

Council

CNL(07)71

***Presentations Made at the 2007 Special Session on Unreported
Catches***

Canada

1. Unreported catches are a concern in fisheries management
2. Underreporting and illegal fishing threaten conservation
3. Measures taken to restrict legitimate fisheries in response to declines in stocks can be nullified by unaccounted fishing mortality
4. Socio-economic losses can occur

1. Sources of unreported catch

It is illegal to retain salmon caught in gear directed at other species (applies to marine, estuary and fresh water)

Unreported catches can occur in a multitude of small, localized fisheries taking place over a very broad geographic expanse (upwards of 700 rivers in eastern Canada and 10 000 km's of coastline)

Some of these fisheries are illegal but some underreporting occurs in legal recreational and aboriginal fisheries

It is difficult to quantify the unreported catches as they are considered to result mainly from illegal fishing activities

2. Methods used to estimate unreported catch

In the past, Fishery Officers estimated illegal catches and underreporting in legal fisheries based on local knowledge

Surveys of river, estuarine and coastal areas by Fishery Officers for illegal fishing activities combined with local knowledge of the extent of illegal activities were used to estimate the total illegal catch

Frequently, because of a lack of information, unreported catch values have been carried forward from previous years

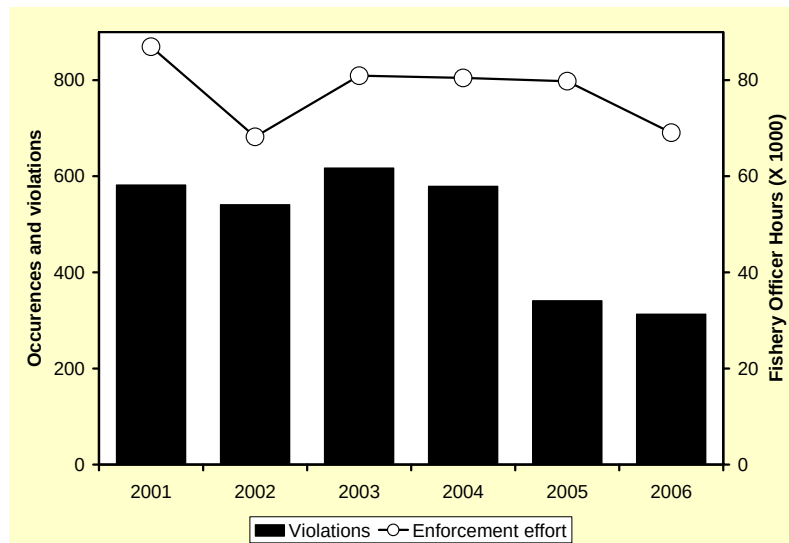
3. Trends in Unreported Catch

Canada has tabled unreported catch values of about 100 t since 2001

The proportion of the unreported catch vs the reported catch has increased as directed and intensive fisheries with reported landings (commercial fisheries with tractable landings) have been reduced or closed.

In some areas, sources of unreported catches were from aboriginal fisheries but as a result of negotiated Food / Social / Ceremonial agreements, these are now accounted for in the reported catch.

Fishery officer activities reports provide a quantified index of unreported catch trends.



Enforcement effort has averaged about 75,000 hours per year (~ 40 person years)

Violations declined by appr. 43% in 2005 and 2006, respectively, compared to average of 2001 to 2004

Declines in violations in 2005 and 2006 correspond to increases in successful prosecutions and the severity of the penalties imposed.

- *Conviction rate exceeded 75% in 2005*
- *Average monetary fine in 2004 was \$1100 Can*
- *Maximum fine imposed was \$5000*
- *Penalties included equipment forfeiture, and on occasion jail time*

Declines in levels of illegal activities are expected to continue as conviction rates remain high, penalties remain severe and public attitudes to illegal fishing change.

4. Measures taken to reduce Unreported Catch

- Management of seasons and gears for legal fisheries
 - *Closures of directed pelagic fisheries to minimize bycatch*
 - *Closure of sections or entire rivers to fishing activities under low water conditions*
- Active protection of salmon using headwater protection barriers to eliminate illegal fishing



- Increased enforcement efforts: *Atlantic salmon enforcement effort and cost is enormous - enforcement by federal fishery officers on average is equal to about 40 officers working year round*
- Public involvement in reporting illegal activities i.e. telephone tip lines
- Education and public notices
- Increased severity of penalties for illegal activities
 - *details of convictions are published in local newspapers*
 - *convicted individuals are increasingly asked to make restitution to local conservation organizations*

Canada's efforts on unreported catch

- Canada's Implementation Plan noted the need to deal with unreported catch
- In 2007, examinations have begun on past catch, catch and release and unreported catch estimates
- Unreported catch estimates in some areas are being based on direct observations, including fish seized from illegal activities
- In 2008 Canada will implement changes to reporting methodology to improve reliability and consistency in reporting of unreported catch.

