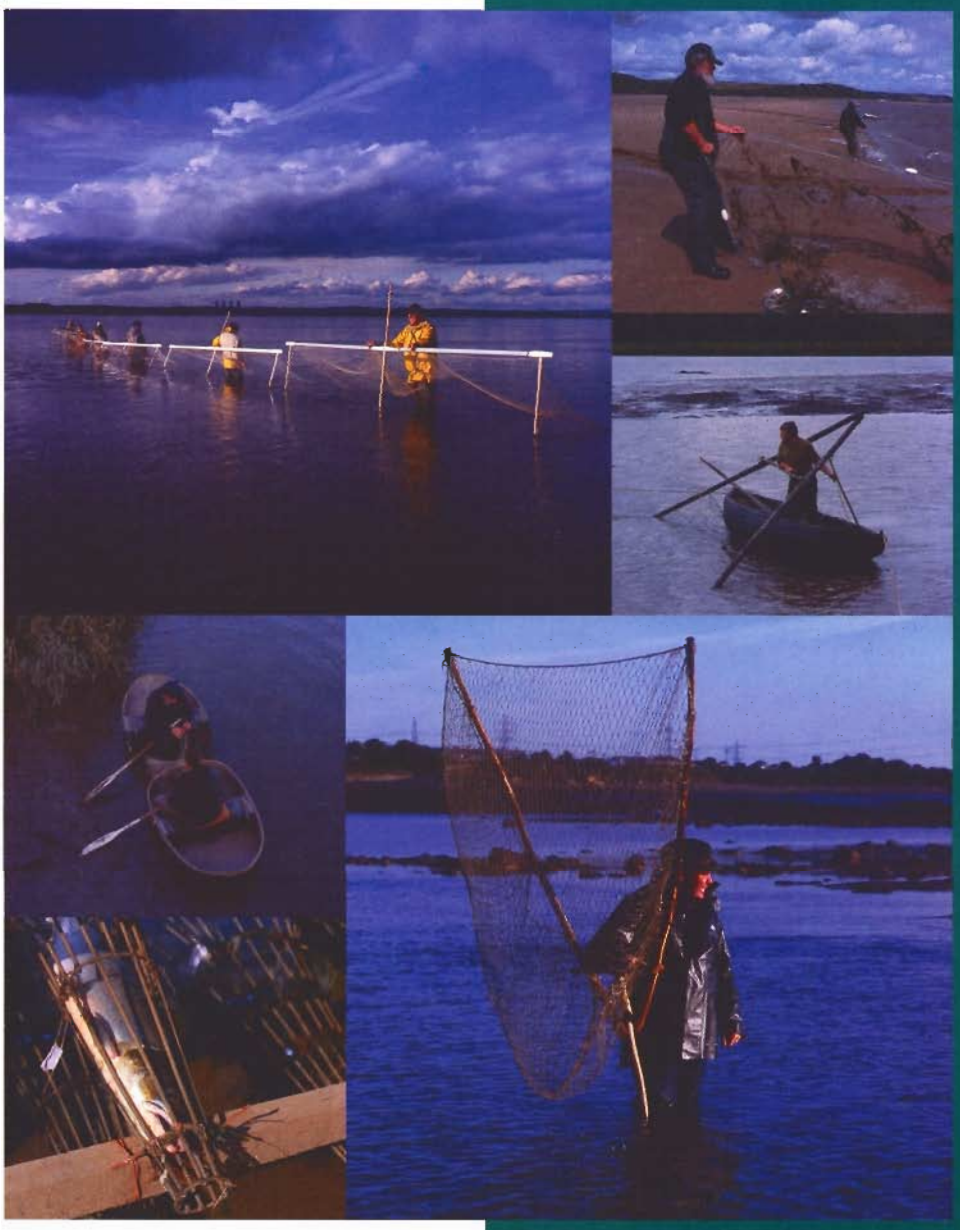
Annual Assessment of Salmon Stocks and Fisheries in England and Wales 2004



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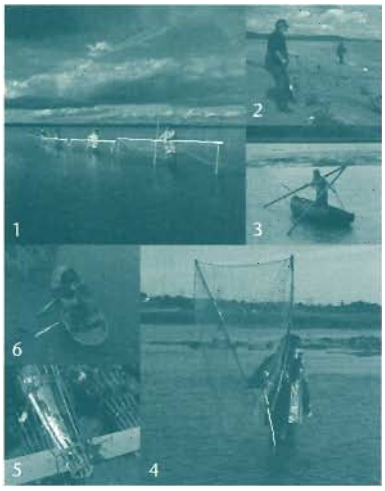

Front cover images (clockwise from top left)

1 - Solway Haaf nets (North West England)
2 - Tywi Estuary Seine nets (South West Wales)
3 - Cleddau Estuary Compass net (South West Wales)
4 - Lave netsman, Severn Estuary (Midlands Region)
5 - Severn Estuary Putcher and salmon (Midlands region)
6 - River Tywi Coracle netsmen (South West Wales)

Photographs by John Tickner Photography (www.johntickner.co.uk)

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SALMON STOCKS AND FISHERIES IN ENGLAND AND WALES, 2004

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CONTENTS

FOREWORD

This is the eighth annual report on the state of salmon stocks in England and Wales prepared by the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) and the Environment Agency (the Agency). Each annual report is designed to stand alone, so that the reader does not need to refer back to previous reports for background information. This means that much of the descriptive information in this report is similar to that in reports for previous years.

The main purpose of the report is to provide information on the status of salmon stocks and fisheries in England and Wales to the International Council for the Exploration of the Seas (ICES), which is used, in turn, to provide advice to the North Atlantic Salmon Conservation Organisation (NASCO). An account of the way in which ICES uses the national data presented in this report to make an assessment of the status of salmon stocks is presented in Section 4.

The objectives of NASCO are to contribute to *'the conservation, restoration, enhancement and rational management of salmon stocks'*. In particular, NASCO is responsible for negotiating the quotas for the salmon fisheries at West Greenland and Faroes. Annex 1 gives further information on NASCO and ICES.

The full list of information requested by NASCO from ICES for its annual meeting in 2005 is given at Annex 2. However, for this report, the pertinent requests relating to events in 2004 are to:

- *provide an overview of salmon catches and landings, including unreported catches by country and catch and release, and production of farmed and ranched salmon;*
- *describe the key events of the 2004 fisheries and the status of the stocks;*
- *evaluate the effects of management measures introduced in recent years;*
- *provide age-specific stock conservation limits for all stocks; and*
- *provide a compilation of tag releases.*

NASCO has previously indicated that it would like the information on the fisheries to relate to *catches, gear, effort, composition and origin of the catch (including escapees and sea-ranched fish), and rates of exploitation.* These headings have, therefore, been used in the appropriate sections of the report.

Over 500 copies of this report are disseminated to managers and fishermen so that this information is available to them at the earliest opportunity. The report is also available on the Agency and CEFAS websites (see inside front cover). **It must be noted that most of the data relating to 2004 are provisional and will not be finalised until complete catch data are obtained and records can be fully validated**. In compiling the report, the previous year's data are routinely updated. Where corrections have been made to data from earlier years, this is indicated by a footnote. Final data for 2004 will be presented in the Agency's annual publication of the Salmonid and Freshwater Fisheries Statistics, which will be published later in the year (e.g. Environment Agency, 2004).

A programme of Salmon Action Plans (SAPs) for the principal salmon rivers in England and Wales was completed in April 2004. SAPs are the means by which the Agency aims to meet the objectives of its National Salmon Management Strategy (launched in 1996) at a local level. Each SAP is the result of responses to a Consultation Document that reviewed stock and fishery status (including the use of conservation limits), identified factors limiting performance and listed a series of costed options to address these. These were circulated to outside interests to seek their opinion and support for the plan. The Final Plan contains an agreed list of actions that the Agency, in partnership with others, is committed to address in the five year lifetime of the plan. Progress against these actions is reviewed annually at both regional and national levels, but this is not included in this report.

In early 2004, the Agency undertook a salmon stock conservation review of the 62 principal salmon rivers in England and Wales. The review concluded that there is still much to be done towards ensuring that these rivers meet their conservation limits. Degradation of freshwater and estuarine environments is thought to be the key problem, together with lower marine survival. Significant changes are required in land management, particularly agriculture, which is impacting on channel structure, increasing siltation and reducing water quality. On some rivers, obstructions to migration and water abstraction schemes remain a significant problem requiring further investment. As a consequence, improvements are unlikely to be achieved solely through further reductions in exploitation, though reductions in legal exploitation are required in some rivers. Illegal exploitation must be kept at a low level. An Action Plan has been drawn up to take forward the Review's recommendations.

An improved and updated assessment of the effects of the Irish fishery has now been carried out. This shows that levels of exploitation of salmon from England and Wales in the Irish coastal fishery have declined following the introduction of new management measures in 1997. Exploitation on salmon from north east England in the Irish fishery appears to be negligible and, whilst exploitation on stocks from north west England and north Wales is currently low, levels increase further south in Wales and for rivers in south west and southern England.

A questionnaire survey was circulated with the 2002 report to assess the value of this report to various user groups (fisheries managers, riparian owners, anglers, netsmen, etc.) and to seek suggestions for possible improvements that could be incorporated in future. The vast majority of respondents considered that the report presented a clear overview of the current status of salmon stocks and fisheries in England and Wales, and a number of suggestions for improvements have been acted upon. We would welcome any further comments or suggestions for improvements to the report (see inside front cover for address details).

MAIN FEATURES OF REPORT FOR 2004

- The declared salmon catch by nets and fixed engines in 2004 was 59.1 tonnes (16,580 fish), a reduction of 10.1 tonnes on 2003 (69.2 tonnes; 17,219 fish) and less than half the average catch of the last five years. A major factor in the reduction over recent years has been the continued buy-out of net licences in England and Wales, particularly in the north-east coast drift net fishery in 2003.

- The declared rod catch (25,766 fish; 98.7 tonnes) was double that in 2003 and reflected good flows for most of the fishing season and improved fishing conditions.

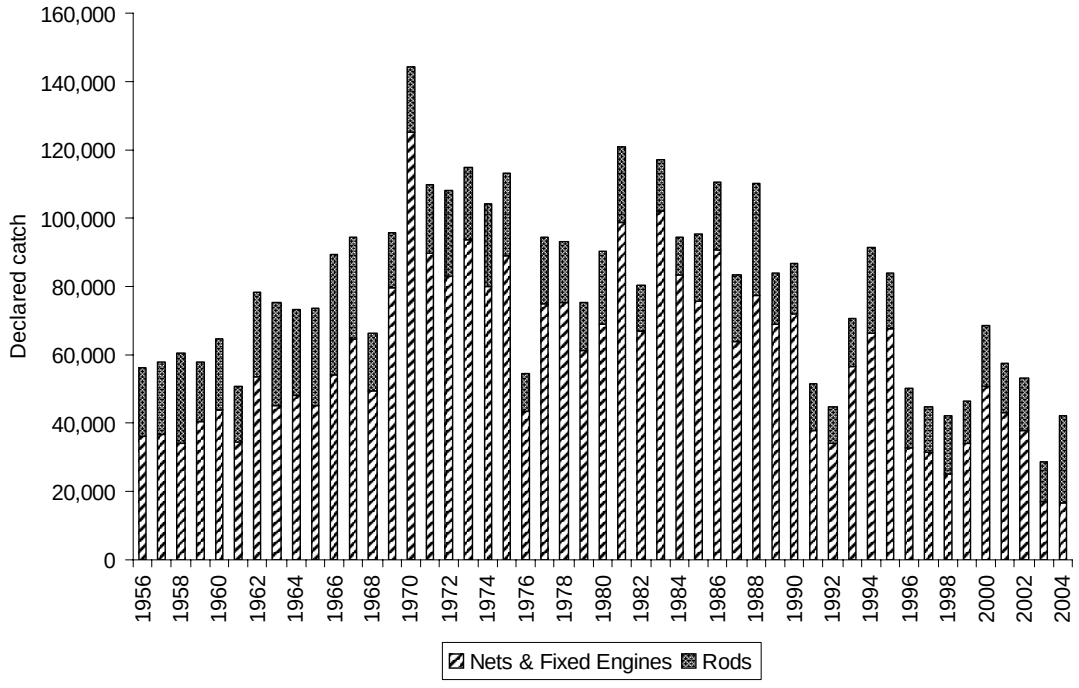
- Rod catches of multi-sea-winter fish in 2004 were 30% above the 5-year (1999-2003) average, whilst grilse catches were more than double the 5-year average.

- Most adult counts and returning stock estimates for 2004 were higher than the recent 5-year averages, and some were at the highest level recorded (Fowey, Lune, Caldew, Tees). Only the Thames, Frome and Itchen have not shown an increasing trend in recent years.

- Since the introduction of the national measures in 1999, anglers have been releasing a greater proportion of all fish caught, and of large salmon in particular. Some 12,379 rod-caught salmon (48% of the catch) were released in 2004, the highest number recorded.

- The programme initiated in 2003 to assess the incidence of fish farm escapees in catches taken by net and rod fisheries in England and Wales continued in 2004. Only one "suspect" fish was reported, and this was confirmed as unlikely to have originated in a fish farm.

- Spawning escapement was estimated to be above the conservation limit in 63% of rivers in England and Wales in 2004. However, compliance assessments taking trends into account indicate only 10 rivers that have a high probability of achieving their conservation limit, and the majority of salmon stocks in England and Wales continue to be in a depleted state.



Declared catch of salmon by nets & fixed engines and rods (including released fish) in England and Wales, 1956-2004. The north-east coast drift net partial buy-out occurred in 2003.

SUMMARY

This report presents a preliminary assessment of the state of salmon stocks and fisheries in England and Wales in 2004 to assist ICES in providing scientific advice to NASCO and to provide early feedback to fishery managers and anglers. The chief indicators of the state of salmon stocks are the catches taken by rod and net fisheries. The declared salmon catch for 2004 (including those fish released alive by anglers) is provisionally estimated at 157.8 tonnes, representing about 42,300 fish, and comprising 59.1 tonnes (~16,600 fish) by nets and fixed engines and 98.7 tonnes (~25,800 fish) by rods. Almost 12,400 fish caught by rods were released alive (49.2 tonnes), representing 48% of all the fish caught by number. These figures do not take account of catches of salmon which go unreported (including those taken illegally), and it is estimated that there may have been a total of 33 tonnes of additional fish caught in 2004.

Net catch

The declared net catch, which is dominated by drift net and T- and J-net fisheries in the North East Region, was 4% lower in 2004 than in 2003, and less than half the mean for the previous five years. The main reason for this was the partial buy-out of drift nets in the English north-east coast fishery (16 licensees fished in 2004 and 2003 compared to 69 in 2002), which now represents an 89% decline in the number of licences issued for drift nets in this fishery since a phase-out in the fishery commenced in 1992. Nationally, the number of licensed nets and fixed engines fell by 4.6% in 2004; the decline in drift net licences and a buy-out of seine nets in the south west being offset somewhat by an increase in licensed T- and J-nets in the North East and lave nets on the Severn. The number of days/tides fished by netsmen increased compared with 2003 in the North East (up 5%) and Midlands (up 35%) Regions, but fell in the South West (down 29%), Wales (down 11%) and the North West (down 4%) Regions. Catch per unit of fishing effort (CPUE) for net fisheries in 2004 was substantially higher than the recent period mean in the North East and South West regions, but around 60% lower in the Midlands (River Severn), due to one particular fishery not fishing during 2004.

Rod catch

The number of salmon rod licences issued in 2004 (~30,900) was 3% higher than in 2003, but the number of days declared to have been fished by anglers was only higher in the North East and North West Regions, being below the previous 5-year mean in all other regions. Despite this, the rod catch in 2004 (including released fish) was more than double that in 2003 (at ~25,800 salmon) and the highest since 1994 in all regions except the Midlands and South West. The (provisional) data presented in this report include many returns received as a result of the second reminder issued in February 2005.

Over the last seven years, the annual rod catch has fluctuated between about 11,500 and 25,800 fish without any evident trend. The catch of grilse in 2004 was more than twice the mean for the previous five years, whilst the catch of multi-sea-winter (MSW) salmon was 30% higher than the mean for the previous five years. This pattern was seen in all but the Midlands Region, where the grilse catch was slightly below average, and in South West Region, where the MSW catch was below average.

Stock status update

The increase in rod fishing effort in the North East and North West Regions, and good angling conditions through most of the 2004 season, make it difficult to draw general conclusions about current stock status from catches alone. The actual relationship between catch and stock abundance depends upon exploitation rates (i.e. the proportion of the salmon population taken in the catch - both retained fish and those released). This can be estimated where there is a fishery-independent measure of the salmon run, such as that obtained from fish counters. Data from a number of counters and traps in England and Wales show that runs into freshwater in 2004 were higher than those in 2003, and well above the recent 5-year mean (with the exception of the Thames). Exploitation rates in 2004 were, however, much higher than in 2003, with the exception of the Test and Frome. Therefore, salmon populations in these rivers were generally less abundant than suggested by the differences in catches alone.

Conservation limits (CL) for 64 rivers across England and Wales were revised in 2003 using lower estimates of marine survival that are thought to be more representative of survival rates over the past 20 years. In 2004, 39 of 62 rivers (63%) exceeded their CL, a marked improvement on 2003 (25%) and the highest in the timeseries. This reflects the good runs and angling conditions due to high flows for much of the fishing season in 2004. Overall, estimated egg deposition was above average (1994-2003), and only 12% of rivers in 2004 had less than half the egg deposition required to meet the CL. Though this suggests that the majority of salmon stocks in England and Wales are in a satisfactory state, the compliance assessment (which takes trends in egg deposition into account) indicates that only 10 rivers across England and Wales had a high probability of achieving their CL in 2004, whilst 33 failed compliance (41 rivers in 2003), and the remaining 20 rivers fell between a clear fail or pass. It is, therefore, too early to conclude that a stock recovery is underway.

Management measures

Viewed against historical data, current stock estimates and catches provide ongoing cause for concern and the conservation of salmon (especially early-run MSW fish) remains a priority. The number of licences issued for nets and fixed engines has continued to decline as a result of measures taken to reduce levels of exploitation and the declining commercial viability of some fisheries. Overall, the number of net licences issued has decreased by 61% between 1985 and 2004.

Concerns about the decline in the numbers of MSW salmon and particularly those returning early in the year ('spring salmon') resulted in national measures being introduced in 1999, banning netsmen from killing and, in most cases, fishing for salmon before 1 June in England and Wales. These measures have reduced the proportion of the net catch taken before June from a five-year average of 6.7% in the mid-1990's to 0.15%, on average, from 1999: all such fish are released.

A number of measures aimed at better management of this valuable resource were implemented or strengthened in England and Wales in 2004. Several net fisheries in England and Wales are being (or have been) phased out because they exploit migratory salmonids returning to more than one river (i.e. mixed stock fisheries). The most important recent development was that agreement was reached to buy out a substantial proportion of the north-east coast drift net fishery, reducing the number of operating licensees in 2003 to 16 from 69 in 2002. In 2004, new reducing net limitation orders (NLOs) were introduced for seine nets on the rivers Lynher, Tavy and Tamar in the South West Region (supported by a 10-year buy out), and a closure byelaw was confirmed in November 2004 for 10 fisheries in Wales. Arrangements have also been made to reduce netting effort in some fisheries by compensating netsmen not to fish for a particular period.

As with the net fisheries, national measures to safeguard spring salmon were introduced for rod fisheries in 1999 and continued through 2004. These banned the killing of salmon caught by anglers prior to 16 June and restricted the methods that they could use at this time to artificial flies or lures. The proportion of the rod catch taken before June fell from 11% over the period 1994-98 to 6% in 1999-2004, and these fish are now required to be released. The rod catch of spring salmon (caught before 1 June) in 2004 was the highest since 1997. Non-statutory restrictions on methods and fishing areas imposed by fishery owners and angling associations include weekly and seasonal bag limits, and there is a continued emphasis on encouraging anglers to return rod-caught fish. As a consequence, the proportion of salmon released by anglers increased steadily from 10% in 1993 to 42-44% over the three-year period 1999-2001; the proportion increased again to 56% in 2003, falling to 48% in 2004 (provisionally). The decrease in 2004 reflects the very large catches, when nearly 12,500 salmon were released, the highest number recorded. Tagging studies suggest that, if handled appropriately, the majority of released salmon can go on to spawn successfully.

Other, non-regulatory, factors may also have contributed to changes in exploitation rates in 2004. River flow is a key factor affecting angler success; the monthly river flows for 13 monitored rivers in England and Wales showed generally high flows throughout August, September and October (typically peak months for rod catches in many areas), which will have assisted salmon to move into and through rivers and provided good conditions for angling.

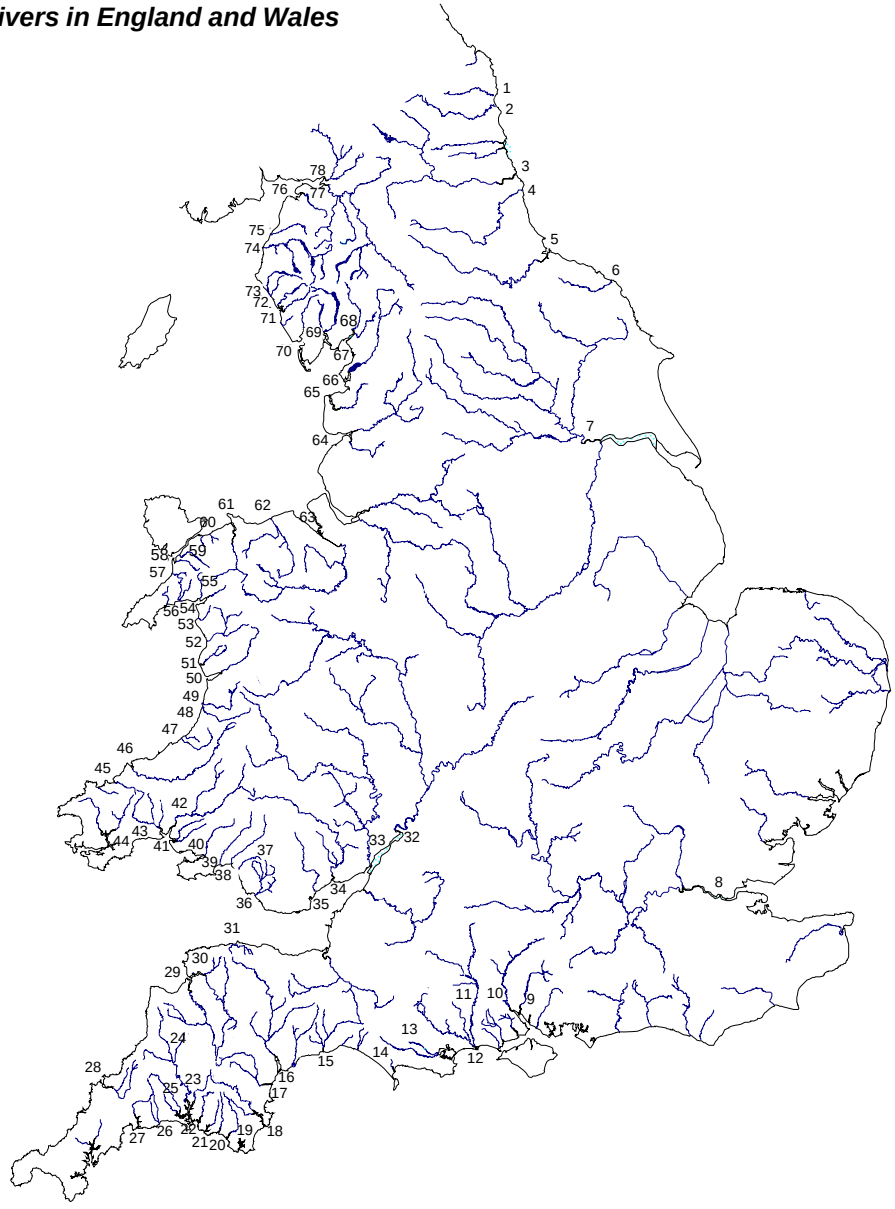
National overview

The ICES North Atlantic Salmon Working Group makes an annual assessment of the status of national stocks in the Northeast Atlantic (NEAC) area as a basis for advising managers. The pre-fishery abundance (PFA) of salmon for each country (defined as the number of 1SW salmon alive in the sea on January 1st in the first sea winter) is estimated. A description of the assessment process and the latest national assessment for stocks in England and Wales is included in this report (Section 4).

The NEAC PFA model endeavours to provide an interpretation of what the available catch and effort data may tell us about changes in the status of the total national stock of salmon over the past three decades. The model output suggests that, for salmon from rivers in England and Wales, the overall PFA has declined by just over 50% from the 1970s to the present time. The majority of this decline has been in the non-maturing (i.e. potential MSW) component of the PFA, which is thought to have declined by about 65%, whilst the maturing (i.e. potential grilse) component has declined by about 25%. It should be noted that these trends mask conflicting changes in individual river stocks. Many rivers have experienced more serious declines but these are obscured by the very substantial improvements in others. The results also suggest that there was a marked decline in PFA around 1990, which is consistent with the general perception of a decrease in the marine survival for many stocks around the North Atlantic around this time.

The estimated number of salmon returning to England and Wales and the total spawning escapement show similar trends to the PFA, although the declines are less marked due to the reductions in net exploitation both in distant water and homewater fisheries, and in rod fisheries. Thus, numbers of returning fish are estimated to have declined by about 35% between the 1970s and the present time, and the spawning escapement by about 30%. However, as with the PFA, the decline in MSW components has been at least twice that of 1SW (grilse) components. There was a slight improvement in numbers of returning fish and spawners in 2000 and 2001, followed by a decline in 2002 and 2003, but estimates suggest a slight improvement again in 2004.

Salmon rivers in England and Wales



Key

No.	River	No.	River	No.	River	No.	River
1	Aln	21	Yealm*	41	Gwendraeth Fawr	61	Conwy*
2	Coquet*	22	Plym*	42	Tywi*	62	Clwyd*
3	Tyne*	23	Tavy*	43	Taf*	63	Dee*$
4	Wear*	24	Tamar*	44	E & W Cleddau*	64	Ribble*
5	Tees*	25	Lynher*	45	Nevern*	65	Wyre*
6	Esk (Yorkshire)*	26	Looe	46	Teifi*$	66	Lune*
7	Ouse	27	Fowey*	47	Aeron	67	Kent*
8	Thames*	28	Camel*$	48	Ystwyth	68	Leven*
9	Itchen*$	29	Torridge*	49	Rheidol*	69	Crake*
10	Test*	30	Taw*	50	Dyfi*	70	Duddon*
11	Avon (Hants)*$	31	Lyn*	51	Dysynni*	71	Esk (Cumbria)*
12	Stour (Dorset)*	32	Severn*	52	Mawddach*	72	Irt*
13	Piddle*	33	Wye*$	53	Artro	73	Ehen & Calder*$
14	Frome*	34	Usk*$	54	Dwyryd*	74	Derwent*$
15	Axe*	35	Taff*	55	Glaslyn*	75	Ellen
16	Exe*	36	Ogmore*	56	Dwyfach & Dwyfawr*	76	Wampool
17	Teign*	37	Afan*	57	Llyfni	77	Eden*$
18	Dart*	38	Neath	58	Gwyrfai$	78	Esk (Border)*
19	Avon (Devon)*	39	Tawe*	59	Seiont*		
20	Erme*	40	Loughor*	60	Ogwen*		

Figure 1. Map of England and Wales, showing the main salmon rivers and denoting those (*) with a Salmon Action Plan (SAP, see page 6 for definition) and those ($) designated as Special Areas of Conservation (SAC) in which salmon must be maintained or restored to favourable conservation status (see Section 3.1.2)

REPORT ON SALMON FISHERIES IN 2004

1. Gear and fishing effort

1.1 Gear

Salmon are caught in a variety of nets and traps around the coasts of England and Wales. These comprise: gill nets, including drift, trammel and coracle nets; sweep nets, such as seine (draft, draw and wade) nets; fixed engines, which include T-nets, J-nets, stop (compass) nets, putcher ranks, traps, cribs (coops); and hand-held nets, which include haaf/heave and lave/dip nets. Brief descriptions of all these nets and fixed engines are given in Annex 3. The principal salmon rivers for which data are presented in this report are shown in Figure 1, and the types of gear used in each net fishery operating in 2004 are listed in Table 1.

There were no substantial changes in the types of gear used to capture salmon in England and Wales in 2004, although dip nets in the Parrett Estuary and fixed engines on the Avon and Lyn (weir and trap, respectively) in Devon are no longer being fished and drift nets have ceased to operate on the Cumbrian coast in North West England.

