch of sea trout
3 Reported rod catch 1996
4 Reported rod catch 1993
* Sightings/Captures recorded

Rivers with recovering runs present the most robust position, sometimes accompanied by significant catches of sea trout, those with developing runs are in the first precarious stage of recovery and finally there is a group of rivers whose

estuarial and river water quality occasionally permits fish to enter to penetrate into freshwater and be observed, usually leaping at obstructions, occasionally caught, or found dead.

Salmon rivers have, according to their current status, been classified in one of five categories by NASCO. The number of rivers in England and Wales in each category is shown below:

1	Lost	14
2	Maintained	5
3	Restored	17
4	Threatened with loss	4
5	Not threatened with loss	93

Pollution and obstructions are the principal causes for relegation to the first four categories. It is unclear whether some rivers in the east and south east of England supported salmon runs in the past.

The continuing environmental and other constraints confronting the maintenance and development of salmon stocks are well known and therefore reference is only made to some particular aspects.

ABSTRACTION AND POLLUTION

Since privatisation of the water industry in 1989, the increased capital expenditure associated with the treatment of industrial and domestic discharges has resulted in significant improvement to river water quality. Results are published giving details of what is currently known as the General Quality Assessment. At present this is based on chemical evaluation of river water samples, which has a particular limitation in that it is unlikely to detect episodic pollution incidents which can limit the maintenance or development of salmon stocks. However, when the last survey results for 1990/92 were published in 1994, notice was given that a biological assessment would be included in future to provide another 'window' on river water quality.

One of the more insidious pollutants affecting catchments with low buffering capacity is acid deposition caused partly by burning of fossil fuels. This can be exacerbated where deposition occurs in the presence of coniferous plantations which 'scour' the atmospheric acidic pollutants. The consequent reduced pH regime, and in some instances the associated release of aluminium ions from the underlying strata, impairs the hatching and growth of young salmon. This was dramatically demonstrated in the headwaters of the river Towy, an acid sensitive catchment, where an earlier fishery protection scheme established to mitigate the impact of a new reservoir, Llyn Brianne, by stocking with young salmon in nursery headwater streams singularly failed because of the then unknown impact of acidification and the situation was only subsequently ameliorated by a programme of liming. The universal and economic mitigation of acidified freshwaters remains a goal.

Whilst many of the historically polluted urban rivers are progressively recovering, assisted by the recession in heavy industry during the 1980s, it is ironical that many rural rivers have been degraded. The causes are various and apart from acidification include organic pollution from farms by slurry and silage, a particular problem in south west England, to which the former South West Water Authority responded in 1983 with the introduction of its "Farm Campaign". In addition the use of pesticides (pyrethroids and organo-phosphates) in livestock and arable farming is receiving continuing attention and in this context the work at CEFAS on the sublethal effects of pesticides on olfactory performance in salmonids is of particular interest.

Water abstraction and salmon fisheries continue to compete for available water resources. As late as the 1960s increasing demands for water was met by the provision of new water resources such as reservoirs which are inimical to salmon stocks. In recent years there has been a change of philosophy and in particular on the better use of existing resources through leakage control and metering. The NRA Water Resources Strategy published in 1993 refers to its aim as managing *"water resources to achieve the right balance between the needs of the environment and those of the abstractors"*. Radio-tracking studies of salmon migration are now providing new information on the relationship between fish movement and river flow. The utility of this information will in some cases depend upon the capacity to address 'licences of right' to abstract, which are deleteriously affecting some salmon rivers. There is currently a review of abstraction licensing by DETR and the need to be able to review abstraction may be made more significant by changes in flow regime associated with climate warming.

FISH PASSES AND BARRAGES

Although the provision of fish passes has been a legal requirement for many years, two problems in particular remain. The first concerns the former ministerial approval (now delegated to the EA under the 1995 Act) for a fish pass under section 9 of the 1975 Act. The approval of fish passes has not required the owner of a pass to demonstrate unhindered passage of salmon. The SAC report on fish passes[31] whilst recommending that the efficiency of all passes should be assessed recognised the difficulty or impracticability of measuring efficiency in many circumstances but suggested the use of fish counters or tagging and tracking studies. Secondly, some rivers which now contain migratory stock, had weirs or dams constructed when no salmon were present because they were polluted and it was not considered necessary at that time to construct fish passes. This situation has been compounded in some cases by the original purpose of the structure having ceased (eg milling, power generation etc) and it can be difficult or impossible to trace its ownership and therefore responsibility for the obstruction and the funding of a fish pass.