Topics for Consideration

- Are unreported catches a science issue? (probably more relevant for fish managers)
- Few organizations track unreported catch.
- Are unreported catches meaningful or a useful tool?

Denmark (in respect of the Faroe Islands and Greenland)

Faroe Islands

- It is estimated that 1 ton of Atlantic salmon is taken each year as unreported catch.
- The catches arise from a legal, limited recreational fishery in Faroese rivers.
- The fishery is managed by a licensing system, in which fishing licences are sold by the Faroese Sportfishing Association in cooperation with the landowners.
- The estimate of the unreported catch is based on reports to the Faroese Sportfishing Association which then informs the Ministry of Fisheries.
- No fishing takes place in marine waters.

Greenland

After all reports from the fishery were received, a total of 22.8 tons of salmon were reported in 2006. Catches of 13.4 tons were reported by licensed fishermen as being sold on the open markets and to hotels, restaurants or institutions, while 9.4 tons were reported as being kept for private consumption

Due to the character of this fishery, especially that part for own consumption, some unreported fishery seems unavoidable, also when quota limits do not restrict the fishery. There is a lack of possibility for control and observation of the salmon fishery and there is presently no way of estimating the magnitude of it. However, for recent years ICES has estimated it to be around 10 tons.

Due to the low number of controlling authorities and the scattered character of this fishery and catches are limited to subsistence only, effective control is not made a priority by the available authorities due to the amount of effort considered necessary to undertake this reasonably. Presently it is not possible to estimate the entire magnitude of the unreported part of the fishery. Considering that a greater number of salmon has been sampled compared with the numbers of salmon reported in some areas over the past 3 years indicate that the current estimated level for the unreported fishery of around 10 tons may be underestimated.

However the Greenlandic Home Rule has put a lot of effort to make the fishermen aware that catch reports are demanded also for private consumption. In 2007 there will be TV spots during the salmon season. The same was done in 2006 and it resulted in a significant increase in catch reports turned in of more than 60 percent. Still the total utilization of licenses amounted is too low (about 31 %) even though we think some fishermen might issue a license not for the purpose of fishing salmon but to maintain the right for having a license.

In our point of view an improved reporting from the fishermen will be essential to get as accurate catch statistics as possible. Therefore Greenland will continue to get as accurate data as possible on salmon catches.

European Union - Ireland

Introduction

There are seven designated salmon fishing regions around the Republic of Ireland with a total of 17 separate salmon fishing districts. Up to 2000, official catch statistics were collected by staff of the Regional Fisheries Boards from records of licenced salmon dealers registers. In 1995, rod catch statistics were improved by the Regional Fisheries Boards and collated by the Central Fisheries Board. From 2001 to 2006, catches have been estimated directly from mandatory log book reporting from the commercial and recreational sectors. All fishermen (commercial and rod) are now obliged to tag their catch with locking coded strap tags indicating the region, year and method of capture and to record details of the catch in a logbook. These logbooks must be returned to the Central and Regional Fisheries Boards who collate the information and report the annual catch statistics (Central Fisheries Board, 2006).

Catch statistics for the Foyle Fisheries Area are provided by the Foyle and Carlingford and Irish Lights Commission (The Loughs Agency), a cross boarder organisation with Northern Ireland. Traditionally, half of the drift net and draft catch declared by the Agency is attributed to fishermen in the South of Ireland for statistical purposes while the other half is included with the declared catch for Northern Ireland.

These data have been collated into a national data set by the Marine Institute for the period 1970 to present.

Methods of estimating unreported catches

Unreported catches can be broken into two broad categories i.e. legal unreported catch and illegal unreported catch. They can also be split broadly between commercial unreported catches and recreational unreported catches.

Commercial catches

Prior to 2001, it was not possible to systematically separate out the legal from the illegal unreported catch in Ireland and in recent years a range (maximum and minimum) of values has been used for assessment and modelling purposes. These estimate have always been made contemporaneously during the season when catches were being landed and in a number of ways.

Local observation during catch scanning of coded wire tags since 1980 provide some information as to number of fish available relative to those declared

and

Information from local inspectors as to level of illegal activities were also used in the final estimate.