1.2 Effort

The restrictions on fishing introduced in England and Wales in 1999 to protect early-running 'spring' multi-sea-winter (MSW) salmon remained in force in 2004. Details of the restrictions imposed on net and rod fisheries are provided in Sections 1.2.1 and 1.2.2, respectively.

Levels of exploitation of migratory salmonids by both rods and nets in England and Wales are regulated by byelaws controlling the fishing gear that may be used, and where and when fishing may take place. Separate licences are required to use rods and nets. There is no restriction on the number of rod licences that may be issued, but the numbers of licences in most net fisheries are subject to Net Limitation Orders (NLOs) as noted in Table 1.

The regulatory measures provide an overall limit on the 'allowable' fishing effort. The single most important recent change was the north east coast partial buy out in 2003, in which 52 of the 69 licensees using drift nets along the coast of Northumberland and Yorkshire in 2002 were compensated for relinquishing their right to fish from 2003 onwards, in perpetuity. In 2004, 23 seine net licensees were bought out on the Rivers Tamar, Lynher and Tavy in southwest England. In addition to these restrictions, there will be annual variations in the amount that both netsmen and anglers actually fish (the 'utilised' effort), due to weather conditions, perceptions about the numbers of fish returning, and other factors. Netting effort has probably also been affected by the price of salmon, which has decreased in real terms over the past two decades due to the rapid expansion in the production of farmed salmon, and the increased costs of net licences, fuel and fishing gear. There are indications that the limited availability of wild salmon for sale is once again enhancing their market value. Changes in costs and the unwillingness on the part of some anglers to practice compulsory catch-and-release may also have affected the take-up of rod licences and angling effort.

For rod fisheries, river flow is a key factor affecting angler effort. Figure 2 shows the monthly river flows for 13 rivers in England and Wales expressed as a percentage of the long-term average for the same month. Overall, flows were below the long-term average for most rivers between March and July in 2004, and above the long-term average in August, September and October. Low flows in the spring and early summer were associated with reduced angling effort, though only on the River Tywi were releases of water authorised from Llyn Brianne in June to assist fish migration, and no

Table 1. Allowable and utilised effort for the principal salmon net fisheries in England and Wales in 2004

Region	River/ Fishery	Method	No. lics	NLO	Days available *	Allowable effort net days **	Utilised effort net days	Utilised effort net tides	% days utilised #	Av. day/lic.
NE	N Coastal (N)	Drift & T	5	X	113	565 }				
	N Coastal (N)	Drift	5	X	65	325 }	1,137		35	37
	N Coastal (N) [1]	T	21	25	113	2,373 }				
	N Coastal (S)	Drift	4	X	65	260	202		78	51
	N Coastal (S) [1]	T	1	1	113	113	9		8	9
	Y Coastal	Drift	2	X	65	130	75		58	38
	Y Coastal [1]	T or J	28	50	113	3,164	873		28	31
	NE Region		**66**			**6,930**	**2,296**		**33**	
SW	Avon & Stour	Seine	5	4	52	260		163	45	23
	Poole Harbour	Seine	1	1	52	52		26	36	19
	Exe	Seine	10	18	64	1,152		277	17	20
	Teign [1]	Seine	6	6	142	852		293	25	35
	Dart [1]	Seine	13	13	128	1,664		614	26	34
	Camel [2]	Drift	7	7	26	182		16	6	2
	Fowey [1,3]	Seine	2	2	65	130		23	13	8
	Taw/Torridge	Seine	3	X	52	156		110	50	26
	SW Region		**47**			**4,448**		**1,522**	**24**	
Midlands	Severn	Putchers	5		75	375	343	91	69	
	Severn	Seine	3	4	75	300		81	19	19
	Severn	Lave	23		75	1,725		841	35	26
	Midlands region		**31**			**2,400**	**343**	**922**	**42**	
Wales	Tywi [1]	Seine	9	9	128	1,152		553	34	44
	Tywi [1]	Coracles	6	12	128	1,536		259	12	31
	Taf	Coracles	1	1	128	128		15	8	11
	Taf	Wade	1	1	128	128		33	18	24
	E/W Cleddau	Compass	7	6	75	525		110	15	11
	Nevern [1]	Seine	0	1	129	129		0	0	0
	Teifi [1]	Seine	3	4	129	516		33	5	8
	Teifi [1]	Coracles	10	11	129	1,419		295	15	21
	Dyfi [1]	Seine	3	3	130	390		89	16	21
	Mawddach	Seine	1	3	75	225		47	15	34
	Conwy	Seine	2	3	75	225		82	26	29
	Dee	Trammel	4	4	51	204		140	49	25
	Dee	Seine	11	16	51	561		411	52	27
	Welsh Region		**58**			**7,138**		**2,067**	**21**	
NW	Ribble	Drift	6	6	78	468		171	26	20
	Lune	Haaf	12	12	78	936		556	42	33
	Lune	Drift	7	7	78	546		306	40	31
	Lune	Seine	1	0	78	78		42	38	30
	Kent	Lave	8	8	78	624		103	12	9
	Leven	Lave	4	0	51	204		83	29	15
	Eden & Esk	Haaf	103	155	78	12,090		3,767	22	26
	Eden & Esk	Coops	3		84	252		8	2	2
	NW Region		**144**			**15,198**		**5,036**	**24**	

Notes: National spring salmon byelaws apply - all net fisheries closed until June 1.
(Note several sea trout fisheries exempted from byelaws, but all salmon caught before June 1 to be returned).
NLO refers to number of nets allowed under the terms of the net limitation order for that fishery.
In calculating the days available, any day, or part day, on which fishing has been allowed is included.
For fisheries in which utilised effort is recorded in terms of tides fished (Wales, Midlands, SW and NW Regions), the proportion of the available effort used has been estimated by assuming that an average of 1.4 tides have been fished per day.

Key: * *Days available have been adjusted to take account of partial buy-off arrangements.*
** *Allowable effort is calculated by multiplying the days available by the number of nets permitted under the NLO, except where the number of licences exceeds the NLO, in which case the higher figure is used.*
\# *Expressed as days utilised (i.e. tide data x 1.4).*
X Denotes reducing NLO - fishery being phased out as existing licensees leave the fishery.
[1] *Sea trout fisheries - exempted from national spring salmon byelaws (all salmon caught before 1 June to be released).*
[2] *Buy-off 1 July to 31 August.*
[3] *Buy-off 2 March to 15 June.*

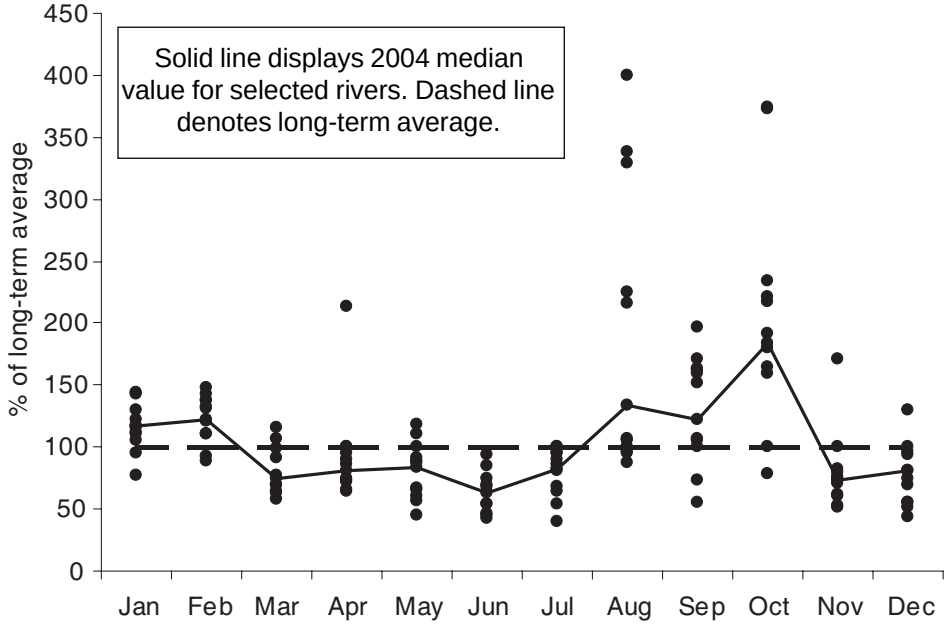


Figure 2. Monthly mean river flows (cubic metres per second) in 2004 for 13 rivers (South Tyne, Tees, Itchen, Avon, Exe, Taw, Severn, Wye, Cynon, Teifi, Dee, Lune and Eden) in England and Wales, expressed as a percentage of the long term average for the same month. (Data supplied by Centre for Ecology and Hydrology). The long term average is calculated for the available time series, which varies from river to river, but is in the range of 25-40 years.

mortalities attributable to poor water quality were reported in estuaries (Tyne, etc.) in 2004. Though heavy rain in some areas (NE, SW, Wales, NW) in August and October may have led to reduced fishing opportunities, there was sufficient rain from the end of July onwards to raise levels in many rivers and encourage fish to run and possibly avoid estuary/coastal nets. As a result, conditions for salmon angling were generally good and likely to have resulted in both increased effort and increases in exploitation. Therefore, the use of rod catch as a measure of salmon abundance may not be an accurate indication of stock size and, by itself, is likely to over-estimate salmon numbers. Around 17,428 salmon were caught in September and October 2004 compared with 9,251 and 7,061 respectively in the generally dry autumns of 2002 and 2003.

1.2.1 Allowable effort in net fisheries

The various fishing gears used to catch salmon in England and Wales have been grouped into broad categories based on their method of capture (see definitions in the footnote to Table 2 and descriptions in Annex 3). Since 1985, there has been a steady decline in the numbers of netting licences issued for gill nets, sweep nets and hand-held nets and, since 1990, for fixed engines, as a result of measures taken to reduce levels of exploitation (especially in mixed stock fisheries, see section 2.1.3) and the declining commercial viability of some fisheries. The total number of licences issued decreased by 4.6% in 2004 (Tables 1 and 2, and Figure 3), the large reduction in drift net licences (113 in 2002; 58 in 2003; 36 in 2004) and the buyout of the 23 Tamar/Lynher/Tavy seine nets being offset to some extent by an increase in licensed fixed engines on the north east coast (32 in 2002; 50 in 2004) and small increases elsewhere. Overall, the number of net licences issued has decreased by 61% between 1985 and 2004.

The national measures to safeguard spring salmon, introduced in 1999, continued to apply in 2004. Under these measures, netsmen are banned from killing, and in most cases fishing for, salmon before 1 June. There are derogations that allow fishing in some areas where netting is predominantly for sea trout, on the basis that any salmon caught are returned alive (see Table 1).

Table 2. Numbers of rod licences (1994-2004) and net and fixed engine licences (1983-2004) issued in England and Wales

Year	Rod licences		Gear Type					Total net licences
	Short-term	Annual	Gill	Sweep	Hand-held	Fixed Engines	Combined drift/T net #	
1983			232	209	333	74	75	848
1984			226	223	354	74	75	877
1985			223	230	375	69	75	897
1986			220	221	368	64	75	873
1987			213	206	352	68	75	839
1988			210	212	284	70	75	776
1989			201	199	282	75	75	757
1990			200	204	292	69	75	765
1991			199	187	264	66	75	716
1992			203	158	267	65	75	693
1993			187	151	259	55	36	652
1994	10,637	26,641	177	158	257	53	30	645
1995	9,992	24,949	163	156	249	47	29	615
1996	12,508	22,773	151	132	232	42	29	557
1997	11,640	21,146	139	131	231	35	27	536
1998	11,364	21,161	130	129	196	35	26	490
1999	10,709	18,423	120	109	178	30	26	437
2000	10,916	19,223	110	103	158	32	25	403
2001	9,434	14,916	113	99	143	33	24	388
2002	10,039	19,368	113	94	147	32	24	386
2003	8,683	21,253	58	96	160	57	5	371
2004 *	**10,272**	**20,622**	**57**	**75**	**157**	**65**	**5**	**354**

Notes: Rod short-term licences are for 1 or 8 days; annual licences are valid from the date of issue to 31 March following.
Gill nets include: drift, trammel, sling and coracle nets.
Sweep nets include: seine (draft and draw) and wade nets.
Hand-held nets include: haaf/heave and lave/dip nets.
Fixed engines include: T-nets, J-nets, stop (compass) nets, putcher ranks, traps, weirs and cribs (coops).
East Anglian coastal nets are not included, as they are targeted primarily at sea trout and catch few salmon.
Key: # Combined drift/T net licences (issued in Northumbria (Northern area)) have been included in the gill net totals.
** Provisional*

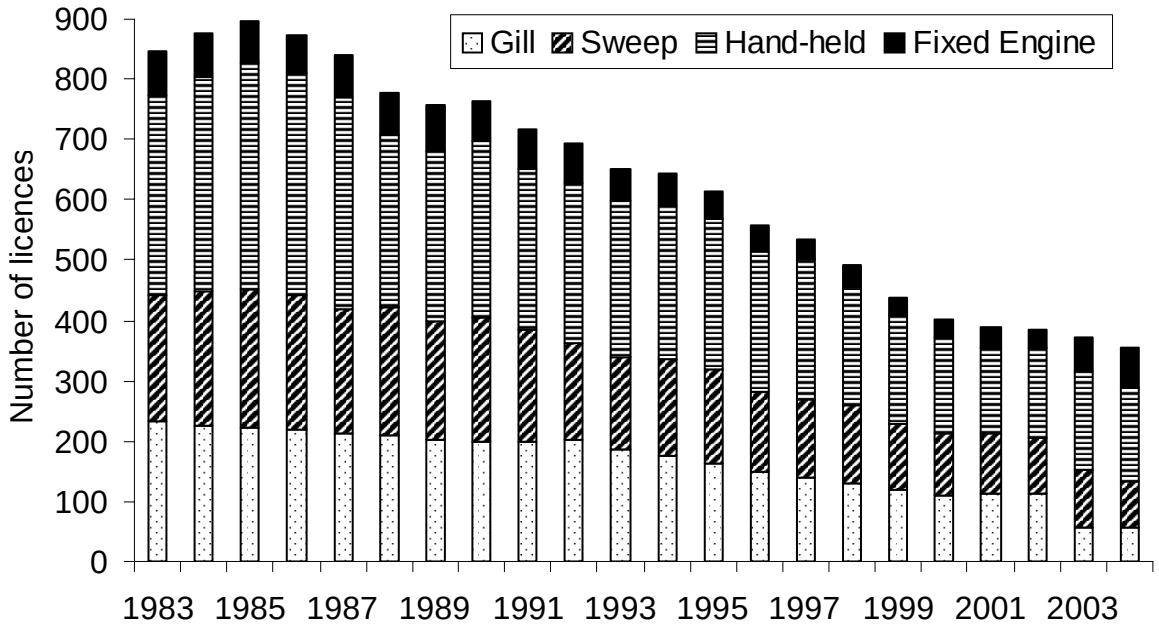


Figure 3. Numbers of salmon net and fixed engine licences issued in England and Wales, 1983-2004

A number of net fisheries in England and Wales are being (or have been) phased out because they exploit migratory salmonids returning to more than one river (i.e. mixed stock fisheries). Licence numbers are being reduced as fishermen retire from the fishery. The phase out of the north east coast drift net fishery was accelerated by a compensation scheme (details in Section 2.1.3). Progress with those phase-outs that were incomplete in 2004 is summarised in the text table below:

Fishery	Netting method	Start of phase out	Number of nets: before start	in 2004	Reduction
North East Coast	drift nets	1993	142	16	89%
Anglian Coast	coastal nets	1996	59	40	32%
River Taw/Torridge	seine nets	2002	14	3	79%

In 2004, a reducing NLO was introduced in the rivers Lynher, Tavy and Tamar in southwest England. This reduced the total number of seine nets operating in this joint estuary from 23 to zero for a 10 year period, and was supported by a buy-out of all nets for 10 years. In Wales, 10 fisheries were closed by bye-laws, in some cases following a phase-out of effort: Usk drift nets; South Lleyn - seine; North Lleyn - seine; South Menai Strait (Seiont & Braint) - seine; North Menai Strait (Ogwen & Aber) - seine; North Anglesey - seine; Clwyd – sling; Dwyfawr - seine; West Wales Coastal – wade and West Wales Coastal – seine. The remaining drift net on the Cumbrian coast was bought out in perpetuity using joint private/public funding in 2004.

Rank of putcher traps in the Severn Estuary

Arrangements were made to reduce netting effort in the following fisheries in 2004 (as in earlier years) by compensating netsmen not to fish for the periods shown, or to release fish alive:

River/ Fishery	Method	Period without netting (starting year) (*full season in parentheses*)	Funding agency
Tavy	seine nets	complete season (commenced 2004) (*1 June - 31 August*)	South West Water plc, English Nature, Maristowe Estate, Lynher River Association, and Tamar & Tributaries Fisheries Association (10-year buy out)
Tamar	seine nets	complete season (commenced 2004) (*1 June - 31 August*)	
Lynher	seine nets	complete season (commenced 2004) (*1 June - 31 August*)	
Fowey	seine nets	2 March - 15 June (*2 March - 31 August*) (Varying measures have applied on the above rivers since 1997)	South West Water plc
Camel	drift nets	1 August - 31 August (commenced 2002) (*1 June - 31 August*)	Environment Agency
Lyn	fish trap	complete season (in perpetuity) (commenced 2003) (*1 June - 31 August*)	Environment Agency
Cumbrian coast	drift nets	complete season (in perpetuity) (3 of 4 nets commenced 1999) (4th net commenced 2004) (*1 June - 31 August*)	Derwent Owners Association Local owners/angling interests and UK Government
Avon and Stour (Christchurch Harbour)	seine nets	All salmon caught to be released (scheme operating since 1997) (*1 June - 31 July*)	
Severn Estuary (Usk)	1 putcher rank	complete season (for 5 years) (commenced 2000) (*1 June – 31 August*)	Local owners/angling interests, NASF & River Wye & Usk Foundation
Severn Estuary (Severn)	1 putcher rank	complete season (commenced 2004) (*1 June – 31 August*)	Environment Agency
Severn Estuary (Wye)	1 putcher rank	complete season (for 5 years) (commenced 2000) (*1 June – 15 August*)	Environment Agency

Notes: NASF = North Atlantic Salmon Fund.
National byelaw - salmon season start delayed until 1 June from 2000.
Fowey buy-off - fishing from 2 March to 31 May for sea trout only.
Severn Estuary - Usk drift nets and putcher fisheries bought-out from 2000.

There have thus been substantial reductions in net fisheries in England and Wales over the past 10 years as a result of various controls and restrictions; details are summarised in Tables 3a and 3b.

1.2.2 Allowable effort in rod fisheries

The national measures to safeguard spring salmon, introduced in 1999, continued to apply in 2004. These ban the killing of salmon caught by anglers prior to 16 June and restrict the methods that they can use at this time to artificial flies or lures.

No other statutory effort restrictions were imposed on rod fisheries in 2004, although trial season extensions continued to apply on a small number of rivers in North Wales and on Anglesey. Rivers on Anglesey and the Llyn Peninsula remained open until 17 November, but no salmon were caught as flows were generally too high for angling. A number of other rivers in North Wales (Dwyryd, Conwy, Ogwen, Seiont and Dyfi) remained open until 31 October, with catch and release (C&R) beyond the normal closing date. Though fishing pressure was generally light and flows were high during the extension period, a total of 20 salmon were caught and returned. A trial extension on the Exe in Devon from 30 September to 14 October, restricted to fly only and with catch and release, resulted in an additional 63 salmon being caught.

A catch and release byelaw introduced on 16 June 2003 for the Leven and Crake upstream of the Leven viaduct near Ulverston continued in 2004. This required that salmon caught there by rods must be returned.

New byelaws came into force on the River Wye on 1 September 2003 (expire 31 December 2008), which delayed the start of the salmon season until 3 March (from 26 January), allowed spinning from the opening day until 31 August, and banned bait fishing at all times.

Non-statutory restrictions on methods and fishing areas are known to be imposed by some fishery owners and angling associations, but there is no national record of these. For example, anglers on a number of the southern chalkstream rivers are encouraged to return all rod-caught fish, and 609 salmon were returned in 2004.

1.2.3 Utilised effort in net fisheries

Table 1 presents data on utilised effort for salmon net fisheries in England and Wales in 2004. A new national net catch return system was introduced in 2001 in all regions, except the North East. This requires netsmen to report catch and effort data monthly according to the number of tides fished, and represented a change in effort reporting procedures for the South West Region (previously, days fished). Reporting rates for net fisheries have been at, or close to, 100% in all regions for many years. Consequently, the effort data for the nets and fixed engines presented in this report are not expected to change significantly due to late returns. In comparison with 2003, there was an increase in the numbers of days/tides fished in 2004 in the North East (up 5%) and Midlands (up 35%) Regions (reflecting an increase in the number of licences issued there), but a decrease in the number of days/tides fished in the South West (down 29%) and North West (down 4%) Regions, and in Wales (down 11%).

Table 3(a). Number of licences issued each year under phase outs (reducing NLOs to zero) and closures for net fisheries in England and Wales, 1992-2004

Fishery	Phase Outs															Closures **		
	NE Coast drift	Anglian coastal	SW Wales coast wade & seine	R. Ogwen seine	R. Seiont seine	R. Clwyd sling	R. Llyfni seine	R. Dwyfawr seine	R. Usk drift	SW Cumbria drift	R. Lune seine	Taw/Torridge seine	R. Tamar seine	R. Lynher seine	R. Tavy seine	R. Duddon seine	S. Caern seine	N. Anglesey seine
Commenced	1993	1996	1997	1997	1997	1997	1997	1997	1997	1998	2000	2002	2004	2004	2004			
NLO at start	142	65	1	2	4	2	1	2	8	4	1	14	15	5	1			
Year																		
1992	142	129	17	2	2	2	0	2	8	4	1	0	14	5	4	2	0	0
1993	124	93	11	1	1	3	0	2	8	4	1	0	14	5	4	1	0	0
1994	114	72	16	2	2	2	0	2	8	4	1	0	14	5	5	0	0	0
1995	99	65	9	2	1	2	0	2	8	4	1	0	14	5	5	0	0	0
1996	89	59	0	2	1	2	1	2	8	4	1	12	14	5	4	0	0	0
1997	81	56	1	2	1	2	0	2	8	4	1	14	14	5	5	0	0	0
1998	75	54	**0**	2	**0**	**0***	**0**	1	8	4	1	14	15	5	5	0	0	0
1999	72	54		2				1	8	1	1	14	14	5	4	0	0	0
2000	71	46		1				**0**	**0***	1	1	14	14	5	4	0	0	0
2001	70	46		**0**						1	1	14	14	5	4	0	0	0
2002	69	46								1	1	3 *	14	5	4	0	0	0
2003	16 *	45								1	1	3	14	5	4	#	0	0
2004	16	40	#	#	#	#	#	#	#	**0**	1	3	**0***	**0***	**0***		#	#

Note: Bold text denotes target reached.
*Key: * Phase out accelerated by full or partial buy-out.*
 # Denotes fishery closed by byelaw.
*** Fisheries have not operated for a number of years, now formally closed through byelaw.*

Table 3(b). Other measures affecting net fisheries introduced in England and Wales, 1993-2004

Year	Full or part season buy-offs in place	Other measures
1993	1 fishery: Taw & Torridge seine nets	Itchen seine net fished for scientific purposes only - all fish released
1994	1 fishery: Taw & Torridge seine nets	Itchen seine net fished for scientific purposes only - all fish released
1995	1 fishery: Taw & Torridge seine nets	Reduced netting season (delayed start) in Wye, Usk & Dee fisheries
1996		New net licence fees resulted in reduced 'take up' of licences Some fisheries in SW Wales closed due to Sea Empess oil spill
1997	4 fisheries: Tavy, Tamar, Lynher and Fowey (all seine nets)	Reduced netting season (earlier close) in Tywi & Taf fisheries
1998	6 fisheries: Tavy, Tamar, Lynher, Exe & Fowey (seine nets) & Cumbrian coast (drift net)	Reduced netting season (delayed start) on Taw & Torridge seine net fishery. Compensation scheme on Avon & Stour (seine nets) - fish released alive.
1999	6 fisheries: Tavy, Tamar, Lynher, Exe & Fowey (seine nets) & Cumbrian coast (drift net)	National measures introduced - all net fisheries banned from taking, and in most cases fishing for, salmon before 1 June. Reduced netting season (delayed start) on Taw & Torridge seine net fishery. Compensation scheme on Avon & Stour (seine nets) - fish released alive.
2000	8 fisheries: Tavy, Tamar, Lynher & Fowey (seine nets), Cumbrian coast & Usk (drift nets), Usk & Wye (fixed engines)	New net licence fees resulted in reduced 'take up' of licences Compensation scheme on Avon & Stour (seine nets) - fish released alive.
2001	8 fisheries: Tavy, Tamar, Lynher & Fowey (seine nets), Cumbrian coast & Usk (drift nets), Usk & Wye (fixed engines).	Compensation scheme on Avon & Stour (seine nets) - fish released alive.
2002	9 fisheries: Tavy, Tamar, Lynher & Fowey (seine nets), Camel, Cumbrian coast & Usk (drift nets), Usk & Wye (fixed engines)	Compensation scheme on Avon & Stour (seine nets) - fish released alive.
2003	10 fisheries: Tavy, Tamar, Lynher & Fowey (seine nets), Camel, Cumbrian coast & Usk (drift nets), Usk, Wye & Lyn (fixed engines)	Compensation scheme on Avon & Stour (seine nets) - fish released alive. Leven lave nets - delayed start of season to 1 July.
2004	10 fisheries: Tavy, Tamar, Lynher & Fowey (seine nets), Camel, Cumbrian coast & Usk (drift nets), Usk, Wye & Severn (1) (fixed engines)	Compensation scheme on Avon & Stour (seine nets) - fish released alive. Leven lave nets - delayed start of season to 1 July.

As in previous years, the proportion of the allowable effort that was utilised in 2004 varied considerably between fisheries and was highest on average for the Midlands (42%) and North East (33%) Regions, but was similar to that in 2003 for all other regions. It is virtually impossible for most fisheries to utilise 100% of the allowable effort due to factors such as weather conditions, tide heights and availability of fishing stations. In the north-east coast fishery, for example, it has been suggested that no more than about 75% of the allowable effort could be used in the summer months under typical weather conditions (Anon., 1997).

1.2.4 Utilised effort in rod fisheries

The numbers of licences purchased each year for salmon and migratory trout angling (annual and short-term) between 1994 and 2004 are shown in Table 2; the data for 2004 are provisional (annual licences are valid from the date of purchase to the 31 March following). No comparable data are available for earlier years because of changes in licensing arrangements. The total number of rod licences issued decreased by 12% between 1994 and 1997, but has remained fairly stable since then. The number of annual licences issued has decreased by 23% since 1994, whilst the number of short-term (one day and eight day) licences issued in 2004 was just below the average for the period 1994 – 2003. These changes in the numbers of licence types issued are thought to have been influenced by the decline in salmon stocks and by the recent introduction of restrictions on angling, especially those to protect early-run MSW fish.

The Agency maintains a national rod licence database for England and Wales. In order to maximise the quantity and quality of returns received, reminders are issued to as many anglers as possible in November, soon after most rod fisheries have closed. In 2001, various improvements to these procedures were made, reflecting NASCO's resolution to reduce the level of unreported catch: a more complete list of anglers was available in November; a second reminder was issued some 10 weeks after the first, to anglers who had failed to send in a return (in previous years only a single reminder was issued). Though these procedures continued to apply in 2004 and a second reminder was issued on the 10th February 2005, reporting rates have fallen back in the last two years.

The proportions (%) of salmon rod licence holders making a catch return, by licence type, 1998-2004 are presented in the text table below:

Year	Licence Type	
	Annual (Full & concessionary)	Short-term (1 & 8 day)
1998	78	51
1999	76	53
2000	71	53
2001	83	61
2002	94	60
2003	86	44
2004*	**80**	**41**
Mean 1998-2000	75	52
Mean 2001-2004	88	55

** Provisional data*

Reporting rates for all licence categories increased in 2001 and 2002, though provisional data for 2004 indicate that these improvements have not been maintained, although reporting rates are still better than pre-2001. Though only 41% of short-term licence holders made a return, it is known that many anglers who purchase more than one short-term licence during a season combine catch details on a single licence return, and this contributes to the lower return rate for this licence category. Also, in general, short-term licence holders fish less and catch fewer fish than those anglers who hold an annual licence. A detailed analysis of catch return data for 2002 for the Rivers Dee (North Wales) and Tyne indicated that 89% and 86%, respectively, of short-term licence holders making a return declared a nil catch, and that 98% and 96%, respectively, of the total declared salmon catch for these rivers was made by anglers holding an annual licence. The lower return rates for short-term licence holders is, therefore, expected to have a negligible impact on the declared catch. A brief description of the Agency's catch reporting and reminder system is provided at Annex 1.