On a positive note the work of the Thames Salmon Trust should be mentioned. It has been successful in obtaining corporate sponsorship of £700,000 for the construction in the first phase of fish passes on 22 weirs downstream of Reading at a total cost of £1.1 million. In the second phase, which started in 1997,

construction of 17 passes on the river Kennet, a potential major salmon spawning tributary is required at an estimated cost of £1.3 million, which is to be funded by the Millennium Commission, Thames Salmon Trust and the EA. Another success was achieved by the Conwy Falls Trust who commissioned in 1994 the construction of a unique rock tunnel fish pass on the river Conwy at the Conwy Falls. This novel design which includes 25 pools inside the tunnel, surmounting an 11 metre high waterfall, opened up a further 40% of the catchment to migratory fish.

Elsewhere consideration is being given to the reintroduction of salmon where inter alia weirs are an impediment, such as on the river Dove a tributary of the river Trent. A feasibility study carried out in 1993[32] identified eight weirs on the Trent and seven on the Dove requiring remedial action. Poor water quality, particularly in the tidal reaches was also cited for the present small numbers of fish in parts of the Trent although conditions in the Dove and Derwent are suitable for the reestablishment of salmon.

A new impediment to salmon migration has been the construction of estuarial barrages on the rivers Tees, Tawe and shortly the river Taff (Cardiff Bay Barrage) which is under construction. Barrages either totally (Cardiff Bay & Tees) or partially (Tawe) exclude the tide, necessitating the construction of fish passes. An assessment of their effectiveness has begun and will continue with the completion of the Taff barrage. A recent review[33] has highlighted the very significant problems posed by estuarial barrages for the future salmon stocks of these rivers. This was highlighted by the failure to obtain consent for a proposed barrage across the Usk because the economic benefits were not sufficiently well justified to warrant the risks to conservation and fisheries including the well established salmon fishery. Their construction has identified our poor understanding of salmon behaviour in estuaries and the need to continue to investigate this by the use of radio and acoustic tagging of juvenile and adult salmon. At present tracking studies suggest that these obstructions impair the movements of both smolts and adults.

POACHING

The impact of poaching is difficult to evaluate objectively since information is obtained principally by the apprehension of poachers or from known incidents. Notwithstanding this it was evident by the mid 1970s that the traditional poaching on the spawning beds was giving way to the development of organised river netting which was greatly assisted by the ready availability of cheap and lightweight nets made of synthetic material. Another long standing problem, going back many decades was the taking of salmon by fishermen, ostensibly fishing for white fish and who were not licensed to take migratory fish. It is likely that this arose as a consequence of the separate institutional arrangements for managing the inshore and migratory fisheries and the absence of specific legislation to deal with this particular problem. The Salmon Act 1986 addressed these issues and also created the further offence of 'handling salmon in suspicious circumstances' making it illegal to buy salmon when there are grounds for suspecting that the fish was taken illegally. This new offence was energetically enforced, initially by the

South West Water Authority who launched their 'Buyer Beware' campaign which was rapidly taken up by most salmon producing regions. A recent review[8] of the effectiveness of the Act by the SAC concluded that poaching was less prevalent than hitherto although it was not possible to say to what extent this was because of the measures contained in the Act or because of the fact that salmon may be less abundant and poaching may not be as lucrative as hitherto. The Committee's conclusions on the particular problem confronting the Solway Firth have been referred to previously. The SAC considered that no major new legislation was needed but that some aspects of bailiffs' powers should be extended. It recommended that proposals for dealer licensing and carcass tagging should be prepared to prevent marketing of illegally taken salmon and in that context a ban on the sale of rod caught salmon should be considered. In recent years a number of reports, including some by the SAC, have suggested that carcass tagging be re-examined not only as a means of curtailing the sale of illegally caught fish, but also as an aid to improved catch statistics.