With the introduction of the carcass tagging and logbook programme this has provided for the first time, an estimate of the previously unrecorded legal catch in Ireland. Return rate of logbooks has exceeded 95% since 2001 and has generally exceeded 98% returns. Also, since 2001, the disposal of the catch must be reported in the commercial logbooks according to the following categories:

Domestic Consumption	Guesthouse B&B	Hotel	Licensed Dealers	Private sales	Restaurant	Unknown	Retail Outlet
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This has provided important information on legal catch previously unreported. In previous years, catch statistics mainly derived from a collation of the licenced dealers records only (except in the Eastern Region where it was based on sample fishermen's reports) and therefore fish disposed of through the other outlets above were not recorded in the official landings but as part of the "unreported" catch.

Assuming that the fishing activities remained relatively similar over recent years, the difference between the estimates of total catch up to 2000 from dealers registers alone and from 2001 on (assuming no major change in the distribution practices of the fishermen after the introduction of the carcass tags) of the extra fish disposed of in other outlets provides an indication of the magnitude of legal unrecorded catch in recent years. Whether this also provides an indication of unrecorded catch over a longer time period depends on how much the fisheries have changed over time in each district. Overall, the estimated percentage of the national catch not recorded in dealers registers was approximately 30% from 2002 to 2006.

The illegal unreported catch is now thought to be relatively small due to the difficulties of distributing untagged salmon in large numbers and the scarcity of salmon in general which command high prices in legal outlets. Most Regional authorities do not believe that there is more than 1 illegally caught salmon to every 10 legally caught salmon and the maximum and minimum range now applied is between 5 and 10% (and includes angling illegal unreported catch).

Recreational unreported catches

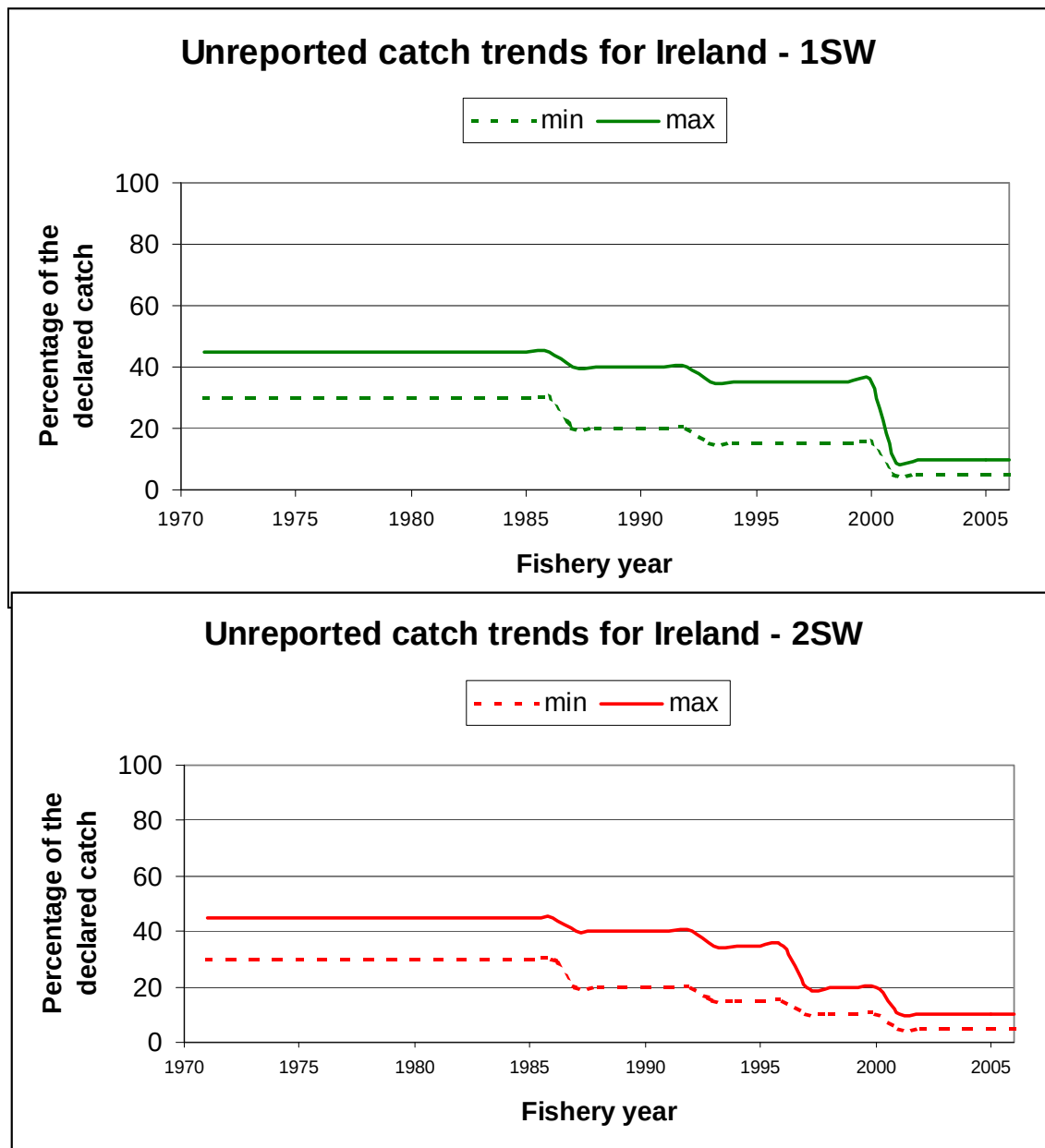
The unreported angling catch has been included in the one national estimate (or range of estimates) rather than being calculated separately. This is due to the difficulty in estimating this on a systematic basis. In fact, the declared estimate of rod catch was greatly improved by the Central Fisheries Board after 1995.