Rod Effort

Table 4 shows the total declared number of rod days fished by anglers in each of the regions in each year from 1994 to 2004. Most of the salmon and sea trout angling in 2004 took place in Wales (38%) and in the North West (25%) and North East (20%) Regions, as in previous years. There was relatively little angling for these species in Thames and Southern Regions. In the North East and North West Regions, the number of days fished increased substantially compared with 2003, but was below the average of the previous five years in all other Regions. Rod fishing effort decreased by 32% between 1994-1998 and 1999-2004, reflecting the introduction of compulsory catch-and-release before 16 June in 1999. The distribution of fishing effort before and after 16 June for 2004 is shown in Table 5, as extracted from a random sample of 2,500 rod catch returns. Based on this sample, 19% of the overall angling effort took place prior to June 16, with the proportion varying regionally from 12% (North West) to 27% (Southern) (excluding the Thames). This represents a decrease on 2003, when 23% of the overall angling effort was prior to June 16 (range 16-30% by Region). Expressed as a percentage of all the days fished early in the season in England and Wales, the highest fishing effort before June 16 was in Wales. This also applied in 2003 and may reflect early season fishing targeted at sea trout rather than salmon.

Table 4. Total number of rod days fished from catch returns for each Region, 1994-2004

Total days	NE	Thames	Southern	SW	Mids	Welsh	NW	Total
1994	37,937	343	2,446	41,087	13,596	118,862	78,176	292,447
1995	38,724	414	2,696	35,853	14,893	85,107	65,601	243,288
1996	34,726	154	1,928	32,504	13,056	84,922	64,454	231,744
1997	40,345	181	2,332	38,809	14,886	102,930	70,222	269,705
1998	38,229	145	2,095	31,285	11,493	85,906	64,248	233,401
1999	31,676	311	2,018	25,642	7,024	70,660	50,667	187,998
2000	32,319	143	1,771	22,401	5,373	66,270	49,255	177,532
2001	27,485	111	2,117	18,573	4,084	59,163	23,320	134,853
2002	34,423	91	2,462	25,526	4,720	72,328	43,278	182,828
2003	31,030	126	2,663	23,322	5,302	72,719	37,567	172,729
2004*	**34,967**	**84**	**2,125**	**22,526**	**4,243**	**67,616**	**44,602**	**176,163**
Mean (1999-03)	31,387	156	2,206	23,093	5,301	68,228	40,817	171,188
% change:								
2004 on 2003	+13	-33	-20	-3	-20	-7	+19	+2
2004 on 5-yr mean	+11	-46	-4	-2	-20	-1	+9	+3

** Provisional*

Table 5. Number and proportion of rod days fished in 2004 before (<) and from (≥) 16 June (based on a sample of 2,500 rod catch returns)

Region	No. days fished			As % of Regional total		As % of days fished in period	
	< June 16	≥ June 16	Total	< June 16	≥ June 16	< June 16	≥ June 16
North East	1,212	6,609	7,821	15	85	19	24
Thames	0	24	24	0	100	0	0
Southern	98	268	366	27	73	2	1
South West	1,208	4,230	5,438	22	78	19	15
Midlands	130	368	498	26	74	2	1
Wales	2,756	9,658	12,414	22	78	44	35
North West	862	6,445	7,307	12	88	14	23
Total	**6,266**	**27,602**	**33,868**	**19**	**81**		

1.3 Catch limits

There are no regulations directly limiting national catches of salmon in net or rod fisheries in England and Wales, but a number of restrictions have been introduced under local byelaws for rod fisheries. Details of the rod bag limits currently in force are listed below. Non-statutory restrictions have also been introduced in some areas by fishery owners and angling associations, but there is no national record of these.

Region	River	Salmon Bag Limit - rods			Other constraints
		per day	per week	per season	
Thames	Thames	2			
South West	Taw	2	3	10	) No fish > 70 cm to be retained
	Torridge	2	2	7	) after 1 August
Wales	Tywi	2	5		
	Taf	2	5		
	E&W Cleddau	2	5		
	Teifi	2	5		
	Aeron	2	5		
	Ystwyth	2	5		
	Rheidol	2	5		
North West	Lune			4	

2. Catches and CPUE

2.1 Catches

The provisional catch statistics for 2004 are based upon returns received up until 24 February 2005. Except for a few rivers where the data from fishery owners' returns are considered to be more complete (Wye, Test & Itchen), the rod catch data are largely based on anglers' returns and include fish reported as a result of the second reminder. A further small increase is expected as a result of late returns. The catch returns for the nets and fixed engines are not expected to change substantially.

2.1.1 Catches in 2004

Table 6 presents the provisional total salmon catch for England and Wales for 2004, compared with confirmed catches for the previous 5 years. A breakdown of the provisional 2004 rod and net catches for each Region is provided in Table 7.

The total declared catch for nets and fixed engines in 2004 was 4% lower than in 2003, and less than half of the average for the previous 5 years (Tables 6 and 8, Figure 4). Catches were lower than those in 2003 in all Regions except the North East and Anglian (where there is a high likelihood that some sea trout were mis-identified as salmon). Despite the partial drift net buy-out in 2003, the catch was still dominated by the north east coast fishery, which has accounted for between 57% and 85% of the national annual net catch during the period 1992-2004 (66% in 2004). Because of the variability in catches from year to year, care must be taken in comparing annual figures. A more reliable picture of recent catch trends may be obtained by comparing data aggregated over a period of years. Between the periods 1997-2000 and 2001-2004, there has been a substantial decline in the average net catches in some regions; the greatest reductions have occurred in Wales (49%) and the South West (26%). However, there was an increase in the average catches between these two periods in the Midlands (5%), the North West (10%) and in the North East until 2002 (21%), followed by a 67% fall there in 2003 (continued in 2004) due to the partial buy out of the north east coast drift net fishery. These figures may reflect, in part, the better status of the main river stocks in the north of the country, compared with other regions of England and Wales. It has also been suggested that the declared catch in the North East for a few years prior to 2003 might have been inflated by the prospect of a buy out (Section 2.1.3).

The rod catches (both retained and released fish) for recent years are shown in Table 9 and Figure 5. The total declared catch varied between about 12,500 and 17,600 fish over the period 1997 to 2002 without any evident trend; but the catch of 11,500 fish in 2003 was associated with a considerable reduction in angling effort in that year. The total rod catch in 2004 was considerably higher, at 25,766 salmon, with the highest levels since 1994 reported in the North East, North West and Wales, and strongly reversed recent declining trends in several Regions (except the North East and Midlands). However, much of the catch was taken from August onwards, when good water conditions for running fish and angling may have increased salmon catches disproportionately to the actual number of fish in the stock.

2.1.2 Catches in coastal, estuarine and riverine fisheries

ICES requests that catch data are grouped for coastal, estuarine and riverine fisheries and these data (fish caught and retained only) for the years 1993 to 2004 are presented in Table 10. The catch for the coastal fisheries mainly reflects the catch in the north east drift net fishery, but also includes fixed nets in this area, drift nets on the Cumbrian coast (North West Region) until 2003, and a number of nets and fixed engines fished around the Welsh and East Anglian coasts and in the Bristol Channel. The data set starts in 1993, as this marks the start of the phase out of the north-east drift net fishery; other mixed stock fisheries have also been phased out since this date. A full list of the fisheries included in the coastal category appears in the footnote to Table 10. In 2004, only two coastal fisheries remained in operation, and one of these, Anglian, usually takes very few salmon. The riverine fisheries comprise catches in freshwater and represent the rod catch plus the very small catches in two ancient fixed engines, the River Conwy basket trap and River Eden coops. The estuarine category includes all the other net and fixed engine fisheries (Table 1).

On average, over the period 1993-1998, coastal catches comprised 59% of the total (declared fish caught and retained), estuarine catches 18% and riverine catches 23%. Over the period 1999 to 2002, the coastal proportion of the catch was at its highest level over the ten-year time series (67-72%). In 2003 and 2004, the coastal catch comprised 41% of the total, estuarine catches 23% and riverine catches 35%. In 2004, riverine fisheries comprised 46% of the total, by far the highest in the time series. The principal influences on these changes have been the national byelaws protecting early-running MSW salmon introduced in 1999, phase out of net fisheries generally, and the partial buyout of north east drift nets in 2002/03.

Table 6. Declared catch of salmon for England and Wales for 1999-2004

Year	Nets & Fixed Engines		Rods (inc. released fish)		Total caught		Total retained	
	No.	Wt (t)	No.	Wt (t)	No.	Wt (t)	No.	Wt (t)
1999	34,167	124.4	12,492	49.8	46,659	174.2	41,094	150.0
2000	50,998	182.7	17,596	67.5	68,594	250.2	60,953	218.8
2001	43,243	153.3	14,383	56.8	57,626	210.1	51,307	184.2
2002	38,279	133.2	15,282	60.4	53,561	193.6	45,669	160.9
2003	17,219	69.2	11,519	48.5	28,738	117.7	22,206	89.0
2004*	**16,580**	**59.1**	**25,766**	**98.7**	**42,346**	**157.8**	**29,824**	**108.2**
Mean (1999-2003)	36,781	133	14,254	57	51,036	189	44,246	161

* *Provisional*

Table 7. Provisional regional salmon catches (including released fish) for England and Wales - 2004 season

Region	Net catch		Rod catch		Total catch	
	No.	Weight (kg)	No.	Weight (kg)	No.	Weight (kg)
North East	11,017	39,065	6,366	27,054	17,383	66,119
Anglian	52	88	0	0	52	88
Thames	0	0	0	0	0	0
Southern	0	0	609	2,192	609	2,192
South West	1,295	4,166	2,593	8,203	3,888	12,369
Midlands	769	3,654	286	1,372	1,055	5,026
Welsh	970	3,653	6,330	25,209	7,300	28,862
North West	2,477	8,504	9,452	34,253	11,929	42,757
Unknown	0	0	130	458	130	458
Total	**16,580**	**59,130**	**25,766**	**98,741**	**42,346**	**157,871**

Table 8. Summary of declared regional salmon net and fixed engine catches (including released fish), 1992-2004

Year	Region						
	NE	Anglian[$]	SW	Mids	Wales	NW	Total
1992	20,144	11	5,521	2,117	2,927	3,123	33,843#
1993	41,800	4	5,017	950	3,324	5,460	56,555#
1994	46,554	3	6,437	2,321	4,995	6,143	66,453#
1995	53,210	5	3,251	2,588	3,039	5,566	67,659
1996	18,581	3	5,093	1,608	2,931	4,464	32,680
1997	21,922	0	2,466	1,282	2,628	3,161	31,459
1998	18,265	3	1,759	1,074	2,300	1,778	25,179
1999	26,833	6	1,605	989	2,347	2,387	34,167*
2000	43,354	0	2,171	973	1,004	3,496	50,998*
2001	36,115	0	1,794	1,027	997	3,310	43,243*
2002	30,980	112	1,404	1,190	1,275	3,318	38,279*
2003	10,435	24	1,444	1,540	975	2,801	17,219*
2004 (provisional)	**11,017**	**52**	**1,295**	**769**	**970**	**2,477**	**16,580***
Mean (1999 - 2003)	29,543		1,684	1,144	1,320	3,062	36,781
% change:							
2004 on 2003	+6		-10	-50	-1	-12	-4
2004 on 5-yr mean	-63		-23	-33	-26	-19	-55

Key: # Totals exclude small numbers of fish caught in the Southern Region. River Itchen seine net fished for scientific purposes only; all salmon caught tagged and released.

** Includes a small number of fish caught & released (Anglian, Wales & SW Regions only).*

[$] It is unusual for salmonids positively identified as salmon to be caught in this sea trout fishery in any numbers; these reported fish may have been misidentified. Hence, no period means reported.

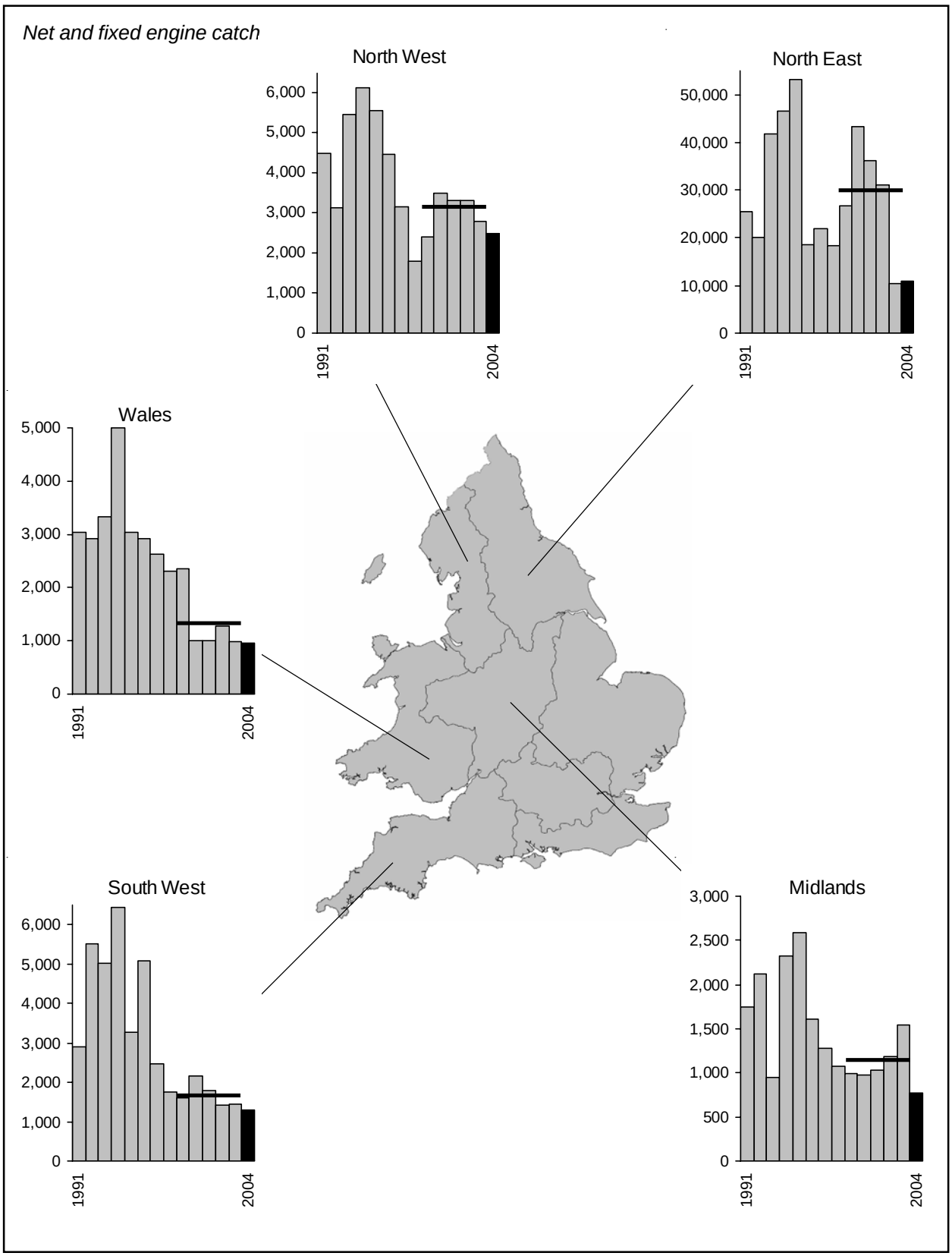


Figure 4. Regional declared salmon net and fixed engine catches. The histograms display data for the fourteen years 1991 to 2004, together with the five-year mean for the period 1999-2003 (displayed as a horizontal line). Note that the histograms are not drawn to the same scale. Data for 2004 are provisional.

Table 9. Summary of declared regional salmon rod catches, 1999-2004 - including details of fish caught and released and fish caught and killed

Year	Region							
	NE	Thames	Southern	SW	Midlands	Wales	NW	Total*
Declared catch (fish caught and retained)								
1999	1,322	0	116	983	120	2,166	2,338	7,045
2000	1,712	0	69	1,335	224	2,785	3,998	10,126
2001	1,878	0	8	761	145	3,004	2,430	8,240
2002	1,710	0	3	817	122	1,966	2,998	7,624
2003	1,242	0	0	520	180	1,460	1,688	5,094
2004 (provisional)	**3,035**	**0**	**0**	**1,164**	**132**	**3,949**	**5,050**	**13,387**
Declared catch (fish released)								
1999	1,348	1	137	898	65	1,203	1,795	5,447
2000	1,888	0	247	1,152	103	1,264	2,816	7,470
2001	1,855	0	397	635	128	1,347	1,779	6,143
2002	2,257	0	528	920	73	1,346	2,534	7,658
2003	2,265	0	225	746	153	1,172	1,859	6,425
2004 (provisional)	**3,331**	**0**	**609**	**1,429**	**154**	**2,381**	**4,402**	**12,379**
% of fish released								
1999	50		54	48	35	36	43	44
2000	52		78	46	31	31	41	42
2001	50		98	45	47	31	42	43
2002	57		99	53	37	41	46	50
2003	65		100	59	46	45	52	56
2004 (provisional)	**52**		**100**	**55**	**54**	**38**	**47**	**48**
Declared catch (including fish caught and released)								
1999	2,670	1	253	1,881	185	3,369	4,133	12,492
2000	3,600	0	316	2,487	327	4,049	6,814	17,596
2001	3,733	0	405	1,396	273	4,351	4,209	14,383
2002	3,967	0	531	1,737	195	3,312	5,532	15,282
2003	3,507	0	225	1,266	333	2,632	3,547	11,519
2004 (provisional)	**6,366**	**0**	**609**	**2,593**	**286**	**6,330**	**9,452**	**25,766**
Mean - including fish caught & released (1999-2003)	3,495	0	346	1,753	263	3,543	4,847	14,254
% change:								
2004 on 2003	+82		+171	+105	-14	+141	+166	+124
2004 on 5-yr mean	+82		+76	+48	+9	+79	+95	+81

** Totals include some fish of unkown region of capture.*
Most 2004 figures are based on anglers' catch returns up to 24 February 2005 (including the second reminder); data for the Rivers Wye, Test and Itchen are based upon owners' returns.

Table 10. Declared catch of salmon (fish caught and retained only) in coastal, estuarine and riverine fisheries, 1993-2004

Year	Coastal		Estuarine		Riverine		Total
	Wt (t)	%	Wt (t)	%	Wt (t)	%	Wt (t)
1993	158.8	64	43.4	18	45.9	18	248.1
1994	183.5	57	58.4	18	81.9	25	323.8
1995	200.3	68	45.4	15	48.9	17	294.6
1996	83.3	45	42.3	23	57.5	31	183.2
1997	80.5	57	26.7	19	34.6	24	141.8
1998	65.2	53	19.4	16	38.2	31	122.9
1999	101.0	67	23.1	15	26.0	17	150.0
2000	156.6	72	25.4	12	36.9	17	218.9
2001	128.6	70	24.2	13	31.3	17	184.1
2002	107.9	67	24.4	15	28.7	18	161.0
2003	42.0	47	26.6	30	20.3	23	88.9
2004*	**39.1**	**36**	**19.6**	**18**	**49.6**	**46**	**108.3**
Mean (1993-98)	128.6	58	39.3	18	51.2	23	219.1
Mean (1999-02)	123.5	69	24.3	14	30.7	17	178.5
Mean (2003-04)	40.6	41	23.1	23	35.0	35	98.6

** Provisional*

Notes: ***Coastal*** *catches include: North East coast nets, Anglian coastal nets, River Parrett putcher rank, River Usk drift nets & putcher rank, SW Wales coastal wade & seine nets, River Ogwen seine nets, River Seiont/Gwyrfai seine nets, River Dwyfawr seine nets, N. Caernarvonshire seine nets, River Clwyd sling (drift) nets and the SW Cumbria drift nets.*
Riverine *fisheries include: rod catches, River Conwy basket trap and River Eden coops.*
Estuarine *fisheries include all other nets and fixed engines not mentioned above.*

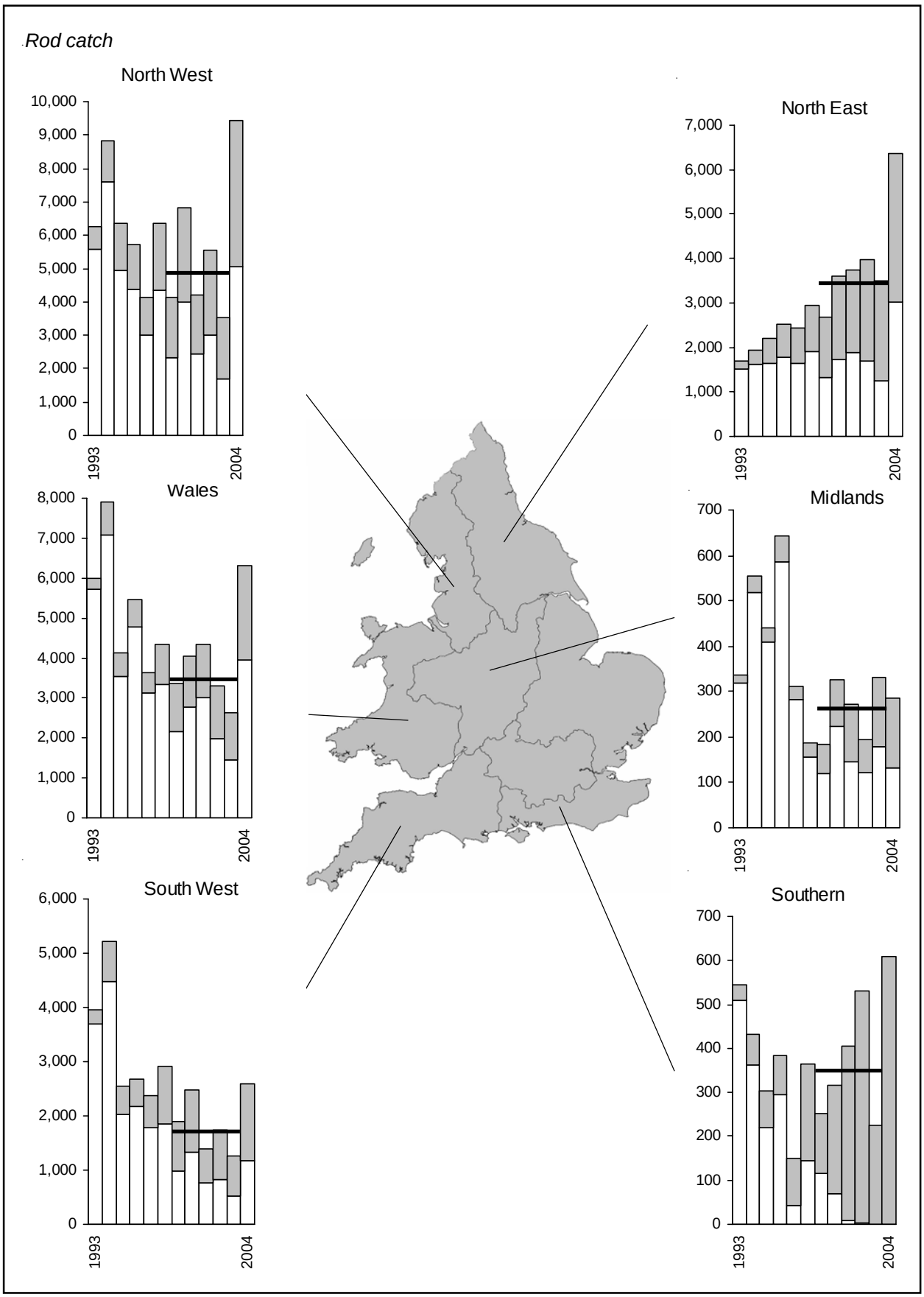


Figure 5. Regional declared salmon rod catch. The histograms display total declared catch, with the shaded area denoting fish caught and released, for the twelve years 1993-2004, together with the five-year mean for the period 1999-2003 (displayed as a horizontal line). Note that the histograms are not drawn to the same scale. Data for 2004 are provisional.

2.1.3 Effects of significant management measures on catches

Catch and release: Within England and Wales, there has been increasing use of catch and release by salmon anglers in recent years, and this has been reinforced by the introduction in 1999 of a national byelaw requiring the compulsory release of all salmon caught by rods before 16 June. This was in response to the well-publicised and ongoing concerns about the decline in the numbers of spring salmon. The number of fish caught before June fell from a 5-year average (1994-98) of 1,898 (10.9% of the total catch) prior to the introduction of the national byelaw to a mean of 917 fish (5.8% of the catch) since 1999 (Table 13). This reflects both the decline in the abundance of spring salmon and the reduction in fishing effort due to the national byelaw. Details of fish caught and released are published for each major salmon river in England and Wales in the annual catch statistics and these data are summarised in Tables 9 and 11 and in Figure 5. In 2004, this amounted to 12,522 fish (49.7 tonnes), by far the highest in the time series, comprising 12,379 (49.2 tonnes) by rods and 143 (0.5 tonnes) by nets. The proportion of rod-caught salmon released by anglers has increased from 10% in 1993 to 42-44% over the three-year period 1999-2001, to 56% in 2003, falling to 48% (provisionally) in 2004. The peak in 2003 may, in part, reflect the fact that catches were relatively good in the spring and at the very end of the fishing season when a higher proportion of MSW and coloured fish would have been caught and released. The decline in release rates in 2004 may have reflected the much improved catches in most areas during summer and early autumn.

Catch and release has been enhanced on some rivers in recent years through negotiated agreements. On the Rivers Test and Itchen in the Southern Region, voluntary agreements have been reached with the salmon fisheries for all the fish to be released. Agreement has also been reached with fishery owners on the Hampshire Avon for all fish to be released; this agreement will be reviewed in 2006.

An analysis of the numbers of salmon released by weight category (<3.6 kg (8 lbs), 3.6 - 6.4 kg (14 lbs), and >6.4 kg) and season, for the years 1998 to 2004, is shown in Table 12. This indicates that, since the introduction of the national measures to protect spring salmon, anglers have been voluntarily releasing an increased proportion of all fish caught after June, and large salmon in particular. For example, in the months of September and October, 45% of large salmon were voluntarily released by anglers in 1998 and this rose to 63% in 2002, 69% in 2003% and 58% (provisionally) in 2004.

Table 11. Number, weight and proportion of declared salmon rod catch released by anglers, and number and weight of net catch released, 1993-2004

	Salmon released by rods			Salmon released by nets	
	Number	Weight (t)	As % of declared catch	Number	Weight (t)
1993	1,448	5.26	10		
1994	3,227	12.19	13		
1995	3,189	12.11	20		
1996	3,428	13.99	20		
1997	3,132	13.77	24		
1998	5,365	20.98	31		
1999	5,447	23.87	44	118	0.4
2000	7,470	30.70	42	171	0.7
2001	6,143	25.50	43	176	0.4
2002	7,658	31.80	50	234	0.9
2003	6,425	28.20	56	107	0.5
2004*	**12,379**	**49.17**	**48**	**143**	**0.5**

** Provisional*

Notes: Many of the salmon released by nets have been as a result of a compensation scheme on the River Avon (see Section 1.2.1).
Data on catch and release not collected prior to 1993.

Table 12. Number and proportion (%) of rod-caught salmon released, by weight category (kg) and season, 1998-2004

Season	April to June			July to August			September to October			April to October		
Wt. category (kg)	<3.6	3.6-6.4	>6.4	<3.6	3.6-6.4	>6.4	<3.6	3.6-6.4	>6.4	<3.6	3.6-6.4	>6.4
Number												
1998	136	113	20	643	197	40	2,076	900	253	2,855	1,210	313
1999	209	570	194	295	163	61	1,430	994	466	1,934	1,727	721
2000	221	532	148	499	229	72	2,325	1,431	502	3,045	2,192	722
2001	119	602	138	422	302	52	1,673	1,141	420	2,214	2,045	610
2002	241	659	213	488	207	57	2,084	1,473	488	2,813	2,339	758
2003	214	629	193	239	235	64	1,382	1,392	595	1,835	2,256	852
2004*	**206**	**630**	**171**	**862**	**430**	**97**	**3,878**	**2,544**	**656**	**4,946**	**3,604**	**924**
Percentage (%)												
1998	26	15	18	17	23	18	36	44	45	28	33	35
1999	59	66	74	23	26	30	39	45	53	36	47	54
2000	57	69	72	20	28	30	40	46	56	35	47	53
2001	58	62	68	24	29	26	39	45	58	35	45	57
2002	64	65	71	24	27	33	47	54	63	41	52	61
2003	76	77	80	27	28	34	48	58	69	46	56	66
2004*	**57**	**70**	**76**	**31**	**31**	**38**	**45**	**47**	**58**	**42**	**47**	**58**

** Provisional*
1998 Pre national byelaw.
1999 National byelaw requiring compulsory catch and release before 16 June introduced on 15 April.
2000 First full year of national catch and release byelaw.