PREDATION

The impact of predation by fish eating birds on fish stocks is a cause of concern particularly amongst anglers and fishing proprietors. Three species have been the focus of concern in recent years, namely cormorants, goosanders and redbreasted mergansers, all of which have extended their range. These species are subject to protection under law and may only be killed under licence issued by either MAFF or WOAD if they can be showed to be causing serious damage to fisheries. Although shooting is regarded as a measure of last resort, when non-lethal scaring techniques and other measures have failed to protect fish stocks. The SAC[34] has identified priority research areas and recommended that whatever action is taken to control predation the consequences should be monitored. Research into aspects of avian predation and its impact on fish stocks has been commissioned by MAFF, DETR and the EA.

HABITAT DEGRADATION

Intensification of agriculture is not only a causative factor in the deterioration of water quality in some areas but over many years has prompted widespread field drainage to improve production. Accompanying this development has been an extensive programme of land drainage and flood protection schemes resulting in the straightening and canalising of river channels which induces faster run off and flash flooding. Amongst the consequences are the reduction in habitat diversity and enhanced silt loads which prevent optimal fish production by reducing intragravel survival of the salmon's youngest life stages. The provision of successful angling is also adversely affected. The problem of siltation coupled with a lack of maintenance of spawning beds has had a significant impact in particular on the chalk streams and rivers of southern England as well as rivers in the west country and elsewhere.

Fortunately the adverse environmental impact of drainage schemes on river habitats is now ameliorated by the need for cost/benefit evaluation, the reduction in the number of capital and maintenance schemes, the requirement for

environmental appraisal of schemes and the continuing consultation between scheme promoters and affected parties.

RESOURCE MANAGEMENT

RESEARCH

The demise of the near ubiquitous salmon fisheries of the eighteenth century was halted by the reforming legislation of the 1860s, however, recovery was not achieved by legislation alone, but also by the characteristic zeal of the19th century as exhibited by particular individuals. Amongst these were the Inspectors of Fisheries, such as Frank Buckland, who held office from 1867 until his death in 1880. He was particularly active in dealing with the widespread obstruction to fish passage by designing fish passes, as well as being a prominent fish culturist. Another Inspector appointed in 1881 was Thomas Henry Huxley, the promoter of science and dubbed Darwin's 'bulldog'. Both witnessed, investigated and reported on the widespread salmon disease which occurred from 1878 onwards and which some consider reappeared again in 1967 as UDN.

Technical support for the management of salmon was, until the 1960s, provided principally by MAFF's Salmon and Freshwater Fisheries Laboratory in Whitehall, although the former Freshwater Biological Association undertook research and hosted conferences for River Board staff. At that time university research into salmon was primarily focused on the Zoology Department of Liverpool University, lead by Dr Jack Jones. His legacy was not only his published research but also the appointment of some of his post-graduate students to a wide range of positions in the developing water industry. Later the MAFF laboratory moved to its present location at Lowestoft where it continues its programme of strategic research, operating now as the Centre for Environment, Fisheries and Aquaculture Science (CEFAS). In addition MAFF has primary responsibility for the investigation into fish diseases and their control. The advent of UDN in 1967 probably accelerated the development of a dedicated fish disease laboratory at Weymouth, where it undertakes research, monitoring and the provision of advice to the present day.

It is evident that some of the river authorities realised that their fishery management responsibilities would be assisted by the recruitment of biologists, modest numbers of whom were appointed. It was not however until the Water Act 1973, that specific powers under section 24(10) was given to the new water authorities to undertake and commission research. Subsequently research and development has become a cornerstone of management, subject to project management procedures. The research topics undertaken since the inception of the NRA is published annually and a summary of topics from 1989 to 1995 is available[35]. Whist the number dealing with salmon specifically is relatively small, those relating to water quality, water resources and flood defence are extensive, many of which are pertinent to the welfare of all fish stocks. The Environment Agency has established a national centre for salmon and trout, based at its Welsh Region in Cardiff. It provides focus and co-ordination for research into these species.

The Atlantic Salmon Trust also commissions research, indeed it was one of its primary objectives when it was established in 1967. Research can be expensive and therefore the Trust's limited research budget is used partly in pump priming or topping up projects that might not otherwise be undertaken. In addition it employs a full time biologist. It receives advice from its Honorary Scientific Advisory Panel comprising members representing many bodies responsible for salmon research and management.