Later net fishery opening under National Byelaws: The national measures introduced in April 1999 also closed all net fisheries for salmon before 1 June. This has resulted in a large reduction in the number of fish caught by net fisheries before June, from a 5-year average (1994-98) of 2,997 fish (6.7% of the total catch) to a mean of 49 (0.15% of the catch) since 1999 (Table 13). However, a small number of fisheries (primarily targeted at sea trout) are allowed to operate prior to 1 June, provided any salmon caught before that date are released. In 2004, a total of 143 salmon, weighing 0.5 t, are reported to have been caught and released by netsmen. The majority of these fish (73) were actually released after 1st June as a result of a compensation scheme on the Hampshire Avon (see Section 1.2.1), whilst 35 were released in that fishery before June 1st, along with 35 salmon, originating from a number of sea trout fisheries in Wales and the South West. Summary data are included in Table 11.

The contribution of MSW salmon to catches in recent years is covered in Section 2.5.

Salmon about to be released by angler

Table 13. Number and proportion of declared salmon net and rod catch taken before (<) 1 June, and the numbers taken from (≥) 1 June, 1989-2004

Year	Net catch				Rod catch (including released fish)			
	Numbers			%	Numbers			%
	< 1 June	≥ 1 June	Total	< 1 June	< 1 June	≥ 1 June	Total	< 1June
1989	4,742	64,198	68,940	6.9	3,199	11,529	14,728	21.7
1990	7,339	64,488	71,827	10.2	2,397	12,290	14,687	16.3
1991	3,637	34,038	37,675	9.7	2,240	11,496	13,736	16.3
1992	2,497	31,352	33,849	7.4	1,012	9,725	10,737	9.4
1993	1,630	54,936	56,566	2.9	865	13,194	14,059	6.2
1994	4,824	61,633	66,457	7.3	2,609	22,282	24,891	10.5
1995	4,888	62,771	67,659	7.2	2,141	13,865	16,006	13.4
1996	2,913	29,767	32,680	8.9	2,691	14,753	17,444	15.4
1997	1,528	29,931	31,459	4.9	1,335	11,278	12,613	10.6
1998	832	24,335	25,167	3.3	712	15,275	15,987	4.5
1999	116	34,043	34,159	0.3	920	11,211	12,131	7.6
2000	19	50,979	50,998	0.04	760	16,496	17,256	4.4
2001	47	43,196	43,243	0.11	708	13,675	14,383	4.9
2002	32	38,247	38,279	0.08	815	14,250	15,065	5.4
2003	42	17,177	17,219	0.24	1,037	10,373	11,410	9.1
2004*	**35**	**16,545**	**16,580**	**0.21**	**1,264**	**24,108**	**25,372**	**5.0**
Mean (1994-98)	2,997	41,687	44,684	6.7	1,898	15,491	17,388	10.9
Mean (1999-04)	49	33,365	33,413	0.1	917	15,019	15,936	5.8

** Provisional, excludes fish for which no capture date recorded.*

Notes: National measures to protect 'spring' salmon introduced on April 15 1999 - required compulsory catch and release of all rod caught salmon prior to June 16, and closed most net fisheries prior to June 1.
Rod catch data only include fish for which date of capture recorded; data differ from total catch (Table 9).

Review of national byelaws: A 5-year review of the national measures to protect spring salmon was carried out by the Agency in 2003 (Environment Agency, 2003a). It found that spawning escapement of spring salmon may have increased by up to one third on some rivers as a result of the measures, but that spring salmon stocks are still seriously depleted on many rivers. The review concluded that the measures should remain in place until at least 2008 and that no further measures specifically aimed at early running salmon are required at this stage. However, the need for enhanced river-specific measures before the 2008 review will be examined through river SAPs (see page 6).

Mixed stock fisheries: Since 1993, there has been a policy to phase out coastal mixed stock salmon fisheries in England and Wales as existing licensees retire. In December 2000, the Government offered up to £750,000, subject to matching funds from interested parties, to launch compensation arrangements designed to accelerate the phase out of mixed stock fisheries on a voluntary basis with particular emphasis on the north east coast fishery. Ultimately, the scheme was based on funding of nearly £3.4 million of which £1.25 million came from the Government, and 52 licensees signed agreements with NASF(UK) to permanently relinquish their licences in return for payments of agreed sums. As a consequence, 16 drift net licences were issued in 2003 compared with 69 in 2002 (-77%). The same number was issued in 2004 and the number of drift net licences issued for the north east coast has now been reduced by 89% since 1992. The remaining drift nets in 2004 took a catch of 5,921 salmon compared with 5,511 in 2003 (+7 %) and 27,685 in 2002 (-78%). Some of the netsmen who relinquished their drift net licences were able to remain in the fishery by switching to inshore T- or J- nets, which are known to exploit a higher proportion of local salmon and sea trout. The salmon catch by T/J nets rose from 3,295 in 2002 to 5,096 in 2004 (an increase of 55%), taken by 41 and 55 nets (including combined drift and T- and J-net licences) respectively. The overall catch on the north east coast fell from 30,980 in 2002 to 11,017 in 2004 (-64%).

It is difficult to draw any firm conclusions on the impact of the reduction in netting effort in the North East on salmon runs and catches based on this short period. In 2004, the fish counter on the Tyne recorded a run of 48,668 fish (combined count for salmon and sea trout), representing a 10% increase on the 2003 total and double the previous 5-year mean of 24,054. After lower catches in 2003, salmon rod catches in 2004 were good in all of the rivers in the north east, in common with most regions. The salmon rod catch for the Tyne in 2004 is provisionally 3,859, the Coquet 1,107 and the Wear 943, all of which are the highest recorded rod catches for these rivers. The rod catch in the River Tees of 196 salmon was a 130% increase over 2003 and the best since 1923. The provisional reported rod catch for the Yorkshire Esk is 104 salmon, the highest since 1994 and three times the recent mean. It is not clear how much of this improvement in escapement is due to the drift-net buyout (any increase in juvenile production from enhanced escapement from 2003 onwards will not be reflected in the grilse run before 2006), or due to the effects of favourable flows and higher rod exploitation in 2004.

The increased fish count would suggest a modest increase in overall stock size in 2004. This is also reflected in the slightly increased salmon catch in the net fishery, although the efficiency of netting can be variable between seasons and is affected by weather conditions.

Nine other small coastal mixed stock fisheries have also been subject to reductions in recent years, eight of which are no longer operating (Table 3). The exception is the Anglian coastal fishery, for which 40 (30 drift and 10 'other' gear) licences were issued in 2004, five down on 2003. The one remaining licensee in the Cumbrian coastal drift net fishery ceased to operate at the end of 2003 as a result of a joint public/private buyout.

Although there have been large annual fluctuations in the declared catches, the overall effect of these measures has been to reduce the catches in these coastal fisheries from an average of about 41,000 fish for the period 1988-92 to a little under 32,000 for the period 1998-2002 and around 11,000 fish in 2003 and 2004. In addition to the north east coast partial buy-out, the drift nets and fixed engines on the River Usk were bought off in 2000, prior to which the average catch of this fishery was about 1,000 fish each year (~40% of the total net catch in Wales). The Usk drift net fishery was permanently closed by byelaw in February 2005. The recent buy-off of the Taw/Torridge fishery has resulted in a drop in the catch from a 5-year mean (1997-2001) of 665 fish to just 205 in 2004. The buyout of the Tamar/Lynher/Tavy seine nets equates to a reduction in the average annual catch of 250 salmon over the last five years. At the same time, a number of mixed stock fisheries that had been phased out in Wales were closed through new byelaws, including:

- Coastal wade nets in parts of St Brides Bay and Carmarthen Bay;
- Sling nets off the mouth of the River Clwyd;
- Seine nets: around the north coast of Anglesey; through the Menai Straits (off the mouths of the Rivers Ogwen and Seiont); around the coast of the Lleyn Peninsula; and off the mouth of the River Dwyfawr.

2.1.4 Long-term catch trends

Figure 6 shows the annual declared net catch for England and Wales since 1956, and distinguishes the catch in the north east coast fishery, which increased rapidly in the late 1960s with the introduction of synthetic nets and has comprised well over 50% of the total net catch in most of the subsequent years. The partial buy out in 2002/3 led to a 65% reduction in the reported north east coast catch in 2003 and 2004.

The catches in the other net fisheries have been declining since the mid 1970s and have fallen to levels of around 7,000 fish between 1998 and 2003. The catch in 2004 at 5,563 salmon was the lowest in the time series. The decline in catches in the 1990s reflects reductions in both fishing effort (see Table 2) and stock size.

The declared rod catch of salmon declined by around 67% from its peak in the mid-1960s to the level reported in 2003, which was only slightly greater than the historical low (1992) (Figure 7). The total annual rod catch (including released fish) has fluctuated around a level of about 14,000 fish between 1989 and 2003, though the rod catch in 2004 (at 25,766 fish) was the highest since 1988. This declining trend underestimates the true rate of decline in catches because reporting rates have improved and catch data for the past seven years are the most complete in the time series. The data since 1993 also include fish caught and released. In addition, the pattern on individual rivers has varied from much more severe declines to substantial recoveries. Although angling effort appears to have declined considerably since 1995 (Table 4), we do not know how this relates to the level of fishing activity in earlier years.

2.2 Catch per unit effort (CPUE)

Catch levels are influenced by stock abundance, the catchability of the fish, and by the variation in the time anglers and netsmen spend fishing. Catch per unit of fishing effort (CPUE) is, therefore, used as well as the declared catch in order to help evaluate the relative status of stocks. CPUE can also provide a measure of angler satisfaction (most people would rather catch one salmon for every 10 days they fished than one every 20 days), and indicates changes in the profitability of net fishing, the income from the catch being set against the costs of time spent netting. For net fisheries in England and Wales, regional CPUE data have been collated using the number of tides fished (or in the North East Region the number of days fished) as a measure of the amount of fishing undertaken by each licence holder. Rod CPUE data (catch per licence day fished) are now reported for all major salmon rivers in England and Wales in the annual catch statistics reports.

2.2.1 CPUE in net fisheries

In previous reports, regionally aggregated CPUE data for the period 1988 to date have been presented, but these data did not take account of the differing fishing methods employed in the various regions, nor of any changes in the relative proportions of different gears used as measures have been introduced to reduce fishing effort.

To partially address the above concerns, and to provide a more consistent time series, annual mean CPUEs for 27 fisheries that have fished in a consistent manner over the period 1997 to 2004 are given in Table 14. Though this results in the CPUE for salmon varying between regions, it provides more robust comparisons through time within a region. The mean CPUE appeared to increase until 2000 – 2002, and then to fall again, with the 2004 value being substantially higher than the period mean only in the North East and South West Regions. The main exception is the Midlands (River Severn), which shows a marked decline (*c*. 60%) compared to the 2003 value, though this is due to one particular set of putchers not fishing during 2004.

The recent relatively high CPUE levels in most regions may reflect the effect of the national measures to safeguard spring salmon, which have concentrated effort on the more productive time of year. This would tend to mask the effects of any reduced availability (stock abundance) of salmon on the CPUE in recent years, and it would be inadvisable to draw conclusions about stock status based on catch and effort data alone.

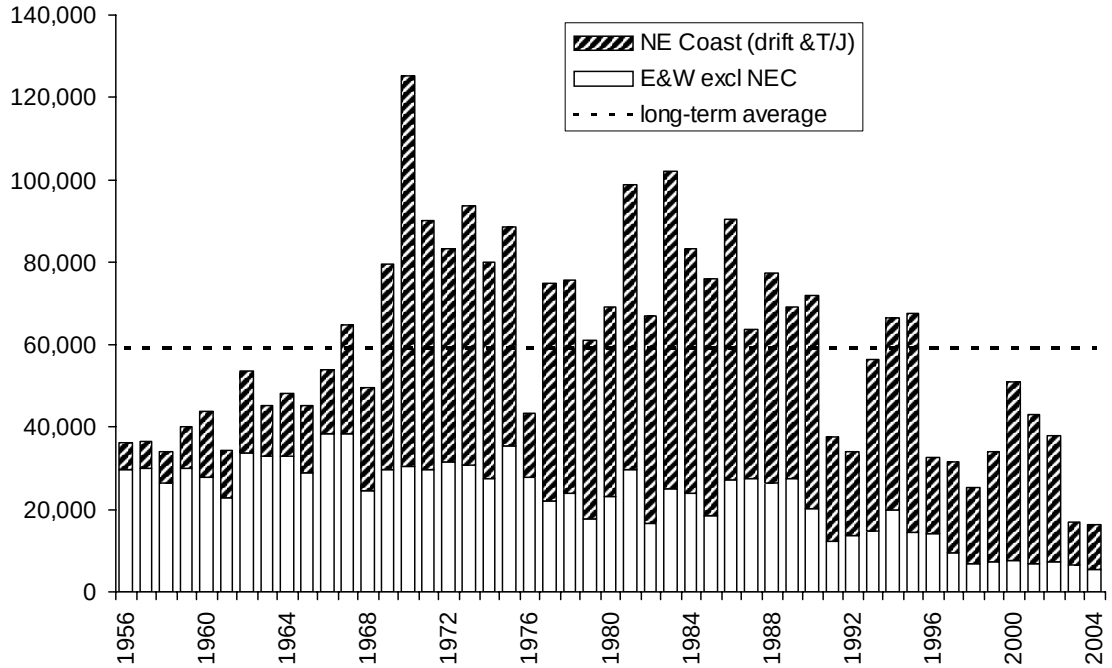


Figure 6. Total declared salmon net and fixed engine catch for England and Wales 1956-2004; the shaded area indicates the catch in the north east coast fishery

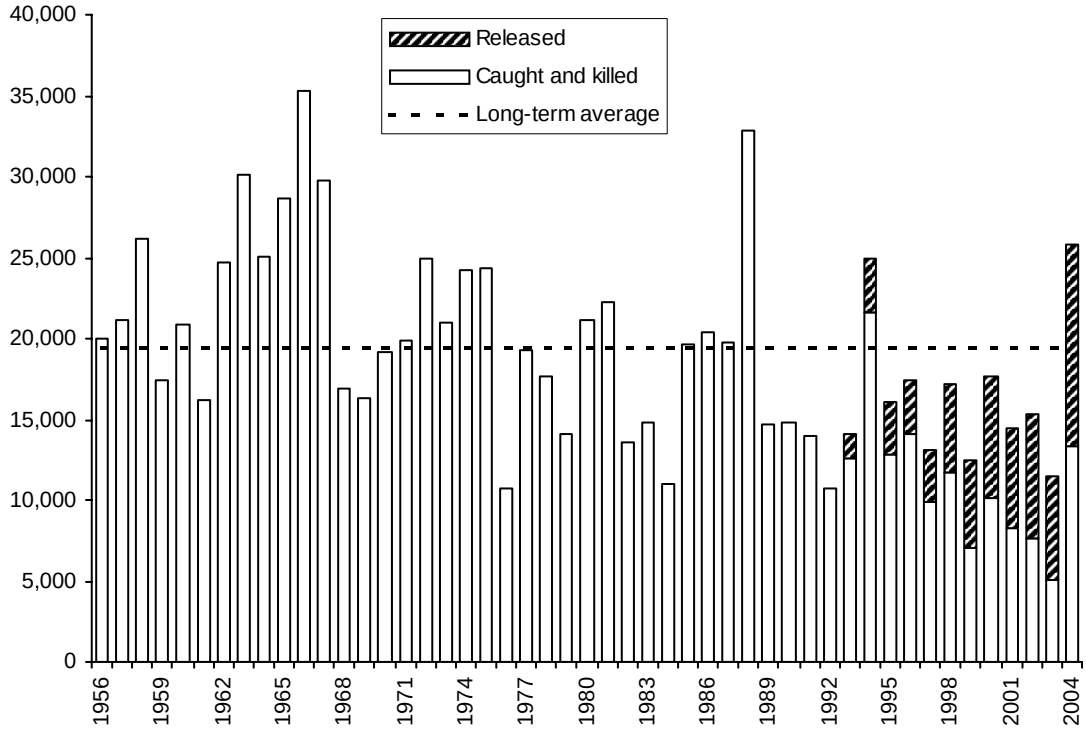


Figure 7. Total declared salmon rod catch for England and Wales 1956-2004; the shaded area indicates fish caught and released. (N.B. Data for 2004 are provisional; fish caught and subsequently released were not reported prior to 1993)

Table 14. Regional CPUE data for 27 net fisheries, 1997 to 2004. Fisheries were selected on the basis that they were fished consistently during the period. Data are expressed as catch per licence-tide, except for the North East, for which data are recorded as catch per licence-day

Year	Region NE Drift nets (June-August)	NE	SW	Midlands	Wales	NW	England & Wales (not NE drift nets)
1997	6.48	4.40	0.56	0.48	0.31	0.63	1.08
1998	5.92	3.81	0.99	0.42	0.51	0.46	1.11
1999	8.06	4.88	0.63	0.72	0.44	0.52	1.19
2000	13.06	8.11	1.05	0.66	0.33	1.05	1.87
2001	10.34	6.83	0.61	0.79	0.45	0.71	1.54
2002	8.55	5.59	0.82	1.39	0.57	0.90	1.51
2003	7.13	4.82	1.06	1.13	0.41	0.62	1.32
2004	**8.17**	**5.88**	**0.95**	**0.46**	**0.45**	**0.69**	**1.46**
Mean 1997-2004	8.38	5.49	0.82	0.80	0.43	0.70	1.38
No. fisheries	1	4	6	1	9	6	26

Note: Revised reporting procedures introduced in 2001 required fishermen in all Regions, except NE, to report catches per tide fished.

2.2.2 CPUE in rod fisheries

Regional summaries of rod CPUE data for anglers making returns (expressed as number of salmon caught per 100 days fished) are presented in Table 15 for the period 1997 to 2004. These figures include returns from a wide variety of anglers (e.g. locals who fish regularly, holiday anglers, and those who fish primarily for sea trout) and river types. This will result in the CPUE for salmon varying between regions, but still provides scope for comparisons through time within a region. It should also be noted that reductions in effort due to the national measures to protect spring salmon may have affected CPUE from 1999 onwards. The rod CPUE in 2004 was at the highest recorded in the period in all Regions, except the Southern, where it was still well above the recent five-year average (though not the Thames). In many regions the 2004 figures are around twice those recorded in 2003. The relatively high CPUE values in 2004 suggest high in-season availability and catchability of fish, probably due to high flows

Table 15. Rod CPUE - number of salmon (including released fish) caught per 100 days fished for regional rod fisheries, 1997-2004. (Catches shown in Table 9)

Year	Region							England & Wales
	NE	Thames	Southern	SW	Midlands	Wales	NW	
1997	5.0	0.6	3.1	5.2	1.7	2.6	5.3	4.0
1998	6.5	0.0	5.9	7.5	1.3	3.9	8.6	6.0
1999	7.4	0.3	3.1	6.3	2.1	3.5	7.4	5.5
2000	9.2	0.0	5.2	8.8	4.9	4.4	11.7	7.9
2001	11.3	0.0	11.0	6.6	5.4	5.5	15.4	8.7
2002	9.4	0.0	18.3	6.0	3.5	3.6	10.0	6.8
2003	9.7	0.0	8.8	4.7	5.2	2.9	8.3	5.7
2004*	**14.7**	**0.0**	**16.8**	**9.8**	**5.5**	**6.8**	**17.7**	11.6
Mean (1999 - 2003)	9.4	0.1	9.3	6.5	4.2	4.0	10.6	6.9
% change:								
2004 on 2003	+52		+91	+109	+6	+134	+113	+104
2004 on 5-yr mean	+56		+81	+51	+30	+71	+68	+68

Note: Based only on catch returns for which effort data have been reported.
** Provisional*

allowing fish to run and providing good fishing conditions. Note that CPUE values reflect only the availability of salmon during the fishing season, and may bear less relation to spawning escapement of late-running fish in November and December. As with nets, it should be noted that the relationship between CPUE for rod fisheries and salmon abundance can be influenced by confounding factors.

2.3 Unreported and illegal catches

If the full effects of fisheries upon stocks are to be assessed, managers must take account of unreported catches by net and rod licence holders and also the scale of illegal catches. In earlier years, estimates of the levels of under-reporting and illegal fishing (expressed as percentages of the declared regional catches) have been provided annually by regional fisheries staff. However, in an effort to improve these estimates, the methodology was re-examined in 1997 and an approach agreed. This has been used for estimating the extent of unreported and illegal catches since 1998.

2.3.1 Under-reporting by licence holders

The rate of under-reporting for net fisheries is generally considered to be low in most fisheries of England and Wales. However, recent evidence has emerged about significant under-reporting on one sizeable fishery and the matter is currently going through legal process.

Opinions on the level of under-reporting in net fisheries in England and Wales were collected from Agency regional fisheries personnel in February 1998; these fell in the range 0% to 15%. In the North East, under-reporting in the coastal fishery has previously been estimated at about 7% (Anon., 1991). In the North West, comparison of the catches seen by the bailiff with those declared for that day, suggested that catches in the estuary net fishery on the River Lune were under-reported by around 8%. It has been suggested that over-reporting of catches may occur in some fisheries in response to rumours about potential future buy-outs (and the perception that compensation will be based on declared catches). This may have applied recently to the north east coast fishery and in 2000-2002 there was assumed to be no under-reporting in this fishery. Apart from this, a figure of 8% has been used for the level of under-reporting of the net catch in recent years. This will be reviewed in 2005.

For the purpose of setting conservation limits under their Salmon Action Plan guidelines, the Agency have estimated that declared salmon rod catches from 1994 onwards should be increased by 10% to allow for under-reporting of the legal rod catch across England and Wales. This has been based on a study of annual catch returns made following reminders (Environment Agency, 1998). Though the reporting rate is likely to vary between rivers and on some is thought to be less than satisfactory, the 10% correction for under-reporting has continued to apply through to the 2004 season, but will be reviewed in 2005. Exceptions to this apply for the River Wye in Wales and the Rivers Test and Itchen in the Southern Region, for which the fishery owners' returns are regarded as being accurate, and for which no scaling factor has been applied for under-reporting.

2.3.2 Illegal catches by unlicensed fishermen

By their nature, illegal catches are very difficult to quantify. However, assessments can be made on the basis of enforcement activities. Consultation with Agency regional fisheries personnel was used as the basis for an assessment in February 1998, which provided estimates of illegal catches in coastal waters and within rivers and estuaries. These ranged from 5% to 18% of the declared catch for different regions.

These estimates were reviewed in 2003 through a brief questionnaire sent to Agency Regional fisheries personnel, as in 1998, asking them whether they agreed with the current estimate or to provide a revised estimate together with any justification for their decision. The results indicated a similar overall level of illegal catches, though regional estimates ranged from 5% (Southern Region, with no licensed commercial catch) to 24% (North West Region, with 15% of the national catch). These catches of salmon tended to arise as by-catch taken by nets legitimately targeting bass and other marine species, although in-river poaching was reported to be an ongoing problem in many areas, driven partly by the premium prices paid for wild salmon.

It is recognised that the use of a national average might not be entirely appropriate given the variation apparent in the regional estimates and the proportion of the England and Wales catch declared by each Region. However, pending further refinement of this analysis, the value of 12% was applied in 2004 (as in all years since 1998), to estimate the total illegal catch for England and Wales.

2.3.3 Under-reported and illegal catch estimate for 2004

On the basis of the above estimates, the non-reported and illegal catch for England and Wales in 2004 is estimated at about 33 tonnes, which represents 23% of the total weight (including the under-reported and illegal catch) of salmon caught and killed.

2.4 Other sources of non-catch fishing mortality

Non-catch fishing mortality includes all sources of mortality generated directly or indirectly by fishing which are not included in the recorded catch. It includes the illegal and unreported catches discussed above, in addition to losses of fish that are removed from fishing gear by predators, dead fish that fall out of a net and fish that escape or are released but subsequently die.

The extent of the likely losses will vary between fisheries because of the type of gear used and its method of operation. In addition, the impact of predators, particularly seals, varies between areas. However, in most net fisheries in England and Wales, the netsmen remain with their gear and remove any fish caught quite quickly; thus relatively few fish will drop out and losses to predators can usually be limited. Sweep and hand-held nets cause very little damage to the fish and so losses of fish that may escape are likely to be minimal. However, small losses may occur from enmeshing nets, and predation losses may be significant in the north east coast fishery, which is close to a large grey seal colony.

No data are available of the mortality of salmon incurred during normal angling activities (e.g. due to lost or foul-hooked fish that subsequently die) that are not recorded in the retained catch. Whilst the use of catch and release is likely to result in some fish dying through exhaustion or damage, studies have demonstrated that if fish are appropriately handled, mortality following capture is low and a large proportion of fish survive to spawn (Webb, 1998a,b: Whoriskey *et al.*, 2000). Recent radio-tracking studies carried out by the Agency on the River Eden, Cumbria, found that upwards of 85% of released spring salmon can reasonably be expected to survive to spawning (Environment Agency, 2003a).

2.5 Composition of catches

2.5.1 Age composition of net catches

Prior to 2001, it was not possible to estimate the proportions of grilse (one-sea-winter) and MSW salmon in the catch of all regional net fisheries, because netsmen were generally not required to report the sizes of individual fish caught and few scale samples were collected. However, data collection procedures for all fisheries, except the North East, were standardised in 2001 and this permits age composition of catches to be reported.

Catches in some net fisheries are reported as small (<3.6 kg = 8 lb) or large (>3.6 kg) salmon, based upon weight splits, and this can be used as a rough indication of sea-age, although this will result in some fish being mis-classified. Such data are available for 2004 for a number of regions as shown in the text table below:

	Small salmon		Large Salmon		Total
	(<3.6 kg)	%	(>3.6 kg)	%	
NE	6,619	60	4,398	40	11,017
Anglian	47	90	5	10	52
NW	1,655	67	822	33	2,477
Mid	225	29	544	71	769
Wales	596	61	374	39	970
SW	953	74	342	26	1,295
Total	**10,095**	**61**	**6,485**	**39**	**16,580**

Where the reporting systems have been consistent, these data can provide an indication of changes in the age-composition of the catches over time. In the North East Region, for example, large ('MSW') salmon are estimated to have made up between 31 and 35% of the catch over the period 1997 to 2002, though the proportion of large salmon there in 2004 is nearer the long-term average of 42% (1965-2004). Nationally, the proportions of MSW salmon recorded since 1999 are expected to have been reduced by the introduction of the measures restricting netting effort in the early part of the season when MSW salmon comprise the majority of the catch. However, the estimated proportion of 'MSW' salmon in 2003 (52%) was the highest recorded for many years (Figure 8), and reflected the poor grilse run in 2003. In 2004, the proportion of 'MSW' salmon was lower than in 2003 in all Regions (though still exceptionally high in the Midlands at 71%), with an overall level of 39%.

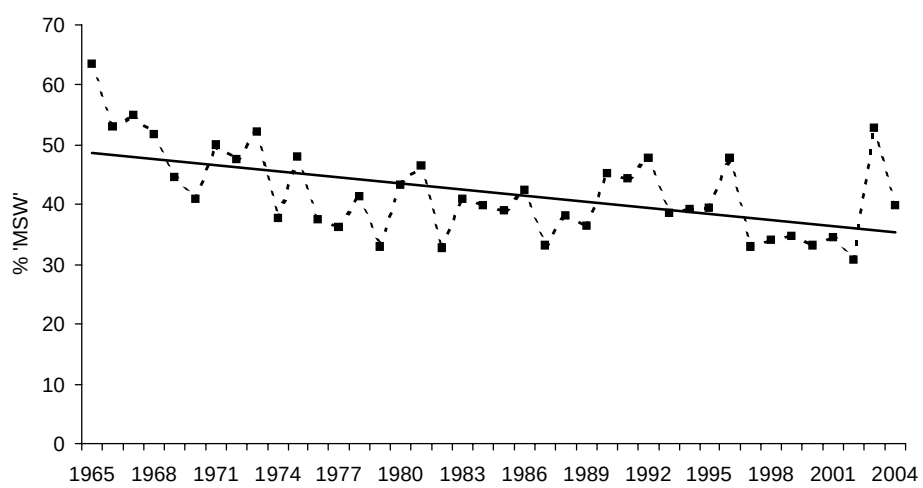


Figure 8. Estimated proportion (%) of salmon >8lb (as declared by netsmen) in the north east coast fishery, 1965-2004

2.5.2 Age composition of rod catches

Monthly age-weight keys are available for salmon caught in the River Dee trap over the period 1992-2004, and these have been used to estimate the age composition of catches for the principal salmon rivers (Table 16). These estimates were derived from the declared catches where a weight and date of capture have been provided.