INTEGRATED MANAGEMENT

Salmon fisheries are in competition with other river users and these can sometimes be antagonistic and it is imperative therefore that these should be managed in an integrated manner. This process has been developing since the creation of the river boards with the remit of successive bodies expanding initially from catchments to regions and finally to England and Wales. Notwithstanding the organisational changes that have taken place a river catchment remains the fundamental management unit and this was recognised when the concept of Catchment Management Planning (CMP) was introduced by the NRA. These plans result from a consultative process which aims to produce a consensual vision of a catchment The associated setting of objectives and standards are expressed in terms of water quality, water resources and physical features. The plans provide an agreed strategy for realising the environmental potential of a catchment within prevailing economic and political constraints. CMPs arise from the multi-use appraisal of a catchment which:-

- provides for the implementation of functional strategies
- identifies present and future uses
- sets objectives and standards for each use
- identifies interaction and potential conflicts between users
- sets out an action plan to achieve the agreed aims
- allocates responsibility for achieving actions together with an investment framework

The SAC observed[36] that it was not only necessary to have the appropriate regulatory framework to implement CMP, which currently exists only in England and Wales, but identified that integrated management could facilitate the development of methods to protect rivers such as the creation of riparian 'buffer zones'. These may be particularly beneficial in areas of intensive agriculture preventing bank erosion and stream damage by grazing animals and reducing inputs of fine solids and pollution by silage slurry and fertilisers.

By 1996 the majority of catchments had been the subject of a CMP which included specific actions in relation to salmon and their exploitation. In the same year the National Salmon Management Strategy was published which set out four objectives aimed at securing the well being of salmon stocks, improving catches and the associated economic returns to the fisheries. These objectives are: -

(i) Optimise the number of salmon returning to home water fisheries

(ii) Maintain and improve fitness and diversity of salmon stocks
(iii) Optimise the total economic value of surplus stocks
(iv) Ensure necessary costs are met by beneficiaries

The EA has determined that these will be addressed through Salmon Action Plans for each of the principal salmon rivers by the year 2001. A list of these is given in Appendix 2. Integral to these plans will be the setting of 'spawning targets', which provide an objective standard against which the status of the rivers salmon stock can be assessed. This concept has been promoted by NASCO because it facilitates the management of salmon in the international context including the setting of quotas for the Greenland and Faroese fisheries. Like the CMPs the delivery of the plan is collaborative and is developed through a consultative process. The plans will feed into the successor to the CMPs, the Local Environment Agency Plans (LEAPs) which seek to integrate all environmental responsibilities within the EA remit, including management of air, land and water. Of particular significance is the usefulness of LEAPs/SAPs as vehicles for river trusts and fishery associations to raise funds for habitat improvement works from the EU (Objective 5B) and the Lottery. In this way the EA and those with an interest in promoting conservation of river ecosystems, including stocks of salmon, can collaborate.

Severn Estuary - Putcher Rank

CONCLUSIONS

What conclusions can or should be drawn from a consideration of the salmon fisheries of England and Wales? Firstly, that the laws relating to salmon have a long history, representing the first concerned with wildlife conservation. Secondly, it is a matter of satisfaction that in a densely populated and intensively managed countryside salmon stocks have been conserved and in some instances re-established by a system unique to England and Wales of integrated river management. Thirdly, that whilst there is a comprehensive management strategy in place it needs to be accompanied by a legislative framework reflecting the situation at the end of the 20th century. In particular it is imperative to redefine the present nebulous duty "to maintain, improve and develop" fisheries and determine the future public role in the management of private and public fisheries, and not least the manner of its funding. In this context the Fisheries Ministers statement of the 7th of July 1997, announcing a review of "-- all aspects of existing policies and legislation on salmon and freshwater fisheries in England and Wales" is to be welcomed. Lastly, it is evident that finite public resources have prompted the establishment of 'fishery trusts' as exemplified by the Thames, South West Rivers, Eden Salmon Trusts and the Wye Foundation. These have a significant role to play, judged by their achievements to date.