Table 16. Numbers and proportions of grilse and MSW salmon in provisional declared 2004 rod catches, including fish released

Region	River	No. grilse	%	No. MSW	%
NE	Coquet	896	83	184	17
	Tyne	2,367	61	1,486	39
	Wear	856	86	142	14
Southern	Itchen	66	86	11	14
	Test	82	86	13	14
SW	Hants Avon	17	35	31	65
	Frome	32	60	21	40
	Exe	487	90	54	10
	Teign	172	88	24	12
	Dart	130	92	12	8
	Tavy	59	95	3	5
	Tamar	261	88	35	12
	Lynher	71	96	3	4
	Fowey	140	90	15	10
	Camel	310	91	31	9
	Taw	229	78	63	22
	Torridge	52	62	32	38
	Lyn	130	84	25	16
Midlands	Severn	99	35	184	65
Wales	Wye	147	30	351	70
	Usk	798	78	223	22
	Ogmore	91	95	5	5
	Tywi	608	85	110	15
	Tawe	116	83	24	17
	Taf	117	93	9	7
	E & W Cleddau	47	98	1	2
	Teifi	858	89	107	11
	Dyfi	132	89	17	11
	Mawddach	155	95	8	5
	Ogwen	105	95	5	5
	Conwy	210	91	21	9
	Dee	821	81	197	19
NW	Ribble	1,119	87	171	13
	Lune	1,611	91	169	9
	Kent	517	93	36	7
	Leven	55	93	4	7
	Irt	115	95	6	5
	Ehen	301	97	10	3
	Derwent	1,418	90	154	10
	Eden	2,043	85	365	15
	Border Esk	783	90	87	10
Total		**18,623**	**81**	**4,449**	**19**

Note: Data only included for fish for which weight data were provided on catch return; these data do not represent the total catch for the season.

In 2004, rod catches in only three of the principal salmon rivers listed in Table 16 (Hampshire Avon, Severn and Wye) contained 50% or more MSW salmon (including fish subsequently released), compared to eight rivers in 2003 (Itchen, Test, Hampshire Avon, Taw, Torridge, Severn, Wye and Usk). Only six of the listed rivers had at least 25% MSW salmon in the rod catch in 2004, well below the period 1999 to 2002 (10 - 13 rivers each year) and the 26 rivers in 2003. The estimated numbers of grilse and MSW salmon, and the proportion of MSW fish, in regional rod catches over the period 1995 to 2004 are shown in Table 17 and Figure 9.

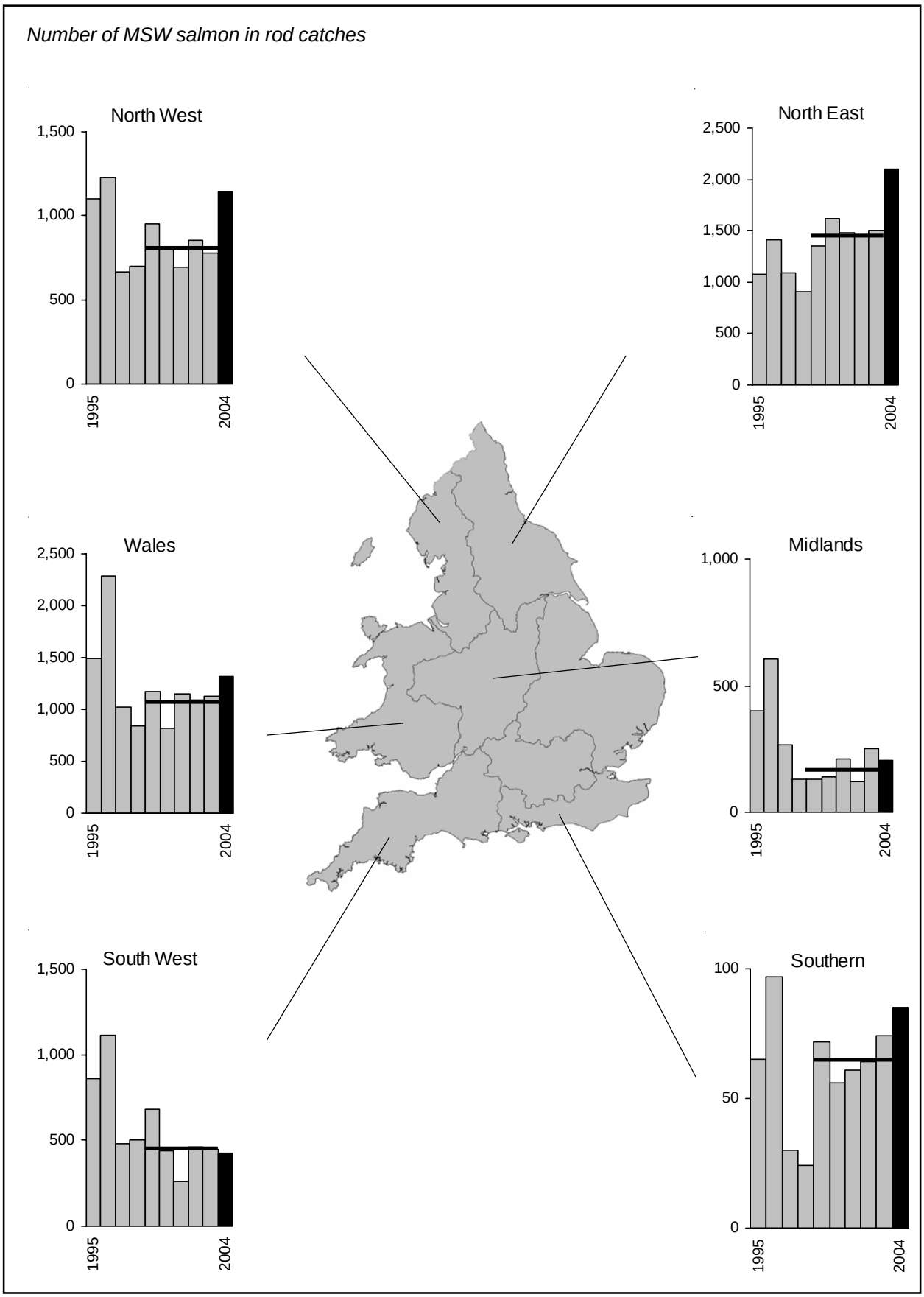


Figure 9. Estimated number of MSW salmon in regional rod catches. The histograms display data for the ten years 1995 to 2004, together with the five-year mean for the period 1999-2003 (displayed as a horizontal line). Note that the histograms are not drawn to the same scale. Data for 2004 are provisional.

Table 17. The estimated number of grilse and MSW salmon (corrected for under-reporting) and the percentage composition of MSW salmon in regional rod catches in England and Wales, 1999-2004 (including fish caught and released)

Year	Region												All Regions	
	NE		Southern		SW		Midlands		Wales		NW			
	Grilse	MSW	Grilse	MSW	Grilse	MSW	Grilse	MSW	Grilse	MSW	Grilse	MSW	Grilse	MSW
1999	1,586	1,351	206	72	1,386	683	70	132	2,278	1,175	3,589	955	9,115	4,368
2000	2,188	1,618	292	56	2,270	441	200	139	3,196	816	6,507	807	12,383	3,821
2001	2,628	1,478	344	61	1,275	261	90	210	3,638	1,149	3,936	694	11,911	3,853
2002	2,924	1,440	520	64	1,452	459	92	123	2,550	1093	5,233	852	12,771	4,031
2003	2,353	1,505	151	74	947	446	117	249	1,766	1129	3,121	780	8,455	4,183
2004 *	**4,902**	**2,101**	**524**	**85**	**2,424**	**428**	**110**	**204**	**5,640**	**1323**	**9,254**	**1144**	**22,854**	**5,285**
Mean (1999-2003)	2,336	1,478	303	65	1,466	458	114	171	2,686	1,072	4,477	818	10,927	4,051
% change:														
2004 on 2003	+108	+40	+247	+15	+156	-4	-6	-18	+219	+17	+197	+47	+170	+26
2004 on 5-year mean	+110	+42	+73	+30	+65	-7	-3	+20	+110	+23	+107	+40	+109	+30

Percentage MSW

Year	Region						All Regions
	NE	Southern	SW	Midlands	Wales	NW	
1999	46	26	33	65	34	21	32
2000	43	16	16	41	20	11	24
2001	36	15	17	70	24	15	24
2002	33	11	24	57	30	14	24
2003	39	33	32	68	39	20	33
2004 *	30	14	15	65	19	11	19
Mean (1999-2003)	39	18	24	60	29	15	27

* *Provisional*

In 2004, MSW salmon were estimated to comprise 19% of the catch nationally, compared with 24% in each of 2000, 2001 and 2002 and 33% in 2003. This decrease in the proportion of MSW fish in river catches reflects the strong grilse run in 2004, since there were more MSW fish caught overall than in 2003, especially on the Rivers Tyne, Wear, Teign, Camel, Torridge, Wye, Dyfi, Dee, Ribble, Kent, Derwent and Eden. Only in the Midlands Region were there fewer MSW salmon taken by rods in 2004 than in 2003. In general, there is no overall trend in the MSW catches over the past 6 years.

In most Regions, rod catches of grilse in 2004 were much higher than in 2003 and, overall, double the 5-year mean and the highest in the time series. Only in the Midlands Region (Severn) were fewer grilse caught in 2004 than in 2003. With the latter exception, grilse catches continue to alternate between good and bad years in all regions, with the 2003 grilse catch being particularly poor, and that in 2004 the highest over the past six years.

2.6 Origin of catches

2.6.1 Reared fish

There is no salmon ranching in England and Wales. Although fish farm escapees are not formally recorded in catches in England and Wales, an estimated 180 fish believed to have originated in a salmon cage-rearing facility in Glenarm Bay, County Armagh, Northern Ireland were reported in fisheries in North West England and North Wales in autumn 2001 (Milner and Evans, 2003). In 2003, a sampling programme was initiated by CEFAS and the Agency to identify any salmon suspected of being of farmed origin in the England and Wales catch. The ultimate aim of this work is to determine the extent to which such fish may be contributing to spawning stocks. The pilot study in 2003 focussed primarily on the commercial catches in the North East and those from the Severn Estuary. The scheme involved local Fishery Officers and a selection of licensed fishermen and merchants, who were asked to look through salmon catches for suspect fish, identified according to specific external characteristics, and to provide morphometric data and scale samples according to a sampling protocol. This scheme was continued in 2004, expanded to cover commercial fisheries in the North West Region. The Agency already samples salmon taken in traps on four index rivers (Lune, Dee, Tamar and Tyne), and scales and other data of suspect fish were sent to the CEFAS laboratory for validation. As before, anglers were encouraged to report any fish they caught that were suspected of being an escapee.

There was only one report in 2004 of a salmon suspected to be of farmed origin. This fish was caught in the North East Region, though it was later confirmed as unlikely to have originated from a fish farm.

In a number of catchments, juvenile salmon are stocked from hatcheries for mitigation or enhancement purposes. Full details of the numbers of fish stocked in these programmes, and the stage (eggs, fry, parr and smolts) of release, are included on a catchment by catchment basis in the Salmonid and Freshwater Fisheries Statistics published annually by the Agency. If they return as adults, these fish cannot usually be distinguished from fish derived from natural spawning, although marking and tagging programmes are undertaken in some areas to assess the efficacy of these programmes (Annex 4). The relatively small scale of stocking and low survival of stocked fish in most instances (Harris, 1994) suggest that these initiatives have a small overall impact on natural salmon populations in England and Wales.

2.6.2 Salmon from other countries

Based upon studies conducted in the 1970s and 1980s, approximately 75% of the salmon caught in the English north-east coast fishery were estimated to be returning to rivers in Scotland. With the buy-out of many of the drift nets in 2003, most of the catch was taken by T- and J-nets which operate close inshore and are known from tagging studies to take a higher proportion of local fish. The proportion of Scottish fish will thus have been lower in the 2003-4 catches. The fishery operating in the Solway Firth is also thought to exploit some salmon returning to rivers in Scotland, but the proportion of such fish in the Solway net catch has not been estimated. There are very few records of tagged salmon released in, or originating from, rivers in other countries being taken in English and Welsh fisheries. However, one salmon microtagged in Ireland was captured in 2004 by an angler fishing on the River Mawddach in west Wales.

2.7 Exploitation rates

2.7.1 Homewater exploitation

The relationships between salmon run and catch are mediated by fishing effort and catchability (the proportion of the stock taken per unit of fishing effort), which in turn are shown to vary between and within rivers. A prime cause of this variation is likely to be river flow, which acts by influencing the behaviour and availability of the fish, and also angler activity.

Relatively few rivers have independent measures of run size to compare against catch. However, such data obtained from counters and traps are available for some rivers in England and Wales (Table 21 and Figure 10), and have been used with the total catch (retained and released combined) to estimate exploitation rates (Table 18). These show varying trends, but the true exploitation rates (i.e. fish retained) show a strong decline in most rivers in recent years, an effect largely attributable to catch and release, which has increased from 10% to around 50% over the past 10 years (see Table 3 for details of other management measures). On some rivers (Tamar, Dee, and Kent), however, exploitation rates in 2004 were the highest in the last three or four years. Pending the results of a study to assess recapture rates of salmon caught and released on the Test and Itchen, it has been decided to publish recent exploitation rates only for retained fish in these rivers. No salmon were known to have been killed by anglers in these two rivers in 2004.

Overall levels of exploitation in 2004 (including released fish) were above the average of the previous five years in most of the rod fisheries for which data are available. The only decrease compared to 2003 was on the Frome, where a high proportion of the salmon catch is released. Exploitation rates are also available for three net fisheries, on the Dee, Kent and Lune; all three were below the value for 2003 and below the average of the previous five years.

An analysis of data from seven rivers (Test, Itchen, Frome, Tamar, Fowey, Dee and Lune; Milner *et al*., 2001) has shown that, while exploitation rates tend to differ between rivers, there is also considerable variation between years within individual rivers. From a tagging and recapture programme on the River Dee, North Wales, it has been shown that early season entrants to the river were subject to much higher exploitation than those entering later, though exploitation rates of spring salmon in the Dee declined from 26% in 1992-94 to 8% in 1999.

Since regulation changes occur frequently in salmon fisheries, with the explicit aim of changing exploitation rates, this needs to be taken into account when interpreting historical catches in terms of indicating stock abundance.

2.7.2 Exploitation in fisheries outside England and Wales

Salmon stocks in England and Wales are exploited in a number of fisheries other than those operating under the jurisdiction of the Agency within national waters. These include the distant water fisheries at Faroes and West Greenland, and other fisheries such as those operating off Ireland and in homewaters in other parts of the UK. Tagging studies have provided information on the levels of exploitation for English and Welsh stocks in many of these fisheries and this is summarised briefly below.

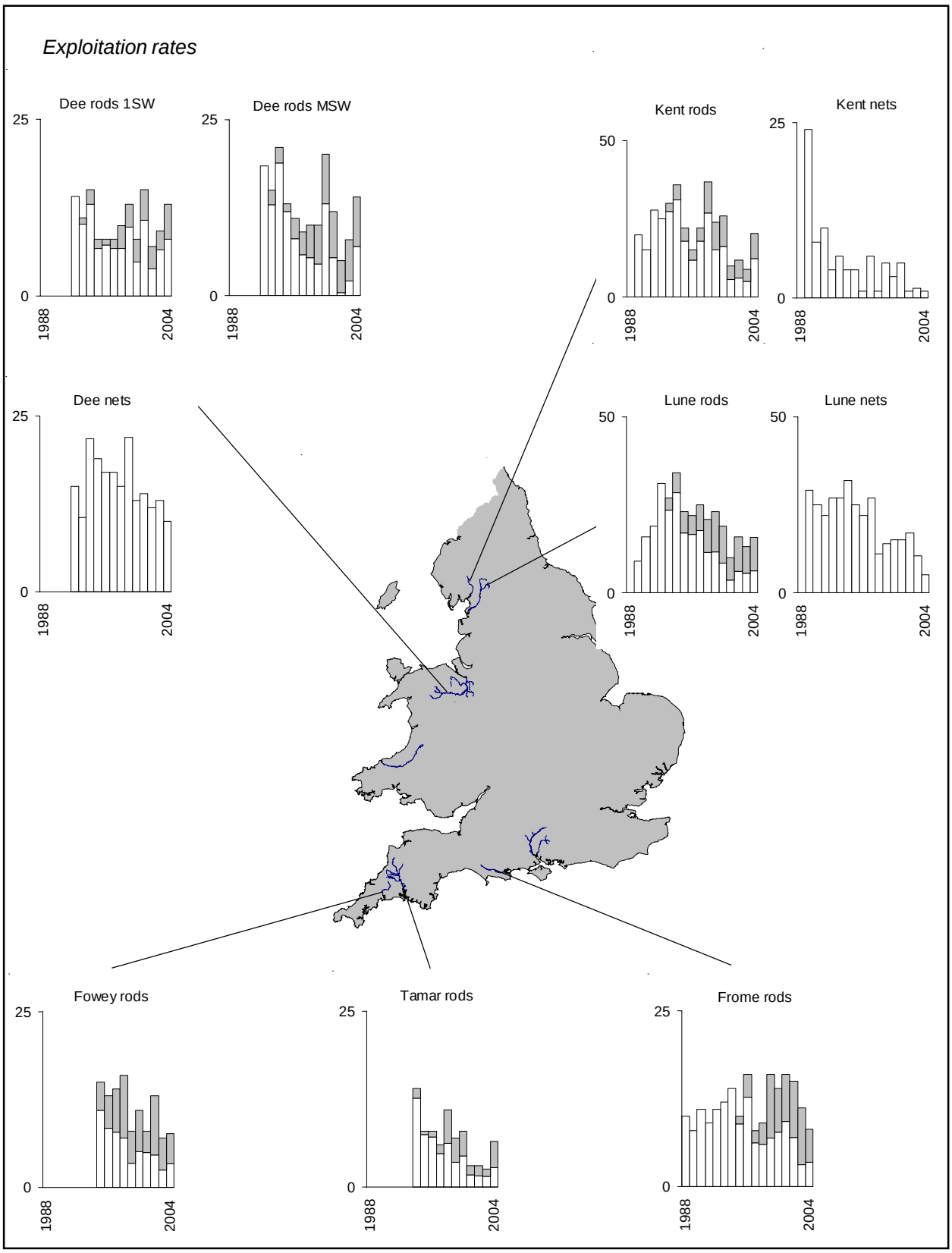


Figure 10. Estimated exploitation rates (%), including fish released (shown as shaded part of bar), for selected rod and net salmon fisheries in England and Wales. The histograms display all available data for the years 1988 to 2004. Data for 2004 are provisional. Note that estimates for the Dee rods have been split by age class (1SW and MSW); all other estimates are combined for all ages.

Table 18. Estimated exploitation rates (%) for selected rod and net fisheries in England and Wales, 1988-2004; data for rod fisheries distinguish exploitation rates for all fish (including fish released) and for retained fish only (Ret.) (Rates are corrected for under-reporting)

Region	Rod Fisheries Southern				SW						Wales				NW				Net Fisheries Wales	NW	
River	Test		Itchen		Frome		Tamar		Fowey		Dee		Dee		Kent		Lune		Dee	Kent	Lune
Hatchery/Wild	W/H		W		W		W		W		W (1SW)		W (MSW)		W		W		W	W	W
Year	All (c)	Ret.	All (c)	Ret.	All (a)	Ret.	All	Ret.	All (d)	Ret.	All (b)	Ret.	All (b)	Ret.	All	Ret.	All	Ret.	Ret.	Ret.	Ret.
1988	40	40	34	34	10	10															
1989	29	29	45	45	8	8									20	20	9	9		24	29
1990	37	37	53	53	11	11									15	15	16	16		8	25
1991	26	26	68	68	9	9									28	28	19	19		10	22
1992	53	53	85	85	11	11					14	14	18	18	25	25	31	31	15	4	27
1993	37	34	30	30	12	12					11	10	15	13	30	27	27	24	11	6	27
1994	40	31	59	54	15	14	14	13			15	13	21	19	36	31	34	29	22	4	32
1995	32	26		10	10	9	8	7	15	11	8	7	13	12	22	18	23	17	18	4	25
1996	24	18		53	16	13	8	7	13	8	9	7	11	8	16	13	22	17	17	1	22
1997	15	14		24	8	6	6	5	14	8	8	7	9	6	23	19	24	18	17	6	26
1998		21		20	9	6	11	6	16	7	10	7	10	5	40	28	21	12	15	1	11
1999		11		14	16	7	7	4	8	3	13	10	10	5	25	15	23	12	22	5	14
2000		0.4		8	14	8	8	4	11	5	8	5	20	13	26	16	19	8	13	3	15
2001		1		1	16	9	3	2	8	4	15	11	12	5	10	6	10	4	14	5	15
2002		0.2		0.4	15	7	3	2	13	6	7	4	5	0.4	12	6	16	6	12	1	17
2003		5		0	11	3	3	2	7	2	9	7	8	2	9	5	13	6	13	1	11
2004*		**0**		**0**	**8**	**3**	**7**	**3**	**8**	**3**	**13**	**8**	**14**	**7**	**21**	**12**	**16**	**6**	**10**	**1**	**5**
Mean (1999 - 2003)		4		5	14	7	5	3	9	4	10	7	11	5	16	10	16	7	15	3	14
% change																					
2004 on 2003					-27	+9	+152	+80	+8	+33	+41	+22	+75	+233	+126	+139	+20	+12	-23	-29	-51
2004 on 5-yr mean					-43	-49	+40	+6	-19	-20	+26	+12	+27	+38	+25	+25	-4	-13	-32	-68	-64

Key: *(a) Data based on CEH counter at Wareham, and supplied courtesy of CEH.*
(b) Data derived from mark recapture experiment.
(c) Almost all Test and Itchen salmon have been returned in recent years. The potential for the same fish to be caught more than once means, therefore, that exploitation rates cannot be estimated from catch returns. Research is underway to provide exploitation rates for these rivers.
(d) Counter data include large sea trout, therefore exploitation rates for salmon may be underestimated.
** Provisional*

Note: Estimates for Dee, Kent, Leven and Lune net fisheries are based on declared catches and are minimum estimates. The entire catch from net fisheries is assumed killed.

West Greenland

This fishery exploits only salmon that would have returned to Europe and North America as MSW fish. The exploitation rates on the MSW component of English and Welsh stocks in the late 1980s/ early 1990s were estimated to be in the region of 10 to 20% (Russell and Potter, 1996). However, following significant quota reductions and other initiatives since the late 1980s (Annex 1), exploitation of MSW fish is believed to have fallen to very low levels. In 1993-94, a privately funded buy-out was negotiated and the fishery (apart from subsistence fishing) was suspended. Between 1995 and 1997 the catch ranged between 58 t and 92 t, while from 1998 to 2000 a subsistence-only fishery (<20 t) operated. In 2001 and 2002, an *ad hoc* management programme was set up to adjust the allowable catch based on CPUE data obtained during the fishery. In 2001 this resulted in a catch of 43 t, whereas in 2002 another privately funded buy-out commenced and a subsistence catch of just 9 t was recorded. This latest buy-out agreement will apply for 5 years, until 2006, on an annually renewable basis. From 2002, therefore, the fishery has been restricted to a subsistence-only catch of about 10 t.

Faroes

The Faroes fishery exploits both grilse and MSW salmon of largely northern European origin. Prior to the recent buy-out arrangements, few tags of English and Welsh origin were recovered in this fishery and estimated exploitation rates on English and Welsh stocks were very low (~1%) (Russell and Potter, 1996). Between 1991 and 1998, the Faroes salmon quota was bought out with NASF funds, and only a small research fishery was operated, taking up to 23 t per year. No buy-out was arranged for 1999 or 2000. Although no fishing took place in 1999, a single vessel carried out commercial fishing in 2000 and a catch of 8 t was reported. There were no reported landings in 2001-2004.

A summary of the recent regulatory measures for the West Greenland and Faroes fisheries is given at Annex 1.

Ireland

A working group of scientists from the Irish Marine Institute, CEFAS and the Environment Agency has been analysing data from selected tagging studies, where sufficient data have been collected, to assess the patterns and levels of exploitation on English and Welsh salmon stocks in the Irish coastal fishery. As part of this assessment, models have been developed to enable robust exploitation rates to be derived, including confidence limits, and incorporating improved estimates of non-catch fishing mortality for the Irish fisheries.

The results have demonstrated that salmon from all parts of England and Wales are exploited in the Irish coastal fishery. However, the levels of exploitation have varied between stocks from different regions and from year to year, and have also declined following the introduction of new management measures in the Irish fishery since 1997. Based on aggregated data for all available years, the extant exploitation rates for the modelled stocks (1SW fish only) are presented in the text table below, for the periods before and after the management changes in the Irish fishery:

River	Pre 1997 management measures			With 1997 management measures		
	Years	Expl. Rate (%)	95% CL (%)	Years	Expl. Rate (%)	95% CL (%)
Tyne - NE England	1986-96	1.4	± 0.4	1997	0.5	± 0.8
Wear - NE England	1986-96	0.9	± 0.2	No data		
Dee - N. Wales	1992-96	15.3	± 5.3	1997-2003	2	± 1.0
Taff - S. Wales	1991-96	22.0	± 6.8	1997-2003	9.8	± 4.2
Test - S. England	1991-96	28.4	± 5.9	1997-2000	11.9	± 4.2

Prior to the introduction of the management measures in 1997, exploitation rates in the Irish fishery were estimated at about 1% for stocks from the north east of England, higher (15 to 22%) for two rivers in Wales, but highest (28%) for the River Test in southern England. Since the introduction of the regulatory changes in 1997 and subsequent years, exploitation rates have fallen to 0.5% for the Tyne (data for one year only), 2 to 10% for Welsh rivers and 12% for the River Test. While it was not possible to use the modelling approach to estimate exploitation rates for other stocks, the overall pattern of tag recapture rates is consistent with this regional pattern of exploitation.

It appears, therefore, that exploitation on salmon from north east England in the Irish fishery is negligible, that exploitation on stocks from north west England and north Wales is currently low, but that levels increase for rivers further south in Wales and in south west and southern England. A full report on the investigations is currently being finalised and will be published shortly.

Other homewater fisheries

Few tags of English and Welsh origin have been returned from homewater fisheries in Northern Ireland or Scotland. The exploitation rates of English and Welsh salmon in these fisheries have not been estimated, but are thought to be low.

Marine by-catch

In 2004, NASCO requested ICES to estimate the potential by-catch of post-smolt salmon in pelagic trawl and purse seine fisheries for mackerel, herring, blue whiting and capelin. Though details are available on the size of the catches by several countries by quarter and area, they are insufficient to assess salmon by-catch. Nevertheless, it was considered that trawling near the surface was more likely to intercept post-smolts than trawling lower in the water column or fishing with purse seines.

A number of approaches to estimating by-catches of salmon have been considered, including extrapolation from research surveys and commercial fishery observer and screening programmes. There has been a low incidence of salmon catches in the majority of existing screening programmes for pelagic research surveys and various countries' pelagic fisheries and on-shore fish processing plants. The exception was a total of 5,851 salmon recorded as by-catch by Dutch vessels fishing in the North Sea between 1995 – 2003, the highest densities occurring in June and October, close to the coast near the Rhine estuary. It not known whether these peaks reflect a true spatial and temporal aggregation of salmon, or whether sea trout have been misclassified as salmon in these fisheries.

Because commercial catch screening methods cannot examine all the catch, it is necessary to sub-sample many of these hauls to provide coverage of the catch, as had been done in a large scale observer-based programme of the mackerel fishery in the Norwegian Sea in 2002 (ICES, 2003).

However, these estimates were based on quarterly rather than weekly disaggregated catches, and were considered to be unreliable. ICES is working to establish suitable protocols for observer-based screening programmes for pelagic fisheries, focusing on a relatively restricted period when there is likely to be overlap in time and space between salmon presence and the mackerel fishery.

Norwegian research cruises to investigate salmon and mackerel were carried out between 2001 and 2003 both in the international area and in the Norwegian EEZ west and north of the Voering Plateau in the Norwegian Sea (61 – 73.3°N; 1.5°W- 13°E). A total of 198, 590 and 436 post-smolts were taken in 2001, 2002 and 2003 respectively, mainly in the international zone, where the strongest branch of the North Atlantic Current passes west of the Vøring Plateau. It was estimated that 26 post-smolts were captured per tonne mackerel in the international zone in 2002, and 25 in 2003, compared with 16 post-smolts/tonne of mackerel in the Norwegian EEZ in 2001, 57 in 2002 and 6 in 2003. It is possible that the overlap in time between the salmon's presence and the fisheries in this area may be shorter than originally thought.

The potential by-catch of salmon and post-smolts in the Russian mackerel fishery in the Norwegian Sea was investigated by onboard observers in 2002 and 2003. From a total catch of 3,800 t of mackerel and 3,400 t of blue-whiting inspected, only 1 post-smolt and 15 adult salmon were recorded in July-August.

Although there is a large discrepancy between these estimates (the highest value was 57 post-smolts/tonne of mackerel from the Norwegian research surveys, and the lowest values of 0.0003 post-smolts/tonne from the Russian fishery), the data collected in 2002-2003 in the Russian pelagic fish surveys and in the screening programme suggest extremely low numbers of post-smolts and adult salmon were caught in the mackerel fishery in July-August in the international waters of the Norwegian Sea.

It was concluded that, although accurate data can be obtained by scanning research survey catches for salmon, the results cannot be extrapolated to estimate by-catch in the commercial fishery unless extensive inter-calibration trials of the different gears used for research and in the commercial fisheries are carried out.

REPORT ON STATUS OF STOCKS IN 2004

3. Status of stocks

3.1 Conservation Limits and Management Targets

3.1.1 Progress with setting conservation limits

The use of conservation limits in England and Wales has developed in line with the requirement of ICES and NASCO to set criteria against which to give advice on stock status and the need to manage and conserve individual river stocks. Conservation limits (CLs) indicate the minimum desirable spawning stock levels below which stocks should not be allowed to fall. The CL is set at a stock size below which further reductions in spawner numbers are likely to result in significant reductions in the number of juvenile fish produced in the next generation.

Two relationships are required to derive the CLs shown in Table 19:

(i) a **stock-recruitment curve** – defining, for the freshwater phase of the life cycle, the relationship between the number of eggs produced by spawning adults (stock) and the number of smolts resulting from those eggs (recruits)

(ii) a **replacement line** – converting the smolts emigrating from freshwater to surviving adults (or their egg equivalents) as they enter marine homewaters. This relationship requires an estimate of the survival rate at sea.

The model used by the Agency to derive a stock-recruitment curve for each river assumes that juvenile production is at a 'pristine' level for that river type (i.e. is not affected by adverse water quality, degraded physical habitat, etc).

Similarly, in deriving the replacement line, marine survival rates for most river stocks were assumed to be equivalent to the rates estimated on UK monitored rivers (such as the North Esk) in the 1960s and 1970s. Default survival values recommended for this purpose were 25% for 1SW salmon and 15% for MSW fish (Environment Agency, 1998). However, that period is thought to be one of high sea survival, and new default values of 11% for 1SW salmon and 5% for MSW fish which are more representative of sea survival over the last 20 years were introduced by the Agency in April 2003 (Environment Agency, 2003b).

These rates have now been applied in calculating CLs for all rivers with Salmon Action Plans (SAPs). In this year's report, as in 2003, the CLs for all principal salmon rivers for which egg deposition estimates are reported in Table 19 have incorporated the new lower marine survival estimates. The net effect of these changes has been to reduce the CLs: the scale varies from river to river, but resulted in a 26% reduction, on average, in England and Wales from values used prior to 2003.

Introducing marine survival rates which are intended to be closer to those currently experienced by UK salmon stocks will reduce the effect of high mortality at sea as a cause of failing CLs. This will help managers focus on other issues over which they have more control (e.g. poor environmental quality in-river, over-exploitation by net and rod fisheries, etc.) when compliance failure occurs. The reduction in CLs means, however, that lower levels of spawning escapement are accepted before the stock is considered to be threatened. In some cases, higher reference points may have been used for management purposes (e.g. to review Net Limitation Orders or introduce Byelaws) in order to provide additional protection for the stock.

Table 19. Conservation Limits (CL) and the proportion of CL attained for the period 1996-2004 for the principal salmon rivers of England and Wales. Current compliance and predicted compliance in 2008 are shown in the right hand columns (see Section 3.1.1 for details). Data for 2004 are provisional.

Region/ River	Accessible wetted area hectares	CL eggs/100m^2	CL eggs (x10^6)	Management Target eggs (x10^6)	2004 egg deposition (millions) *			Proportion of Revised Conservation Limit attained (%)									Current compliance #	Predicted compliance in 2008
					1SW	MSW	All	1996	1997*	1998*	1999*	2000*	2001*	2002*	2003*	2004*		
NE																		
Coquet	144	218	3.14	5.62	-	-	14.28	158	231	190	169	262	285	304	286	455	Pass	Pass
Tyne	542	208	11.25	25.04	-	-	76.16	246	218	241	307	355	421	436	379	677	Pass	Pass
Wear	232	250	5.80	8.66	-	-	14.61	81	51	84	71	121	108	144	146	252	Pass	Pass
Tees	620	240	14.90	15.83	-	-	7.18	8	6	27	25	23	16	19	20	48	Fail	Fail
Esk-Yorks	86	236	2.02	2.25	-	-	1.73	12	43	23	13	28	36	52	34	85	Fail	Uncertain
Total			**37.11**	**57.40**			**105.05**											
Southern																		
Test	138	246	3.40	4.00	-	-	2.79	36	23	57	57	39	29	76	27	82	Fail	Uncertain
Itchen	69	234	1.63	1.95	-	-	1.01	42	31	63	27	29	32	31	31	62	Fail	Fail
Total			**5.03**	**5.95**			**3.80**											
SW																		
Avon-Hants	369	175	6.48	7.79	1.44	1.90	3.34	80	17	28	40	64	58	95	30	52	Fail	Uncertain
Stour	142	149	2.12	2.19	-	-	0.21	7	11	7	8	14	12	19	6	10	Fail	Fail
Piddle	18	177	0.31	0.40	0.10	0.09	0.19	125	106	113	105	168	58	78	47	61	Fail	Fail
Frome	88	171	1.50	2.08	0.90	0.77	1.67	205	195	200	131	97	99	140	86	111	Fail	Fail
Axe	83	175	1.45	1.65	-	-	0.24	28	21	20	28	19	25	70	34	17	Fail	Fail
Exe	282	253	7.14	11.24	-	-	22.21	165	188	196	255	298	150	137	111	311	Uncertain	Uncertain
Teign	98	251	2.47	3.57	3.98	0.96	4.94	190	93	88	76	134	87	58	50	200	Fail	Uncertain
Dart	137	218	2.98	3.44	2.62	0.35	2.97	53	67	51	53	67	49	39	34	100	Fail	Fail
Avon-Devon	35	202	0.70	0.86	-	-	0.76	76	52	62	59	72	78	126	122	109	Uncertain	Uncertain
Erme	20	180	0.37	0.55	-	-	0.33	47	97	59	120	65	36	237	38	91	Uncertain	Uncertain
Yealm	11	212	0.24	0.34	-	-	0.07	61	53	163	17	91		67	10	28	Fail	Fail
Plym	29	188	0.55	0.71	-	-	0.05	111	77	69	33	57	41	57	21	9	Fail	Fail
Tavy	68	201	1.37	1.90	-	-	0.99	57	96	182	79	82	68	20	19	72	Fail	Fail
Tamar	197	215	4.24	6.18	-	-	5.11	119	69	160	106	99	45	58	49	121	Fail	Fail
Lynher	29	233	0.68	0.94	-	-	0.96	39	76	155	63	130	60	58	52	142	Uncertain	Uncertain
Fowey	42	207	0.86	1.45	-	-	3.59	193	127	152	221	222	225	311	255	417	Pass	Pass
Camel	56	176	0.98	1.41	-	-	2.75	258	177	184	131	185	180	214	258	280	Pass	Pass
Taw	274	211	5.78	9.71	-	-	13.15	226	108	213	200	353	98	123	101	228	Uncertain	Uncertain
Torridge	198	207	4.10	5.36	-	-	3.96	110	35	95	47	84	17	38	26	97	Fail	Fail
Lyn	27	359	0.97	1.61	-	-	3.29	336	144	172	208	360	293	247	208	339	Pass	Pass
Total			**45.28**	**63.38**			**77.98**											
Midlands																		
Severn	898	143	12.85	22.50	1.43	13.36	14.79	341	138	72	72	93	116	70	138	115	Fail	Fail
Total			**12.85**	**22.50**			**14.79**											

Wales																	
Wye[$]	1610	221	35.66	42.88	-	-	31.96		66	73		63	21	33	72	90	Fail	Uncertain
Usk	407	248	10.11	13.53	-	-	19.88	155	122	148	153	209	216	174	89	197	Uncertain	Uncertain
Taff & Ely	146	219	3.19	3.54	-	-	0.34	25	18	19	36	15	7	18	26	11	Fail	Fail
Ogmore	61	180	1.10	1.33	1.11	0.14	1.25	48	70	76	61	77	62	46	26	113	Fail	Uncertain
Tawe	88	211	1.85	2.18	1.19	0.20	1.38	32	39	43	32	21	64	78	31	75	Fail	Uncertain
Tywi	500	226	11.30	14.27	14.51	3.24	17.75	102	56	78	71	89	44	67	85	157	Uncertain	Uncertain
Taf	90	189	1.70	2.44	2.59	0.76	3.34	53	83	54	85	107	133	48	32	197	Uncertain	Uncertain
E&W Cleddau	87	179	1.55	1.67	0.57	0.02	0.59	22	41	44	30	50	39	26	28	38	Fail	Fail
Teifi	326	265	8.65	12.87	20.69	2.99	23.68	219	139	132	145	143	164	128	89	274	Uncertain	Uncertain
Rheidol	31	222	0.68	0.84	0.63	0.03	0.67	112	76	60	56	51	48	30	27	98	Fail	Fail
Nevern	19	259	0.48	0.60	0.47	0.03	0.50	47	28	36	50	69	71	40	85	103	Fail	Uncertain
Dyfi	179	235	4.21	5.32	3.22	0.61	3.83	132	60	83	58	72	85	27	28	91	Fail	Fail
Dysinni	31	216	0.68	0.75	0.15	0.00	0.15	25	28	40	8	23	6	26	4	22	Fail	Fail
Mawddach	57	242	1.37	1.57	1.34	0.08	1.42	105	99	107	117	67	80	79	69	104	Fail	Fail
Dwyryd	9	201	0.19	0.36	0.46	0.01	0.47	279	279	281	140	79	234	497	251	251	Uncertain	Uncertain
Glaslyn	25	191	0.48	0.69	0.51	0.03	0.53	109	136	72	39	24	42	52	15	112	Fail	Fail
Dwyfawr	33	258	0.86	1.04	0.85	0.07	0.92	58	61	35	35	47	34	28	20	107	Fail	Fail
Seiont	21	226	0.48	1.14	2.89	0.18	3.07	147	158	198	111	214	242	69	85	645	Uncertain	Uncertain
Ogwen	24	362	0.87	1.50	2.89	0.18	3.07	180	259	336	165	279	392	195	137	354	Uncertain	Uncertain
Conwy	50	127	0.63	1.21	2.70	0.52	3.23	402	226	267	173	345	430	214	304	511	Pass	Pass
Clwyd	84	237	1.99	2.45	1.61	0.16	1.77	47	27	128	77	63	81	60	46	89	Fail	Uncertain
Dee	617	248	15.30	17.61	0.51	0.52	18.94	86	91	107	81	61	85	114	88	124	Uncertain	Uncertain
Total			**103.33**	**129.79**			**138.74**											
NW																		
Ribble	351	242	8.49	10.13	-	-	8.24	52	26	63	63	81	38	71	71	97	Uncertain	Uncertain
Wyre	67	70	0.47	0.60	-	-	0.45	42	16	96	15	14	35	41	9	96	Fail	Uncertain
Lune	423	280	11.84	17.66	-	-	30.94	83	56	120	95	165	130	154	142	261	Pass	Pass
Kent	68	223	1.52	3.24	-	-	7.29	218	139	366	117	271	414	472	429	479	Pass	Pass
Leven	46	182	0.83	0.98	-	-	0.61	45	45	56	31	92		68	81	73	Fail	Uncertain
Crake	16	194	0.32	0.41	-	-	0.17	51	14	109	32	64		58	6	54	Fail	Fail
Duddon(&Lickle)	26	121	0.31	0.55	-	-	1.04	92	56	200	77	69		115	52	335	Uncertain	Uncertain
Esk	20	181	0.37	0.58	-	-	0.49	93	55	161	173	261	116	89	59	132	Uncertain	Uncertain
Irt	35	198	0.69	0.99	-	-	1.16	133	90	157	47	120	35	90	54	169	Fail	Uncertain
Ehen	41	230	0.94	1.75	-	-	2.34	135	88	253	52	343		306	101	249	Uncertain	Uncertain
Calder	13	261	0.33	0.50	-	-	0.45	105	149	220	26	176		183	57	137	Uncertain	Uncertain
Derwent	213	185	3.93	6.82	-	-	15.42	135	139	146	144	299	235	209	125	392	Pass	Pass
Eden	688	200	13.75	19.70	-	-	32.43	166	110	95	92	101	108	107	87	236	Uncertain	Uncertain
Esk-Border	306	255	7.79	9.50	-	-	10.60	96	89	85	63	102	75	120	69	136	Uncertain	Uncertain
Total			**51.59**	**73.41**			**111.63**											
E&W	**Total**		**255.20**	**352.43**			**451.99**											

Footnotes

CL and compliance figures are provided for 61 of the 63 statutory SAP rivers. This excludes the Severn Estuary (where no one CL applies) and the Thames (where salmon populations are considered to be maintained entirely by stocking). In addition, figures are included for the Dwyryd (a statutory SAP river but originally combined with the Glaslyn) and the Crake and Calder (river systems associated with the Rivers Leven and Ehen, respectively, which feature in the SAPs for these rivers).

** Estimates include eggs contributed by rod-released fish.*

[#] Basis for current compliance explained in Section 3.1.1.

[$] CL has been revised to include previously inaccessible/unsuitable parts of the catchment; egg deposition estimates are now based on RSEs for the Wye (see Table 21).

Spawning success may have been compromised on certain catchments in NW England (Eden & Derwent) where flooding in January 2005 is likely to have caused wash-out of redds.

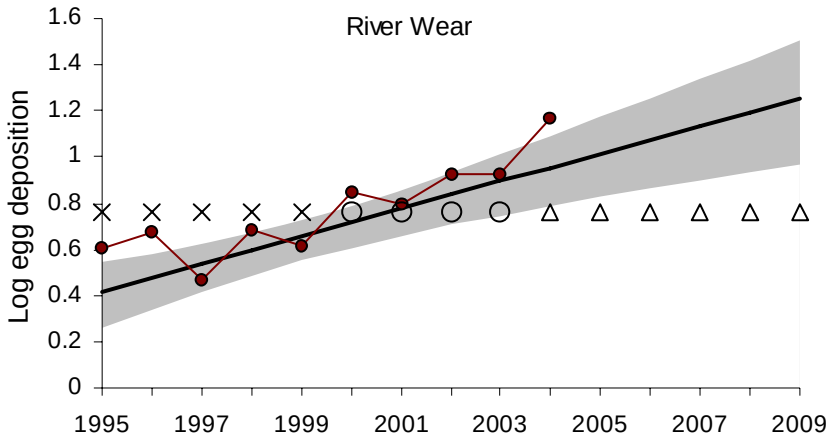
Border Esk egg deposition estimates based only on English rod catch, and likely to be underestimates.

Note: Some entries in this table have been updated from that presented in previous reports as a result of river-specific refinements and corrections.

New compliance assessment

The performance of salmon stocks in England and Wales is assessed using a compliance scheme designed to give an early warning that a river has fallen below its CL. A new approach to compliance assessment has now been developed which retains the same underlying statistical assumptions and operating characteristics of the existing scheme. This approach provides a way of summarising the performance of a river's salmon stock over the last 10 years (including the current year), in relation to its CL. Bayesian regression analyses are applied to egg deposition estimates from the last 10 years, on the assumption that there might be an underlying trend over the period. The method fits a 20th percentile regression line to the data and calculates the probability that this regression line is above the CL, and thus that the conservation limit will be exceeded four years out of five. If there is a low probability (less than 5%) that the 20th percentile regression line is above the CL, the river fails to comply. If the probability is high (more than 95%), the river complies in that year, whereas between these probability values we cannot be certain of the stock status. The new scheme also allows the 20th percentile regression line to be extrapolated beyond the current year in order to predict the likely future performance of the stock relative to its CL, and so assess the likely effect of recent management intervention and the need for additional measures.

As an example, the Wear (below) has not complied for most of the last ten years, but there has been an upward trend from failure until 1999 (X on CL line), through uncertainty in 2000-2003 (○ on CL line), and then a very high probability (p = 99%) that it will be above its CL in 2004 (△ on CL line), and that this will continue until 2008. These results are in broad agreement with the previous compliance scheme.



The probability that each of the salmon rivers in England and Wales were above their respective CLs in 2004 is given in Table 19, which also gives the predicted probability that each river will be above its respective CL in 2008.

Table 19 also shows the Management Target (MT) for each river, based on the revised CL. The MT is a spawning stock level for managers to aim at, to ensure that the objective of exceeding the CL is met four years out of five in the long run (i.e. 80% of the time). The value of the MT has been estimated using the standard deviation (SD) of egg deposition estimates for the last 10 years, where: MT = CL + 0.842*SD. The constant 0.842 is taken from probability tables for the standard normal distribution, such that the CL forms the 20 percentile of a distribution, the average (or 50 percentile) of which equates to the MT.

CLs and MTs form only one part of the assessment of the status of a stock, and management decisions are never based simply on a compliance result alone. Because stocks are naturally variable, the fact that a stock is currently exceeding its CL does not mean that there will be no need for any management action. Similarly, the fact that a stock may fall below its CL for a small proportion of the time may not mean there is a problem. Thus, a range of other factors are taken into account, particularly the structure of the stock and any evidence concerning the status of particular stock components, such as tributary populations or age groups, based for example on patterns of run timing and the production of juveniles in the river sub-catchments. These data are provided by a programme of river catchment monitoring (Section 3.2.2).

The Agency is continuing to review and revise its procedures with the aim of incorporating more extensive statistical descriptions of the risks and uncertainties in reference points and assessments.

3.1.2 Habitats Directive and salmon conservation

The EU Habitats Directive 92/43/EEC, on Conservation of Natural Habitat and of Wild Fauna and Flora, stipulates that member states maintain or restore habitats and species to favourable conservation status. To comply with this Directive, a number of rivers in England and Wales have been designated Special Areas of Conservation (SACs) because they support important populations of vulnerable qualifying species.

The following rivers in England and Wales are SACs and have salmon as a "qualifying species", which confers additional protection measures specifically for salmon in these rivers and associated on-line lakes:

Southern Region: Itchen.
South West Region: Hampshire Avon, Camel, Dartmoor Headwaters.
Wales: Wye, Usk, Teifi, Dee (and Bala Lake), Gwyrfai (and Llyn Cwellyn), Eden (west Gwynedd).
North West Region: Derwent (and Bassenthwaite Lake), Eden, Ehen.

3.1.3 Spawning escapement in 2004

Egg deposition estimates are given for 64 rivers in England and Wales in Table 19. These comprise 61 of the 63 statutory SAP rivers (excluding the Severn estuary and the River Thames) and also include the Dwyryd (a statutory SAP river, but previously combined with the Glaslyn) and the Rivers Crake and Calder (previously combined with the Rivers Leven and Ehen respectively).

For rivers without traps or counters, the usual procedure for estimating egg deposition derives run size from rod catch using estimates of exploitation, which do not take into account annual changes in fishing effort. In years when effort was low – such as the 'low-flow' year of 2003 and the foot-and-mouth disease year of 2001, this approach has probably resulted in rod exploitation being over-estimated on a number of rivers and hence escapement and egg deposition being under-estimated. An improved procedure is being developed by the Agency to address this problem. This will take account of annual changes in fishing effort, as well as partitioning effort between salmon and sea trout (no distinction is currently made between these species when reporting effort). Many rivers, and particularly some of the smaller catchments on the west coast of Wales, support relatively small salmon stocks and are principally regarded as sea trout rivers. Current procedures may fail to take adequate account of this.

Egg deposition estimates shown for the Tamar in Table 19 are not based on Returning Stock Estimates (RSEs) as given in Table 21, but on angling catches and modelled rod-exploitation rates (see Section 3.1.3). These estimates will be revised in the coming year using RSEs. The CL for the Tamar will also be re-examined as part of a wider review of the Tamar SAP planned for 2005.

Compliance assessments (see Section 3.1.1) are shown in Table 19 for all 64 rivers. Of these, 33 rivers (52%) failed compliance in 2004, and 22 are also forecast to fail compliance in 2008. Despite improved levels of egg deposition in 2004, the new method of assessing compliance results in only 10 of 64 rivers (16%) across England and Wales having a high probability that they actually are achieving their CL in 2004. This remains the same in 2008. The remaining 20 rivers fall between a clear fail or pass in 2004; this rises to 32 rivers in 2008.

For comparison with previous year's assessments, Table 20 gives the number of rivers with egg deposition estimates above their respective CL in 2004, between 50% and 100% of their CL and below 50% CL. This shows that 39 rivers were above their CL in 2004 (17 in 2003), and only 8 below 50% of their CL, compared with 28 in 2003. Though this suggests that salmon stocks are now much stronger in many rivers than in 2003, estimates of egg deposition/escapement in most rivers are based on rod catch data and assumed exploitation rates, and 2004 was an exceptionally good year for salmon angling in the UK. It is, therefore, too early to conclude that a stock recovery is underway (see Section 4.2).

River-to-river variation in the proportion of the CL attained is illustrated in Figure 11. Most rivers in England and Wales performed better in 2004 than in 2003, though spawning escapement remained below the CL in most of the south coast chalkstreams and in some of the rivers in south west England and in south and mid Wales.

Table 20. Summary of the number and percentage of rivers above their Conservation Limits (CL), between 50% and 100% of the CL, and less than 50% of the CL, 1993-2004

Year	>CL		50-100% CL		<50% CL	
	No.	%	No.	%	No.	%
1993	34	56	12	20	15	25
1994	41	65	14	22	8	13
1995	27	43	20	32	16	25
1996	31	49	15	24	17	27
1997	21	33	25	39	18	28
1998	31	48	22	34	11	17
1999	21	33	22	35	20	32
2000	26	41	26	41	12	19
2001[$]	20	34	16	28	22	38
2002	25	39	22	34	17	27
2003	17	27	19	30	28	44
2004*	**39**	**61**	**17**	**27**	**8**	**12**

Key: [$] No assessment possible for 6 rivers due to impact of foot and mouth disease.
** Provisional values.*

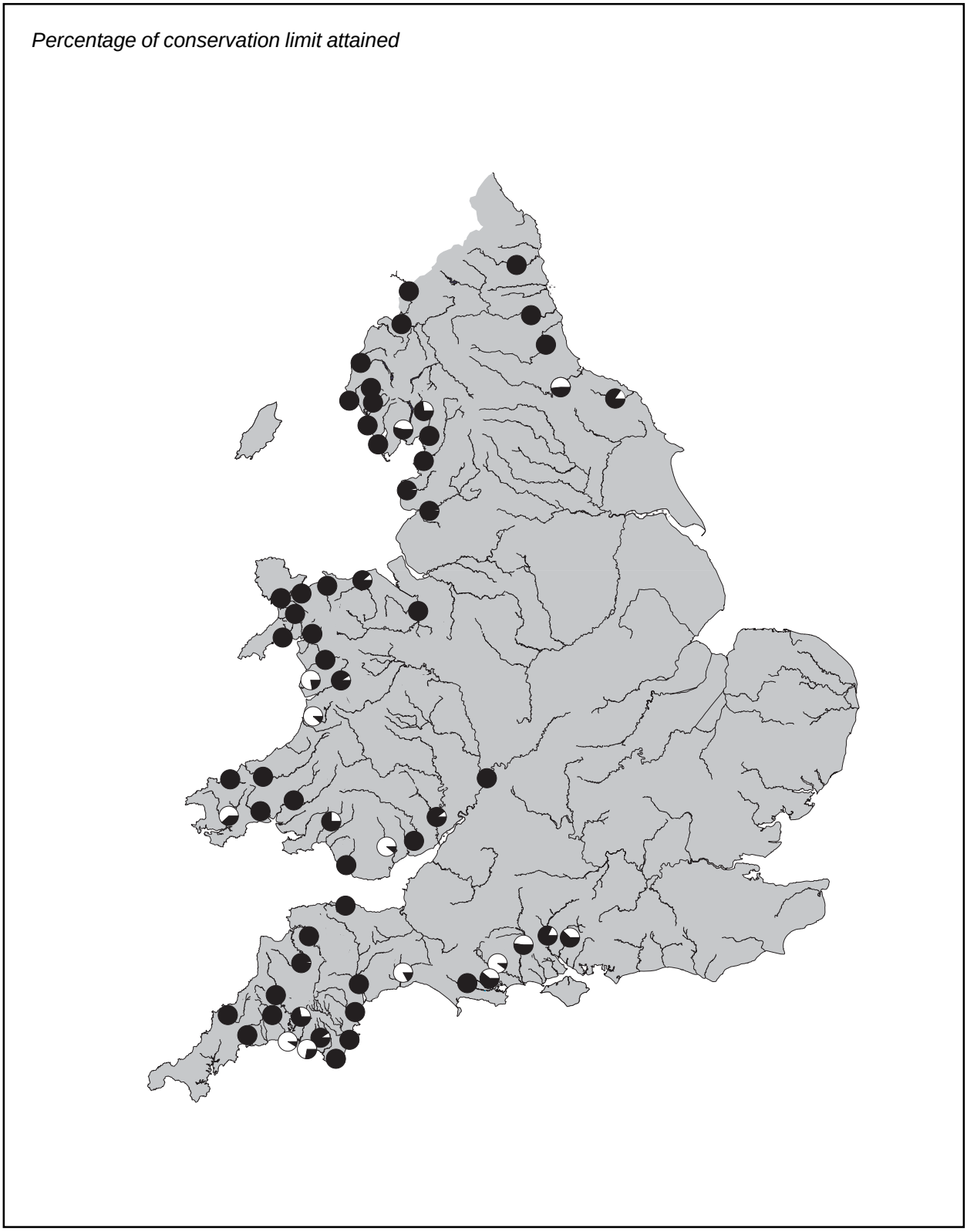


Figure 11. Pie charts for individual rivers for which conservation limits have been set (Table 19) showing the % of the conservation limit attained in 2004. A black circle indicates that the limit was met or exceeded.

3.1.4 Stock status reviews

Salmon Action Plan review: The programme of developing SAPs for all 63 principal salmon rivers in England and Wales was completed in 2004. Each Plan contains an agreed list of actions with a 5 year planning horizon. Reviews are now underway for some of the earlier SAPs (the first ones were published in 1997) and have been completed on the Wye, Leven and Crake and the Hampshire Avon, in consultation with fisheries interests and other stakeholders. This is an ongoing process.

Stock Conservation review: Following NASCO guidance, the Agency carried out a review of salmon stock conservation in 2004, assessing the status and trends in salmon stocks in England and Wales and progress with SAPs. The review demonstrated that, whilst many conservation measures had been implemented, the majority of stocks remained below the river CL and a significant number were in decline. It highlighted that the key pressures on salmon fisheries require concerted and integrated action at a broad scale to address such issues as deficiencies in land management, development and effects of diffuse pollution and siltation. Of the 42 rivers failing their CL in 2003, the review identified the main contributory factors (within catchments) as channel structure and siltation (83%), water quality (52%), in-river obstruction (36%), exploitation (29%) and water quantity (29%). An Action Plan has been drawn up to take forward the Review's recommendations.

The review noted that, whilst additional controls on exploitation were not by themselves a solution, in some instances further controls would be appropriate to protect stocks in decline and under significant pressures. To provide better focus for actions, and particularly those involving increased regulation, work is underway to develop a Decision Structure. The Decision Structure will be a tool to enable those responsible to apply conservation measures, and particularly fisheries regulations, in a logical and consistent manner. It also aims to ensure that all necessary measures to conserve stocks are fully considered and will assist in refining national policies and processes.