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APPENDIX I

A Note on 19th Century River Pollution and Legislation

An account of river pollution and the legislation to regulate it is outwith the scope of this consideration, but it should be noted that apart from the Royal Commission appointed to enquire into Salmon Fisheries (England and Wales), published in 1861 other Commissions were set up to consider the problems of public health and river pollution brought about by a century of industrialisation. These included the Rivers Pollution Prevention Commissions of 1865-7 and 1868-74 and the Royal Sanitary Commission of 1869-71.These gave rise to The Public Health Act 1875 and the Rivers Pollution Prevention Act 1876; the former provided for drains and sewers to receive domestic waste (it was not envisaged that they should accommodate industrial waste), nevertheless sewage continued to be increasingly discharged to rivers. This was remedied by the 1876 Act which made it an offence to pollute streams by either domestic or trade effluents. However, the ability of the producers of industrial waste to use the sewers provided by the 1875 Act was tempered by the discretionary powers of local authorities to receive such waste as contained in the 1876 Act. Anthony Netboy in his book *'The Atlantic Salmon: A Vanishing Species?'* observed that "it is generally agreed that the River Pollution Act 1876 was a failure" and opined that " the condition of English and Welsh waterways, on the whole continued to decline". In 1898 a Royal Commission on Sewage and Sewage Disposal was appointed which issued nine reports up to 1915. Its recommendations for particular effluent standards and their dilution by receiving watercourses were adopted well into the present century.

The Royal Commission of 1860 in taking evidence on the impact of pollution on fisheries, particularly noted the consequences of mining, for example the total extinction of animal life in parts of the rivers Ystwyth and Rheidol in west Wales caused by lead mining as well as in Cornwall, where *" the salmon fisheries may be said to have been virtually destroyed by the mines"*. Other rivers affected by mining were the Tawe, Neath, Rhymney, Towy, Taff and South Tyne. Surprisingly to the present reader but perhaps not so in the context of the time when the report was written the following quote in respect of the situation in Cornwall exemplifies the attitude to the damage caused by mining, *"we cannot avoid the conclusion that to prefer the salmon rivers of Cornwall, which indeed are not of the first class, to the great mining interests that form the staple industry of that wealthy county, would be to preserve salmon at a preposterous cost"*.

A similar response was also made in respect of pollution by manufacturing and sewage, thus *"the interests of manufactures, nationally considered, must be deemed paramount to those of fisheries--"* and *"even the sewage---has not been found, in any great degree, detrimental to the salmon"*. This at a time when the last recorded salmon taken from the Thames was in 1833 and despite the construction of weirs on that river, these alone were not considered to be solely responsible for the elimination of Thames salmon[37].

APPENDIX 2

Timetable for the Production of Salmon Action Plans for Principal Rivers

Region	River	1996/97	1997/98	1998/99	1999/2000	2000/01
North West	Eden	*				
	Leven	*				
	Lune	*				
	Derwent		*			
	Ehen		*			
	Ribble		*			
	Wyre		*			
	Border Esk			*		
	Kent			*		
	Cumbrian Esk				*	
	Duddon				*	
North East	Coquet	*				
	Wear		*			
	Esk		*			
	Tees			*		
	Tyne			*		
Southern	Test/Itchen	*				
Midlands	Severn	*				
	Severn Estuary		*			
South West	Torridge	*				
	Avon (Hants)	*				
	Tamar	*				
	Lynher	*				
	Taw		*			
	Frome		*			
	Tavy		*			
	Camel			*		
	Piddle			*		
	Teign			*		
	Dart			*		
	Exe				*	
	Fowey				*	
	Lyn				*	
	Stour				*	
	Axe					*
	Plym					*
	Erme					*
	Avon(Devon)					*

Region	River	1996/97	1997/98	1998/99	1999/2000	2000/01
Thames	Thames		*			
Welsh	Dee	*				
	Mawddach	*				
	Teifi	*				
	Wye	*				
	Dwyfawr		*			
	Ogwen		*			
	Seiont/Gwyrfai		*			
	Twyi		*			
	Usk		*			
	Cleddau			*		
	Clwyd			*		
	Conwy			*		
	Dysynni			*		
	Taff			*		
	Tawe			*		
	Dyfi				*	
	Glaslyn/Dwyryd				*	
	Ogmore				*	
	Taf				*	
	Nevem					*
	Rheidol					*

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