The Decision Structure will guide judgements and decisions, and ultimately focuses on an assessment of the probability of achieving management targets and on the level of any change required in exploitation rates. The model will be used in 2005 to review SAPs for a number of rivers identified in the stock conservation review as needing further measures.

3.2 Measures of abundance/escapement

3.2.1 Adult fish

Electronic fish counters are operated on a number of catchments in England and Wales to provide estimates of the upstream run of adult salmonids. Where possible, the counts have been adjusted to provide estimates of the returning salmon stock, and values for a number of counters in some years have also been adjusted retrospectively to accommodate new efficiency estimates. Time-series of counts, or other estimates of in-river stocks, are presented in Table 21 and Figure 12.

Except for the River Thames, where the returning stock estimate in 2004 was the second lowest in the time series, the available measures of adult stock abundance were all above the levels recorded in 2003, and were the highest in the available time series in some rivers (Fowey, Lune and Caldew). Moreover, most of these adult stock abundance values for 2004 were higher than the averages for the previous five years (1999-2003), reversing the overall downward trend on some rivers in the Southern Region in that period (Test and Itchen) and continuing the increasing trend over the past five years on other rivers in the South West (Tamar and Fowey), North West (Lune, Kent and Caldew) and in Wales (Wye and Dee).

Table 21. Validated counts and run estimates of salmon smolts and adults in rivers in England and Wales

	Stage:	Smolts	Adults												
	Region:	Southern	Thames	Southern		SW			Wales			NW			
	River:	Test #	Thames#	Test	Itchen	Frome	Tamar	Fowey	Dee	Tawe	Wye	Lune	Kent	Caldew	
	Method:	Run estimate	T	RSE[1]	RSE[1]	RSE[1]	RSE[1]	C[$]	RSE[2]	T **	C *	RSE[1]	RSE[1]	T***	
1986			81												
1987			41												
1988			288	1,507	1,336	4,334									
1989			91	1,730	791	3,324						8,785	1,137		
1990			63	790	367	2,002						8,261	2,216		
1991			36	538	152	847				93		7,591	1,736		
1992		11,967	247	488	305	954			4,643	77		4,066	1,816		
1993		7,131	259	920	646	1,280			9,757	85		7,883	1,526		
1994		3,381	143	618	311	1,141	6,381		5,285	383		6,254	2,072	1,461	
1995		6,853	162	517	798	1,102	5,656	890	5,703	43		4,589	2,762	1,456	
1996		4,712	122	515	386	1,499	4,011	1,187	4,931	82		4,739	3,246	1,202	
1997		7,229	25	317	232	1,207	2,989	1,075	5,496	58	7,713	3,205	1,473	831	
1998		14,672	6	748	412	1,273	4,181	882	6,661	79	8,357	7,457	2,166	1,042	
1999		4,085	35	777	207	815	3,590	1,262	3,664	37	n/a	4,936	1,034	969	
2000		3,516	53	537	204	641	3,547	1,692	3,751	47	8,559	8,364	2,403	1,288	
2001		2,625	9	408	214	666	4,191	1,611	4,766	88	2,981	6,198	2,961	n/a	
2002		2,190	22	1,046	239	855	6,055	1,804	7,216	252	4,012	7,606	3,204	1,231	
2003		7,585	18	367	169	562	4,835	1,777	4,915	n/a	6,607	6,895	2,819	759	
2004		**5,024**	**7**	**1,129**	**410**	**712**	**5,126**	**2,279**	**7,024**	**n/a**	**8,451**	**12,781**	**3,032**	**1,579**	
Mean (1999-03)		4,000	27	627	207	708	4,444	1,629	4,862	106	5,540	6,800	2,484	1,062	

Key to methods: *T = adult trap.*
C = adult salmon count.
RSE[1] = returning stock estimate (validated count + catch below counter).
RSE[2] = returning stock estimate (mark/recapture estimate).

Key: *# Denotes stock supported by large-scale stocking from hatchery programme.*
** Index of run only, data adjusted (where possible) for down-time, but not corrected for counter efficiency. Count for 2003 excludes July (counter not operative).*
*** Index of run - based on adult trap (2 days per week, April to November). Not operated in 2003 and 2004 due to resource constraints.*
**** Data adjusted for multiple entry (re-entry rate of 6.6% in 2002). Data relate to spawning year, i.e. 12 month period from March to February.*
[$] Includes large sea trout.

Note: *Some data corrected from those reported previously.*

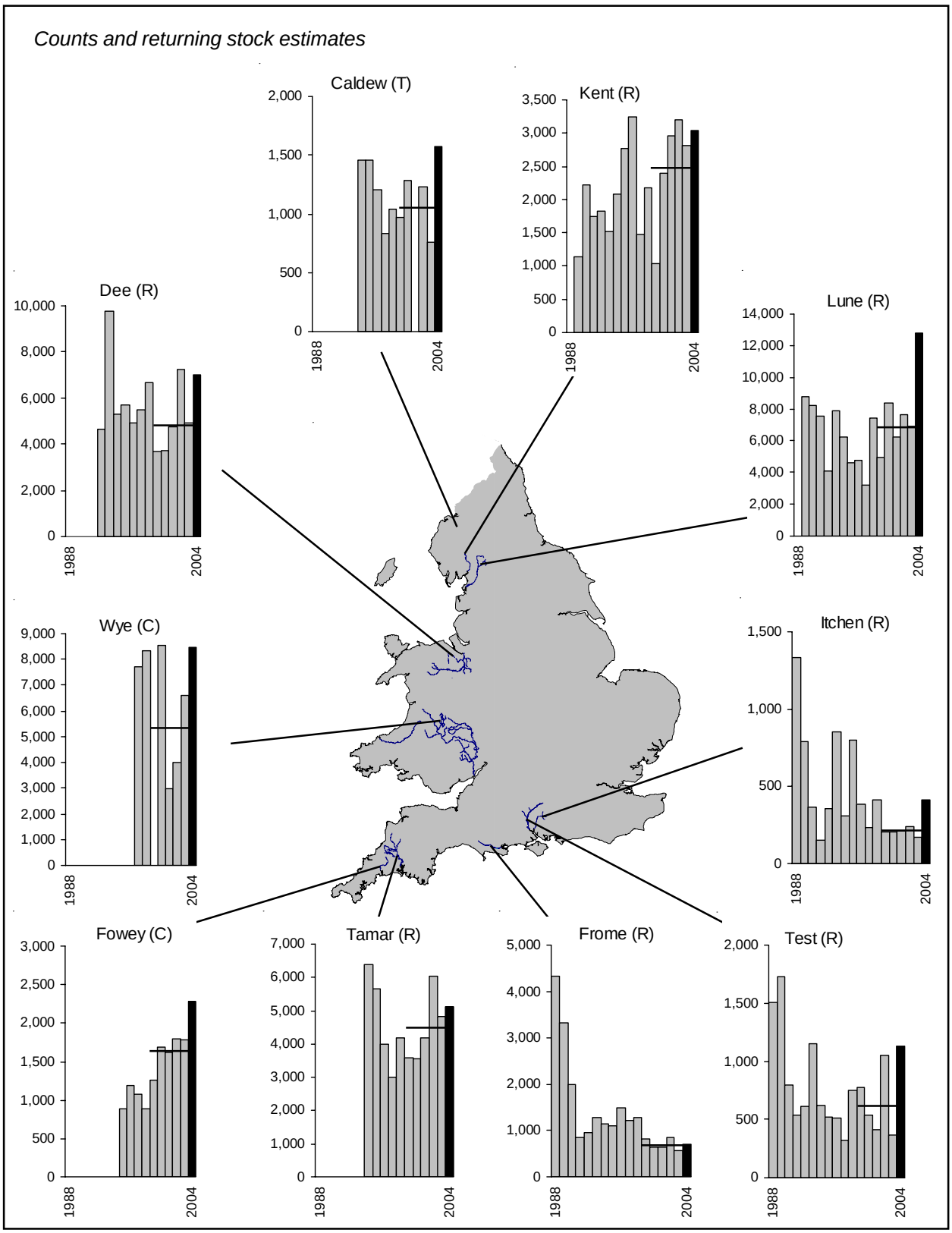


Figure 12. Counts (C), returning stock estimates (R) and trap data (T) for selected salmon stocks in England and Wales. The histograms display all available data for the years 1988 to 2004, together with the five-year mean for the period 1999-2003 (displayed as a horizontal line). Note that the histograms are not drawn to the same scale. Data for 2004 are provisional. Data for River Wye are partial hydroacoustic counts.

Although salmon have been returning strongly to some historically polluted rivers (e.g. Tyne, Wear, Ogmore), there is concern about chronic environmental degradation in others, mainly in rural areas, caused by changing land use practices, especially agriculture and forestry. Issues of particular concern are siltation resulting from soil erosion, pesticides from sheep dip chemicals, acidification and changes in river flows. The relative importance of these effects vary around the country, but clusters of high pesticide levels have been found in Welsh upland streams, and acidification still occurs in the uplands of Wales and the North West. Salmon runs in the chalk rivers of Southern Region have declined since the 1980s, but the reasons for this are not clear. The extent and nature of soil erosion impacts are being investigated and national water abstraction licence legislation is under review. Attempts to restore salmon to the Thames continue to be frustrated by water quality problems in the estuary, where there were significant fish mortalities in 2004.

Changes in the British climate are predicted to become more pronounced (Hulme *et al*., 2002) and the most likely changes are for higher temperatures, wetter winters, drier summers and more extreme events of flooding and drought. Changes in climate are global and the increased natural mortality of salmon at sea in recent years may also be linked to climate change. Thus climate change impacts are experienced by salmon in both marine and freshwater environments.

3.2.2 Juvenile salmonid monitoring programme

The Agency monitors both the stocks and fishery performance in those rivers where the annual rod catch is greater than 50 salmon. The juvenile programme started in 2002, and aims to identify spatial differences and temporal trends in the juvenile salmon population. It samples the same 380 quantitative sites each year to identify temporal trends in abundance, and 3,030 sites are sampled semi-quantitatively once every five years to identify spatial variation in the juvenile population. The sampling programme has been designed (number of sites, samples and periodicity) to detect an annual change if it is more than 20% below or more than 25% above, and differences between sub-catchments of 45%, with 5% significance and a 20% probability that the difference is real. The habitat at all sites is assessed using the model HABSCORE (Milner *et al*., 1998), which enables the detectable difference of the spatial surveys to be increased by a further 1.1 – 22.1%, depending on life stage sampled. HABSCORE also provides reference conditions against which the size of the population at any site can be compared.

In 2002, reliable data were obtained from 173 sites in Cumbria (NW Region), Wales and the southwest. The data were assessed using a classification scheme which produces two scores for each site – one for 0+ parr and one for older parr, using average values at each age for the early 1990s as a baseline (Mainstone *et al*., 1994). Figure 13 shows the distribution of abundance scores for each age class relative to the baseline average. Fewer than half of the sites are classified as average or above (Class A to C), with around 40% of sites classified as well below average or fishless (Class E or F) for each age class. Only six sites (3.5%) were classified as well above average for both age classes, while juvenile salmon were absent from 11 sites (6.5%).

It is necessary to be cautious when drawing conclusions from these data. The classifications have been derived from a limited number of surveys and cover only one year. Fish populations vary considerably with time and location, and only when several more years' surveys, and a wider geographic coverage, have been completed will it be possible to detect any meaningful trends.

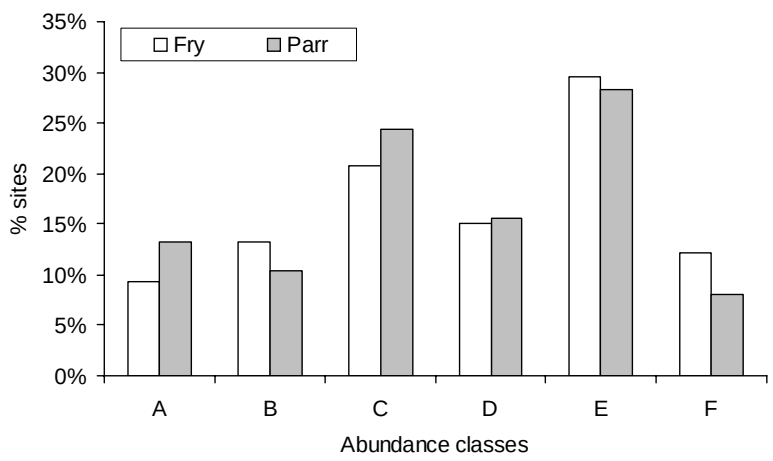


Figure 13. Salmon fry and parr abundance scores from 173 sites in Cumbria, Wales and the southwest surveyed in 2002. Over half of these sites scored lower than the benchmark averages set in the 1990s

3.2.3 River Fish Habitat Inventory

The Agency has recently completed an R&D project to develop a "River Fish Habitat Inventory" (RFHI). This project developed a methodology that combines statistical modelling techniques with a Geographical Information System (GIS) for producing a quantitative inventory of the juvenile salmonid habitat and populations present within a catchment.

The models for quantifying habitat were calibrated on reference sites throughout England and Wales that were not considered to be impacted by factors such as access for migratory adults, water quality or sedimentation problems. The models operate at two levels: one is based on a very simple assessment of map-based variables from GIS, such as altitude and catchment area; and the other includes field-based variables from habitat surveys, such as substrate and flow types. The primary application for these models will be to improve the basis for setting salmon Conservation Limits. The methods are not yet published.

The models for quantifying juvenile populations are based on annual electrofishing data, and interpolate/extrapolate these data throughout a catchment using the habitat models described above (Wyatt, 2003). The method can be applied to sites that have been sampled by either single or multiple pass removal, by using the capture probabilities from the multiple-pass sites to help interpret the catches at the single-pass sites (Wyatt, 2002). Figure 14 illustrates the spatial distribution of 0+ parr in the Tamar catchment, where it is evident that certain parts of the upper catchment have a low density of juvenile salmon. The primary application for these models will be the quantitative assessment of freshwater impacts on juvenile salmonids at a catchment scale.

3.3 Survival indices

Few data are available to evaluate long-term trends in marine survival for salmon stocks in England and Wales. Marine survival estimates for the River Corrib (Ireland), River Bush (Northern Ireland) and River North Esk (Scotland) are shown in Table 22. These data confirm patterns seen elsewhere in the North Atlantic, which indicate that marine survival can be quite variable between stocks and between years, but has generally decreased since 1987. A shorter time series for the River Dee (Wales) is also shown.

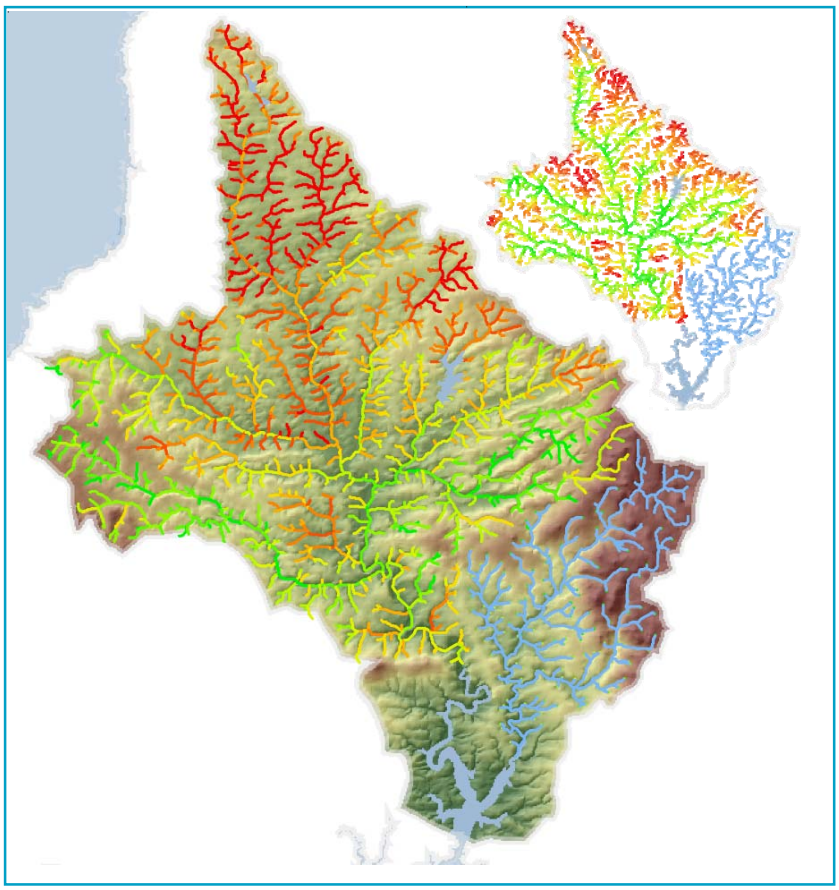


Figure 14. Estimated density of 0+ salmon on the River Tamar in 1999. Green denotes high densities (max 76/100m², red denotes low densities (min 0/100m²). Inset map shows estimation error (red is high, green is low)

Table 22. Estimated survival of wild smolts (%) to return to homewaters (prior to coastal fisheries) for index rivers in the UK and Ireland (from ICES, 2004) and Agency data

Smolt migration year	Ireland River Corrib		UK (N. Ireland) River Bush*	UK (Scotland) River North Esk**		UK (England and Wales) River Dee***	
	1SW	2SW	1SW	1SW	MSW	1SW	MSW
1984	26.2	2.0		7.8	3.5		
1985	18.9	1.8		19.9	5.8		
1986	-	-	31.3	-	-		
1987	16.6	0.7	35.1	11.9	3.1		
1988	14.6	0.7	36.2	-	-		
1989	6.7	0.7	25.0	7.0	4.2		
1990	5.0	0.6	34.7	6.4	2.9		
1991	7.3	1.3	27.8	9.6	4.2		
1992	7.3	-	29.0	-	-		
1993	10.8	0.1	-	-	-	4.5	1.8
1994	9.8	1.4	27.1	13.7	2.3	1.0	0.9
1995	8.4	0.1	n/a	9.8	3.7	2.2	0.4
1996	6.3	1.2	31.0	9.3	3.4	3.5	1.6
1997	12.7	0.8	19.8	9.6	4.4	4.8	2.3
1998	5.5	1.1	13.4	-	-	1.7	2.7
1999	6.4	0.9	16.5	-	-	4.3	9.7
2000	9.4	0.0	10.1	5.9	2.3	1.6	0.8
2001	7.2	1.1	12.4	9.0	3.2	3.7	0.0
2002	6.1		13.9	3.2		2.2	0.5
Mean (5 year)	8.2	0.7	14.4	8.2	3.5	2.7	2.7
Mean (10 year)	8.4	0.7	19.9	9.6	3.4	3.0	2.1

*Key: * Based on microtagging, corrected for tagging mortality.*
*** Based on tagging with Carlin tags, not corrected for tagging mortality.*
**** Based on microtagging with a 90% tag retention rate, not corrected for tagging mortality or other in-river losses.*

4. The ICES assessment of the status of salmon stocks in England and Wales

4.1 Description of the assessment methodology

Each year, the ICES North Atlantic Salmon Working Group makes an assessment of the status of the salmon stocks in the Northeast Atlantic (NEAC area) as a basis for advising managers. A key part of this assessment is the estimation of the pre-fishery abundance (PFA) of all NEAC stocks. The PFA of salmon from countries in the NASCO-NEAC area is defined as the number of fish alive in the sea on January 1 in their first sea winter. ICES uses estimates of PFA for the period 1971 to the present to investigate the effect of fisheries and other natural and anthropogenic factors on stocks. ICES has also used these estimates to develop a forecast of PFA for coming seasons in order to advise on management actions.

The model that ICES uses to estimate PFA for NEAC countries first estimates the returns of salmon to freshwater, and then back-calculates the numbers of fish that must have been alive in the sea to generate these returns. The numbers of returning fish are estimated using the catch data for each country, which are raised to take account of non-reported catches and exploitation rates for 1SW and MSW fish. These values are then further raised to take account of catches in the distant water fisheries and natural mortality between January 1 in the first sea winter and their return to homewaters. Ranges of values are used for some of the input data in order to obtain a measure of the uncertainty in the PFA estimates. In order to run the NEAC PFA model, each country requires time-series (beginning in 1971) of catch in numbers, non-reporting rates and exploitation rates for 1SW and MSW salmon.

For England & Wales, nominal catches have been derived from the catch returns submitted by netsmen and anglers and split into 1SW and MSW categories using two different methods. Over the period 1992-2004, monthly age-weight keys derived from salmon caught in the River Dee trap have been used to estimate the age composition of all rod-caught fish where a weight and date of capture have been provided. This has then been scaled up to the total catch (rods and nets combined) on a pro-rata basis. In earlier years (1971-91), the age composition of the total catch has been

Rotary screw fish trap - River Tamar

estimated using the mean weight of the fish caught and the mean weight of 1SW and MSW salmon recovered in tagging programmes. Estimates of unreported and illegal catches have been made on the basis of consultation with regional fisheries personnel and according to the approach described in Section 2.3.

As the contribution of farmed and ranched salmon to the national catch is negligible (see Section 2.6), the occurrence of such fish is ignored in the assessments of the status of national stocks. However, a large proportion of the fish taken in the north-east coast fishery are destined for Scottish rivers, and these are deducted from the returning stock estimate for England and Wales. (These are added to the data for Scotland in the ICES assessment.) This proportion is estimated to have declined from 95% of the north-east net catch in the early part of the time-series to 75% more recently and to around 65% in 2004. This reflects both the steady improvement in the status of the stocks in north-east England and the phase out of the fishery in 2003 (Section 2.1.3). The latter resulted in a major overall reduction in the fishery, with the majority of the remaining netsmen now fishing close inshore using T-nets. Previous tagging studies have shown that these inshore nets exploit a much higher proportion of local fish.

Exploitation rates in England and Wales in 1998-99 from a number of monitored fisheries are given in Section 2.7.1. National exploitation rates have then been estimated by deriving a time-series of 'standard fishing units' employed in the salmon fisheries for the period 1970 to the present. These are calculated from the numbers of licences issued (Section 1.2.1) weighted by their relative catching power which is estimated from historic CPUE data. The annual exploitation rates are then estimated by adjusting the estimate for 1998-99 according to the changes in the number of standard fishing units employed. Finally, ICES has agreed to apply a natural mortality rate of 3% per month in back-calculating the PFA of salmon in the sea, on the basis of studies undertaken on a range of stocks (ICES, 2002, 2003, 2004).

Whilst this model is acknowledged as containing a number of uncertainties, it currently provides our best interpretation of available information on salmon stocks at a national level. Efforts are being made to improve the input data and we hope that progress in that direction is apparent in this and previous annual reports.

4.2 Results of the pre-fishery abundance assessment

The output from the ICES-NEAC model for England and Wales is summarised in Figure 15(a) to (e). The model endeavours to provide our best interpretation of what the available catch and effort data may tell us about changes in the status of the total national stock of salmon over the past three decades. It is important to note that the overall trends may not reflect the patterns of change in any individual river. Indeed, it is well known that while many river stocks in England and Wales have declined substantially in the past 30 years, there are others, like the Tyne and Wear, that have shown great improvements; the model sums all of these trends. Furthermore, the model is likely to provide a more reliable picture of the medium-term trends than of the year-to-year fluctuations.

The model output suggests that the overall PFA of salmon from England and Wales has declined by just over 50% from the 1970s to the present time (Figure 15c, in which no estimate is available for MSW fish in 2004). The decrease has been greater in the non-maturing (i.e. potential MSW) component of the PFA, which is thought to have declined by about 65%, whilst the maturing (i.e. potential grilse) component has declined by about 25%. The results also suggest that there was a marked decline in PFA around 1990, which is consistent with the general perception of a decrease in the marine survival for many stocks around the North Atlantic at about this time.

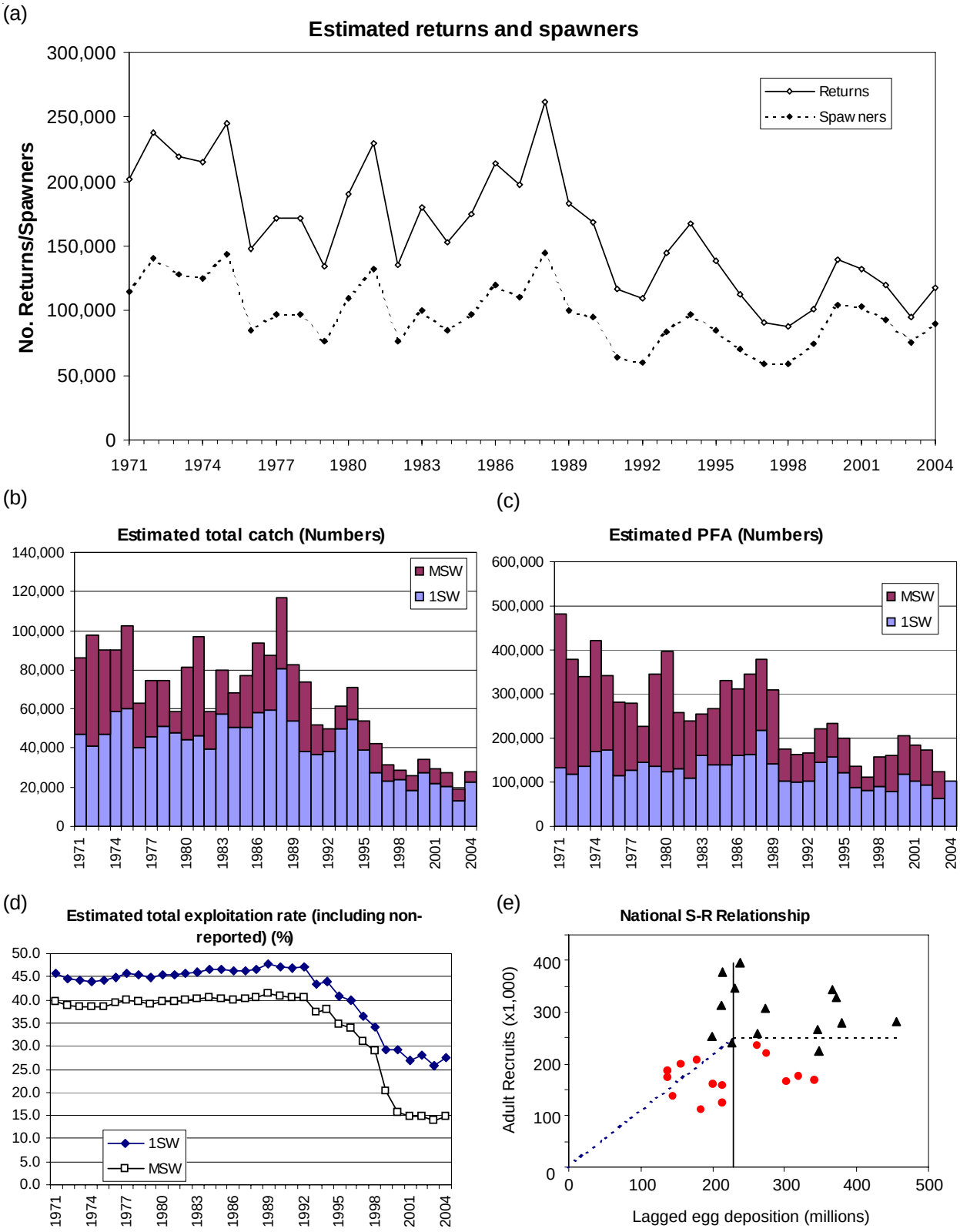


Figure 15 (a-e). Summary output from the ICES-NEAC PFA model for UK (England & Wales)

The estimated number of salmon returning to England and Wales (prior to exploitation in homewater fisheries) and the total spawning escapement show similar trends to the PFA (Figure 15a), although the declines are less marked due to the reductions in net exploitation both in distant water and homewater fisheries, and in rod fisheries. Thus, numbers of returning fish are estimated to have declined by about 35% between the 1970s and the present time, and the spawning escapement by about 30%. However, as with the PFA, the decline in MSW components has been at least twice that of 1SW components. Figure 15a indicates that there was a slight improvement in the return and spawner numbers in 2000 and 2001, followed by a decline in 2002 and 2003, but estimates for 2004 show returns towards the 2000-2001 levels.

The results also provide an estimate of the total catches in England and Wales, including the non-reported and illegal catches (Figure 15b), and the consequent overall trends in exploitation (Figure 15d). Exploitation probably remained at around 40-45% for most of the 1970s and 1980s but has been more than halved for MSW fish and reduced by over 40% for 1SW fish in the last decade due to the measures taken to control both legal and illegal fisheries.

Figure 15e shows the relationship between the numbers of spawners (the lagged egg deposition, expressed as millions of eggs) for the national stock and the subsequent production in the next generation (the recruits = PFA). As expected, production (recruits) appears to have been reduced in years of poor spawner abundance (low egg deposition), but there is also evidence of lower recruitment at all levels of egg deposition since 1990 (dots) compared with earlier years (triangles). This possibly reflects an increase in marine mortality at about this time.

4.3 The ICES assessment in relation to management measures taken to conserve salmon stocks in England and Wales

The preliminary assessment for ICES has indicated that the estimated number of salmon returning to England and Wales has declined by about 35% between the 1970s and the present time, and the decline in MSW fish has been at least twice that of 1SW fish.

Total exploitation probably remained at around 40 - 45% for most of the 1970s and 1980s, but it has been more than halved for MSW fish and reduced by over 40 % for 1SW fish in the last decade. This is due to the measures taken to control both legal and illegal fisheries in England and Wales. These have included the introduction of reducing NLOs for 15 fisheries, the first phase-out starting in 1993, and which has achieved the aim of zero effort by 2004 in all but 5 cases. In 7 fisheries, the phase out has been accelerated by buy-outs using both private and government funds. Over this period the number of net licences has declined by 53% and, in many of the remaining fisheries, the open season for taking salmon has been severely curtailed (especially since 1999 when nets were prohibited from taking salmon prior to June 1st). As a consequence, net catches comprised 40% of total catches of salmon in England and Wales (including released fish) in 2004, compared to 82% in 1989. The increase in catch and release in rod fisheries from 10% in 1993 to around 50% since 2002 has also contributed substantially to the reduction in exploitation levels.

In 2004, the Agency carried out a Salmon Stock Conservation Review that aimed to estimate the extent to which each of the principal salmon rivers in England and Wales will achieve compliance with their CL by 2008 and in the longer term. It concluded that only 19 rivers in England and 6 in Wales (out of 62 with SAPs) are expected to exceed their CLs in 2008, whilst a further 8 may do so but with a greater degree of uncertainty. The current assessment of compliance suggests that only 10 rivers in England and Wales have a high probability of exceeding their CL in 2008, with a further 32 rivers having neither a clear pass nor failure. A key concern is that the trend in estimated egg deposition on many rivers in Wales and the South and West of England is currently downwards.

Although exploitation within catchments was not generally considered a primary factor limiting salmon spawning in most rivers, further reductions in exploitation on 19 English and 11 Welsh rivers may be necessary to help sustain and improve stocks. To this end, additional measures were put in place in 2004 on one Welsh and 4 English rivers (see Section 1.2). The Irish drift net fishery remains a significant exploiter of some stocks on the west and south coasts, but water quality problems (attributed to industrial discharges, agricultural pollution, metal mining, sewerage and acidification) affect many rivers, as does water quantity. Channel structure and siltation due to intensive agriculture, forestry and the downstream impacts of water supply reservoirs were perceived as a key problem in all rivers, whilst obstructions had substantial effects on some rivers. In contrast, rivers in the North East and some in the North West are showing an upward trend in salmon runs, the former clearly benefiting from improved water quality and, more recently, from the buy-out of the majority of the north-east coast drift nets.

5. Microtag, fin clip and external tag releases

Details of all marking and tagging of salmon undertaken in England and Wales in 2004 are included at Annex 4.

In 2004, 80,868 hatchery-reared salmon parr and smolts and 9,682 wild salmon smolts were microtagged and adipose fin-clipped and released in England and Wales to assess levels of exploitation and marine survival and to investigate the efficacy of enhancement programmes. A further 87,458 hatchery parr and smolts were marked with adipose fin clips, and almost 5,000 wild parr were given other tags or marks (e.g. PIT tags), and some of these were given adipose fin clips. About 1,200 adult salmon were tagged for the assessment of returning stocks or in conjunction with the use of radio tags in behaviour studies.

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GLOSSARY OF TERMS AND ABBREVIATIONS USED IN THIS REPORT

This glossary has been extracted from various sources, but chiefly the EU SALMODEL report (Crozier *et al.,* 2003) and the Agency's SAP reports (p.6).

Adult Salmon after the middle of the first sea-winter, after which the main categorisation is by sea-age, measured in sea-winters (e.g. two sea winter, or 2SW).

Abstraction Taking water, either permanently or temporarily, from a water source (river, stream, spring, pond, lake or groundwater).

Anadromous fish Fish, born in freshwater, that migrates to sea, to grow and mature, and then returns to fresh water as adults to spawn (e.g. salmon, sea trout).

By-catch The capture of non-targeted fish.

Catchment The area of land draining to a defined point.

Dissolved oxygen The amount of oxygen dissolved in water, one of the features that is used to classify water quality.

Distant-water fisheries Fisheries in areas outside the jurisdiction of the country of origin. With respect to the NASCO convention, this specifically refers to the fisheries under the jurisdiction of the Faroe Islands and Greenland.

EC Directive A type of legislation issued by the European Community, which is binding on Member States and sets standards and results to be achieved.

Escapement Salmon or sea trout that survive to spawn after exploitation.

Exploitation Removal of fish from a stock by fishing.

Fishery The area where it is, or may be, lawful to fish and where the resource is exploitable.

Fry Young salmonids that have hatched out in the current year, normally in May for salmon and trout, at the stage from independence on yolk sac as the primary source of nutrition up to dispersal from spawning areas.

Grilse Adult salmon that have spent only one winter feeding at sea before returning to freshwater to spawn; normally only applied to salmon in homewaters.

Homewater fisheries Fisheries within the jurisdiction of the countries of origin (within 12 miles).

MAFF The former Ministry of Agriculture, Fisheries and Food; incorporated in June 2001 into the Department for Environment, Food and Rural Affairs (Defra).

Management target A desirable stock level or level of fishing activity which may be used as a reference point to achieve management objectives.

Microtag A coded wire tag 1.1 mm long and 0.25 mm diameter, inserted into the nasal cartilage (snout) of fish and detectable in live fish, but only readable after removal.

Multi-Sea-Winter (MSW) salmon Adult salmon returning to spawn after two or more years feeding at sea.

NLO – Net Limitation Order Mechanism within the Salmon and Freshwater Fisheries Act whereby the competent authority may apply to limit the number of nets fishing a public fishery.

Parr Juvenile salmonid in the stage following fry until its migration as a smolt or, for non-migratory forms, until it becomes an adult. Salmon parr are normally 8 – 16 cm long and have parr-marks (dark vertical bars) on the sides of the body.

Post-smolt Young salmon, at the stage from leaving the river until the middle of its first winter in the sea.

Precautionary approach A concept enshrined in Principle 15 of the Rio Declaration of the UN Conference on Environment and Development, which states: "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

Pre-fishery abundance (PFA) The numbers of salmon estimated to be alive in the ocean from a particular stock at a specified time (1st Jan for Faroes fishery; 1st Aug for West Greenland fishery).

Production The assimilation of nutrients to produce growth in a population over a given period.

Radio tag An electronic transmitter which emits radio frequencies and is attached to a fish to enable its position to be determined in freshwater.

Recruits The abundance of fish measured at a particular point in the life cycle, e.g. at the juvenile stages, the smolt stage, at the stage of recruitment to the fishery, or as returning spawners.

Reference point An estimated value derived from an agreed scientific procedure and/or model which corresponds to a state of the resource and/or of the fishery and can be used to assess stock status or inform management decisions.

Run The number of adult salmon ascending, or smolts descending, a river in a given year. The main smolt run takes place in spring, whereas adult salmon runs may occur in spring, summer, autumn or winter.

Special Areas of Conservation (SACs) To comply with the EU Habitats Directive (92/43/EEC) on Conservation of Natural Habitat and of Wild Fauna and Flora, which stipulates that member states maintain or restore habitats and species to favourable conservation status, a number of rivers in England and Wales that support important populations of vulnerable qualifying species have been designated candidate SACs. Where salmon is a "qualifying species", additional protection measures specifically for salmon are required.

Salmon Action Plan (SAP) An agreed list of actions that the Environment Agency, in partnership with outside interests who support the plan, is committed to address in order to meet the objectives of its National Salmon Management Strategy (launched in 1996) at a local level.

Salmonid A fish belonging to the family *Salmonidae*, which includes the Atlantic salmon (*Salmo salar*), trout (*Salmo trutta*), charr (*Salvelinus alpinus*) and rainbow trout (*Oncorhynchus mykiss*).

Sea trout Anadromous form of the trout (*Salmo trutta*) after the post-smolt stage; the brown trout, *Salmo trutta*, remains in freshwater throughout its life

Smolt At a particular stage of their development, salmon parr undergo physiological changes, they become silver in appearance and migrate to sea, and are known as smolts. Salmon smolts are typically 12 - 16 cms long.

Smolt age The number of winters that a salmon remained in freshwater prior to emigration as a smolt (this does not include the winter in which the egg was laid).

Spring salmon Multi-sea-winter salmon which return to freshwater early in the year, usually before the end of May.

Stock A management unit comprising one or more salmon populations, which may be used to describe those salmon either originating from or occurring in a particular area. Thus, salmon from separate rivers are referred to as “river stocks”.

Stocking The intentional release of fish into an ecosystem.

Sustainable use The use of a biological resource in a way and at a rate that does not lead to the long-term decline of its potential to meet the needs and aspirations of present and future generations. Sustainable is not meant to imply that abundance is constant.

ANNEX 1. Additional information

North Atlantic Salmon Conservation Organisation

The North Atlantic Salmon Conservation Organisation (NASCO) was established in 1984 following calls for international co-operation on the management of salmon stocks. It is an international body with the objective of contributing through consultation and co-operation to the conservation and rational management of salmon stocks taking account of the best available scientific evidence. NASCO therefore seeks scientific advice on the status of salmon stocks and fisheries and their management from the International Council for the Exploration of the Sea (ICES) (Annex 2). The Contracting Parties to the NASCO Convention are: Canada; Denmark (in respect of the Faroe Islands and Greenland); European Union; Iceland; Norway; the Russian Federation; and the USA. Much of the business of the organisation is conducted by three regional Commissions: the North American Commission; the North East Atlantic Commission; and the West Greenland Commission. One of the main functions of these Commissions is to propose regulatory measures for fisheries of one Party to the NASCO Convention which exploit salmon originating in the rivers of other Parties. The main fisheries of relevance for the management of European stocks are those operated on the west coast of Greenland and within Faroese waters. In 1998, NASCO adopted the Agreement on the Adoption of a Precautionary Approach; this requires that more caution be exercised when information is uncertain, unreliable or inadequate, and that the absence of adequate scientific information is not to be used as a reason for postponing or failing to take conservation and management measures.

International Council for the Exploration of the Sea

The International Council for the Exploration of the Sea (ICES) provides biological information and advice on a wide range of fish stocks in order to help fisheries managers maintain viable fisheries within sustainable ecosystems. Information is compiled and assessments are conducted by Working Groups, which are comprised of national experts on the specific fish stocks. The Working Group reports are passed to the Advisory Committee on Fisheries Management (ACFM) for peer review and to prepare the advice to managers. The advice may take many forms, but in general it involves: assessments of stock dynamics; evaluation of the status of the stocks; projections of various stock parameters into the future; and management options. For Atlantic salmon, ICES provides advice relating to the list of questions posed by NASCO (Annex 2). The assessment of salmon stocks and their fisheries presents particular problems to the ICES scientists both because of the highly migratory nature of the fish and because they comprise a large number of distinct river stocks which must, to some extent at least, be managed separately.

The Environment Agency's catch return system

The Agency and its predecessor the National Rivers Authority have operated a national catch return system since 1995. The first national catch reminder was issued to anglers (regardless of whether a return had already been made) in January 1995, in respect of the 1994 season. For 1995, the reminder was brought forward to November, closer to the end of the fishing season in most regions. The reporting and reminder system has been subject to a number of difficulties, not least the problem of collating licence counterfoils from over 17,000 outlets and inputting details onto a database in time for the November reminder. In 2001, improvements to the database enabled more effective targeting of reminders. These improvements also made possible the issue of a second reminder (sent to all anglers who had not sent in a return by 11 January), in line with NASCO recommendations, in order to reduce the level of unreported catch. This was undertaken nationwide for the first time early in 2002, in respect of catches for the 2001 season, and was continued in 2003 and in 2004.

Summary of Regulatory Measures agreed by NASCO for the West Greenland Salmon Fishery

Year	Allowable catch (tonnes)	Comments/other measures
1984	870	
1985	-	Greenlandic authorities unilaterally established quota of 852t.
1986	850	Catch limit adjusted for season commencing after 1 August.
1987	850	Catch limit adjusted for season commencing after 1 August.
1988-1990	2520	Annual catch in any year not to exceed annual average (840t) by more than 10%. Catch limit adjusted for season commencing after 1 August.
1991	-	Greenlandic authorities unilaterally established quota of 840t.
1992	-	No TAC imposed by Greenlandic authorities but if the catch in first 14 days of the season had been higher compared to the previous year a TAC would have been imposed.
1993	213 *	An agreement detailing a mechanism for establishing annual quota in each of the years 1993 to 1997 was adopted by the Commission.
1994	159 *	
1995	77	
1996	-	Greenlandic authorities unilaterally established a quota of 174t.
1997	57	An addendum to the 1993 Agreement was agreed by the Commission.
1998	Internal consumption fishery only	Amount for internal consumption in Greenland has been estimated in the past to be 20t.
1999	Internal consumption fishery only	Amount for internal consumption in Greenland has been estimated in the past to be 20t.
2000	Internal consumption fishery only	Amount for internal consumption in Greenland has been estimated in the past to be 20t. A Resolution Regarding the Fishing of Salmon at West Greenland was agreed by the Commission.
2001	28 – 200	Under an *ad hoc* management programme the allowable catch will be determined on the basis of CPUE data obtained during the fishery.
2002	20 – 55 +	Under an *ad hoc* management programme the allowable catch will be determined on the basis of CPUE data obtained during the fishery.
2003-2004	Internal subsistence consumption fishery only	Amount for internal consumption in Greenland has been estimated in the past to be 20t.

Key: * Quotas were bought out.
+ Start of five-year, annually renewable buy-out (only subsistence fishery remains).

Summary of Regulatory Measures agreed by NASCO for the Faroese Salmon Fishery

Year	Allowable catch (tonnes)	Comments/other measures
1984-1985	625	
1986	-	
1987-1989	1790	Catch in any year not to exceed annual average (597t) by more than 5%.
1990-1991	1100	Catch in any year not to exceed annual average (550t) by more than 15%.
1992	550	
1993	550	
1994	550	
1995	550	
1996	470	No more than 390 tonnes of the quota to be allocated if fishing licences issued.
1997	425	No more than 360 tonnes of the quota to be allocated if fishing licences issued.
1998	380	No more than 330 tonnes of the quota to be allocated if fishing licences issued.
1999	330	No more than 290 tonnes of the quota to be allocated if fishing licences issued.
2000	300	No more than 260 tonnes of the quota to be allocated if fishing licences issued.
2001-2003	No quota set	It is the intention of the Faroese authorities to manage the fishery in a precautionary manner with a view to sustainability, and to make management decisions with due consideration to the advice from ICES concerning status of stocks contributing to the fishery.
2004-2005	No quota set	It is the intention of the Faroese authorities to manage the fishery on the basis of the advice from ICES concerning status of stocks contributing to the fishery in a precautionary manner with a view to sustainability and taking into account relevant factors such as socio-economic needs and other fisheries on mixed stocks.

Note: The quotas for the Faroe Islands detailed above for the period 1984-2000 were agreed as part of effort limitation programmes (limiting the number of licences, season length and maximum number of boat fishing days) together with measures to minimise the capture of fish less than 60cm in length. The measure for 1984/85 did not set limits on the number of licences or the number of boat fishing days.

Acknowledgement: Information supplied courtesy of NASCO.

ANNEX 2. NASCO's request for scientific advice from ICES in 2005

1. With respect to Atlantic salmon in the North Atlantic Area:

    1.1. provide an overview of salmon catches and landings, including unreported catches by country and catch-and-release, and worldwide production of farmed and ranched Atlantic salmon in 2004;

    1.2. report on significant developments which might assist NASCO with the management of salmon stocks;

    1.3. provide a compilation of tag releases by country in 2004;

    1.4. identify relevant data deficiencies, monitoring needs and research requirements.[1]

2. With respect to Atlantic salmon in the North-East Atlantic Commission area:

    2.1. describe the key events of the 2004 fisheries and the status of the stocks;[2]

    2.2. provide any new information on the extent to which the objectives of any significant management measures introduced in recent years have been achieved;

    2.3. further develop the age-specific stock conservation limits, where possible based upon individual river stocks;

    2.4. provide catch options or alternative management advice, if possible based on forecasts of PFA for northern and southern stocks, with an assessment of risks relative to the objective of exceeding stock conservation limits and advise on the implications of these options for stock rebuilding;[3]

    2.5. provide an estimate of by-catch of salmon in pelagic fisheries.

3. With respect to Atlantic salmon in the North American Commission area:

    3.1. describe the key events of the 2004 fisheries and the status of the stocks;[2]

    3.2. provide any new information on the extent to which the objectives of any significant management measures introduced in recent years have been achieved;

    3.3. update age-specific stock conservation limits based on new information as available;

    3.4. provide catch options or alternative management advice with an assessment of risks relative to the objective of exceeding stock conservation limits and advise on the implications of these options for stock rebuilding;[3]

    3.5. provide an analysis of any new biological and/or tag return data to identify the origin and biological characteristics of Atlantic salmon caught at St. Pierre and Miquelon.

4. With respect to Atlantic salmon in the West Greenland Commission area:

   4.1. describe the events of the 2004 fisheries and the status of the stocks;[2,4]

   4.2. provide any new information on the extent to which the objectives of any significant management measures introduced in recent years have been achieved;

   4.3. provide information on the origin of Atlantic salmon caught at West Greenland at a finer resolution than continent of origin (river stocks, country or stock complexes);

   4.4. provide catch options or alternative management advice with an assessment of risk relative to the objective of exceeding stock conservation limits and advise on the implications of these options for stock rebuilding.[3]

Notes:

1. *NASCO's International Atlantic Salmon Research Board's inventory of on-going research relating to salmon mortality in the sea will be provided to ICES to assist in this task.*

2. *In the responses to questions 2.1, 3.1 and 4.1, ICES is asked to provide details of catch, gear, effort, composition and origin of the catch and rates of exploitation. For homewater fisheries, the information provided should indicate the location of the catch in the following categories: in-river; estuarine; and coastal. Any new information on non-catch fishing mortality, of the salmon gear used, and on the by-catch of other species in salmon gear, and of salmon in any existing and new fisheries for other species is also requested.*

3. *In response to questions 2.4, 3.4 and 4.4, provide a detailed explanation and critical examination of any changes to the models used to provide catch advice.*

4. *With regard to question 4.1, ICES is requested to provide a brief summary of the status of the North American and North-East Atlantic salmon stocks. The detailed information on the status of these stocks should be provided in response to questions 2.1 and 3.1.*

ANNEX 3. Description of fishing methods (nets and fixed engines) used for taking salmon and migratory trout in England and Wales

A wide variety of nets and fixed engines are used to take salmon and sea trout. The term fixed engine is an ancient one used as a general descriptor of stationary fishing gears. The following are generalised descriptions of the gear used in England and Wales (for further details see Russell *et al.*, 1995); in practice there is considerable regional variation in the precise mode of operation of specific gears and in the dimensions and mesh sizes of the nets. These characteristics have generally evolved to suit local conditions and are regulated by local byelaws.

Basket trap This is a type of fixed engine which has only been used on the river Conwy in North Wales. It consists of a metal basket set between two boulders, which is designed to catch salmon and sea trout which fall back when attempting to ascend a small waterfall.

Coastal net A loose term used to describe the nets used in the fishery off the East Anglian coast. In practice, various methods of fishing have been employed, including seine nets and drift nets.

Compass net These nets are operated from a boat held stationary against the current. A net is hung between two long poles lashed together in a V-shape and held over the side of the boat so that the net streams out underneath the boat. When a fish strikes the net, the poles are pivoted upwards with the aid of counter-balancing weights.

Coracle net These nets are only used in parts of Wales. Short lengths of trammel net are suspended between two coracles (small boats), which then drift downstream with the net strung across the current.

Crib (or Coop) These ancient fixed engines consist of stone buttresses set across a river, the gaps between the buttresses being filled by box-like traps made of either wood or metal with in-scale entrances. The River Eden cribs were built in 1133 A.D. by monks, although the Derwent cribs are of more recent construction.

Drift net A drift net consists of a sheet of netting which hangs from a floated head rope to a weighted foot rope and is designed to drift with the current or tide. Regional names include: hang, whammel, sling and tuck nets.

Haaf or heave net These one-man-operated nets are operated exclusively in the North West Region. The gear consists of a rectangular net hung from a horizontal wooden beam up to 5.5m wide. A central pole permits the netsmen to stand in the tideway holding the net facing the current with the netting streaming behind him. The net is lifted when a fish strikes the net. It is usual for several netsmen to work together line-abreast.

Lave (or dip) net Lave nets, one regional variety of similar hand-held, one-man-operated nets, consist of a large Y-shaped wooden frame supporting a net, similar in design to an angler's landing net, but measuring up to 2 m across. The netsman actively stalks fish in estuary pools or shallows at low tide.

Putchers (and Putts) Putchers are wickerwork or metal conical baskets which, when erected on stages, form putcher ranks (containing up to 800 putchers). This type of fixed engine is peculiar to the Bristol Channel and is dependent upon the high turbidity and large tidal range which occurs in this area. Each putcher has a mouth from 1 to 1.5 m wide, tapering to a narrow point which will prevent fish of moderate size from passing through. A netting leader is often used to guide fish into the putchers. Putts are of similar design to putchers, only larger.

Seine net A seine net (also known as a draft or draw net) consists of a wall of netting with a weighted foot rope and floated head rope. One end is held on the shore while the rest is paid out from a boat to enclose an area of water between two points on the shore. The net is then retrieved and any fish enclosed drawn up onto the shore. Seine nets normally operate within estuaries, although some are also fished off coastal beaches.

Sling net The sling net is a type of drift net used exclusively on the river Clwyd in North Wales. It differs from other drift nets only in so far as the nets are permitted to carry weights (not exceeding 4 kg) at either end, designed to retard the drift.

T-net T-nets are fixed engines operated close to the shore, usually in specific berths. They comprise a 'leader', usually about 200 m in length, stretching out from the beach to a 'headpiece', which contains two traps with funnel entrances. Some fish may become enmeshed or entangled in the leader of the net, but the majority are taken, free-swimming, in the traps.

'T or J'-net 'T or J'-nets consist of plain sheets of netting on a floated head rope which hang vertically in the water by means of a weighted foot rope and are set from the shore in the shape of a 'T', 'J' or 'P'. These nets are usually operated as fixed engines, held stationary by means of weights, anchors or stakes, but can also be drifted with weights used to retard the rate of movement. Fish can only be caught in a 'T or 'J' net by becoming enmeshed or entangled in the walls of the net.

Trammel net Trammel nets are similar to drift nets but are modified by the addition of sheets of larger mesh netting on one or both sides of the net. Such nets are referred to as being 'armoured'. A fish striking a trammel net pushes the small mesh net through one of the large meshes in the adjoining net and is caught in the resultant pocket. Sometimes known locally as tuck nets.

Wade net A wade net consists of a short (~30 m) single sheet of netting which is attached to a pole at each end, and is pulled along the foreshore parallel to the beach by two men, one wading and the other on the beach. Nets are 'beached' at regular intervals, or when a fish strikes, in much the same way as a seine net.

ANNEX 4. ICES Compilation of microtag, fin clip and external tag releases

Marking season: 2004

Country: UK (England and Wales)

Totals:

Origin	Primary Tag or Mark			
	Microtag	External Mark	Adipose Clip	Total
Hatchery juvenile	80,868	0	87,458	168,326
Wild juvenile	9,682	2,800	1,906	14,388
Adult	0	1,216	0	1,216
Total fish marked	**90,550**	**4,016**	**89,364**	**183,930**

Marking Agency	Age	Life Stage	H/W	Stock Origin	Primary Tag or Mark	Number marked	Code or Serial	Secondary Tag or Mark	Release date	Release Location
EA North East	Various	Adult	W	Tyne	Floy tag	28	Various	None	Jan-Nov	Tyne
EA North East	Various	Smolt	H	Tyne (Kielder burn)	Adipose	3,350		None	Various	Tyne (Kielder burn)
EA Thames	Various	Adult	W	Thames	Radio tag	6	SAL3 var.	Floy tag	June-Sept	Thames
EA Thames	Various	Adult	W	Thames	Floy tag	1	438	None	30-July	Thames
EA Thames	S1	Smolt	H	Shannon (Ireland)	Microtag	10,031	01/42/40	Adipose	01-Mar	Thames (Kennet)
EA Thames	S1	Smolt	H	Shannon (Ireland)	Microtag	10,000	01/42/46	Adipose	01-Mar	Thames (Kennet)
EA Thames	S1	Smolt	H	Shannon (Ireland)	Microtag	10,126	02/42/05	Adipose	03-Mar	Thames (Kennet)
EA Thames	S1	Smolt	H	Shannon (Ireland)	Microtag	4,360	01/42/47	Adipose	03-Mar	Thames (Kennet)
EA Thames	S1	Smolt	H	Shannon (Ireland)	Microtag	6,857	01/42/64	Adipose	02-Mar	Thames (Kennet)
EA Thames	S1	Smolt	H	Shannon (Ireland)	Microtag	7,401	01/42/65	Adipose	03-Mar	Thames (Kennet)
EA Thames	S1	Smolt	H	Shannon (Ireland)	Adipose	4,963		None	26-Apr	Thames
EA Thames	S1	Smolt	H	Shannon (Ireland)	Adipose	3,300		None	15-May	Thames
EA Thames	S2	Smolt	H	Delphi (Ireland)	Adipose	5,345		None	17-Mar	Thames (Kennet)
EA South West	Various	Parr	H	Axe	Adipose	6,000		None	16-Sep	Axe
EA South West	Various	Parr	H	Axe	Adipose	2,000		None	16-Sep	Otter
EA South West	Various	Parr	H	Axe	Adipose	1,000		None	16-Sep	Exe (Culm)
EA Midlands	Various	Parr	H	Severn (Teme)	Microtag	3,820	01/42/42	Adipose	July	Severn (Teme)
EA Midlands	Various	Parr	H	Severn (Tanat)	Microtag	5,000	01/42/41	Adipose	July	Severn (Tanat)
EA Wales	Various	Adult	W	Taff	Floy tag	100	Various	None	May-Dec	Taff
EA Wales	Various	Adult	W	Taff	CART tag	21	Various	Floy tag	May-Dec	Taff
EA Wales	S2	Smolt	H	Taff	Microtag	9,800	01/42/45	Adipose	March	Taff
EA Wales	S1	Smolt	H	Taff	Adipose	50,000		None	Apr-May	Taff
EA Wales	Various	Adult	W	Dee	Floy tag	1,029	Various	None	Feb-Oct	Dee
EA Wales	S1	Smolt	H	Mawddach	Adipose	3,100		None	16-Jan	Mawddach (Wnion)
EA Wales	S2	Smolt	H	Conwy (Lledr)	Adipose	8,400		None	Feb	Conwy (Lledr)
EA North West	1+	Parr	H	Ribble	Microtag	10,700	23/42/25	Adipose	Feb-Mar	Ribble
EA North West	1+	Parr	H	Ribble	Microtag	1,400	18/42/56	Adipose	Feb-Mar	Ribble
EA North West	S2	Smolt	H	Ribble	Microtag	1,373	18/42/57	Adipose	Feb-Mar	Ribble
CEFAS/EA Wales	Various	Smolt	W	Dee (Ceriog)	Microtag	2,348	01/42/29	Adipose	Apr-May	Dee (Ceiriog)
CEFAS/EA Wales	Various	Smolt	W	Dee	Microtag	2,933	01/42/37	Adipose	Apr-May	Dee (Lower)
CEFAS	Various	Smolt	W	Tamar	Microtag	4,401	01/42/03	Adipose	Apr	Tamar
CEFAS	Various	Parr	W	Dee (Ceiriog)	PIT	1,708	DC002A….& DC002B….	Adipose	Sept	Dee (Ceiriog)
CEFAS	Various	Parr	W	Itchen	PIT	198	DC002A….	Adipose	July-Sept	Itchen
CEFAS	Various	Adult	W	Tyne	Acoustic tag	31	Var. 1 to 76	Floy tag	Mar-Oct	Tyne
CEH	1+	Parr	W	Frome	PIT	2,800	DC002A/29/2B	None	Sept-Oct	Frome