The return of angling logbooks has been increasing over the period 2001 to 2006 and about 68% of anglers now return logbooks. In this instance a raising factor is applied to provide an estimate of the total catch by district (Small, 1991). The rate of unreported illegal catch currently has not been assessed.

Trend in unreported catch

In analyses used to provide catch advice, the rate of unreporting is an important input in the estimation of Conservation Limits and Total Allowable Catch. The values currently used for the National model analyses (ICES 2007) assume an unreported range from 30 to 45% up to 1986, 20 to 40% up to 1992, 15 to 35% up to 2000. These changes are generally associated with changes to fisheries management

practices (season, gear, area restrictions etc). From 2001 on a 5 to 10% range was adopted due to the incorporation of the extra information from the carcass tagging and logbook scheme. In the absence of specific information prior to 2001, it seems likely that the estimates of unreported catch were a relatively good approximation for most years although the actual fluctuations over time cannot be ascertained.



References

ICES 2007 Report of the Working Group on North Atlantic Salmon. ICES CM/07 XX. Copenhagen

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European Union - UK (England and Wales)

Summary

All licence holders must provide the Environment Agency with details of their catch of salmon and migratory trout and the number of days fished on each river or, for nets, each fishery. Catch returns are received from 100% of net and trap licence holders and from ~90% of full season anglers. For rod anglers the proportion of under-reporting is estimated through a catch reminder system and is currently estimated at less than 10%. There are few independent measures of under-reporting in the rod fishery, but these indicate that the level is small. For the net fishery, surveillance techniques have been used and a figure of 8% has been used to adjust for the level of under-reporting. However in certain fisheries the level may be substantially higher in the past, possibly as much as 50%. The illegal catch, by its nature is difficult to quantify. A questionnaire survey of Environment Agency enforcement staff suggests that it is about 12 - 13% of reported (legal) catch.

In the early 1990s the percentage of under-reporting in the rod catch decreased from ~50% to ~20% as a result of changes in the licensing and associated catch return system covering England and Wales. Since the mid-1990s, following awareness campaigns and enhanced reminder systems the under-reporting is estimated to have declined to less than 10%. There is little information on the trend in under-reporting for the net fisheries. Whilst not a fully independent and reliable measure, the estimate of illegal catch has reduced from 23 tonnes in 2002 to 14.5 tonnes in 2006. Records of reports and incidents support a declining trend in illegal fishing in the last 10 years.

The calculation of the under-reported catch from anglers comes from an estimate of undeclared catch using the method of Small (1991). For nets-men the main source is through surveillance operations. The estimated illegal catch is derived from enforcement activities.

Of the total estimated unreported catch in 2006 (6,698 salmon), over half derived from illegal catch and a quarter from under-reporting in the rod fisheries. Net fisheries were assessed as contributing a minor component (16%).

In order to maintain the low level of under-reporting the Environment Agency issues reminders to anglers that they should record their catch. Awareness-raising efforts are also used to promote the need for, and the value of properly reporting catches. Enforcement action has been used when there have been significant instances of the law requiring reporting of catch having been contravened. Targeted enforcement activity also aims to suppress illegal unreported catch.

There has been progress against the Environment Agency's corporate target, set in 2002, to reduce illegal and unreported catch from 35 tonnes (in 2001) to 25 tonnes by 2008. The level recorded in 2006 was 25 tonnes. Whilst part of this reduction relates to the way in which the estimation of illegal catch (the greater proportion) is linked to reported (legal) catches that have declined, this does also reflect progress in improving catch reporting and reducing illegal fishing.

1. Introduction

There are 78 rivers supporting salmon in England and Wales (Figure 1)

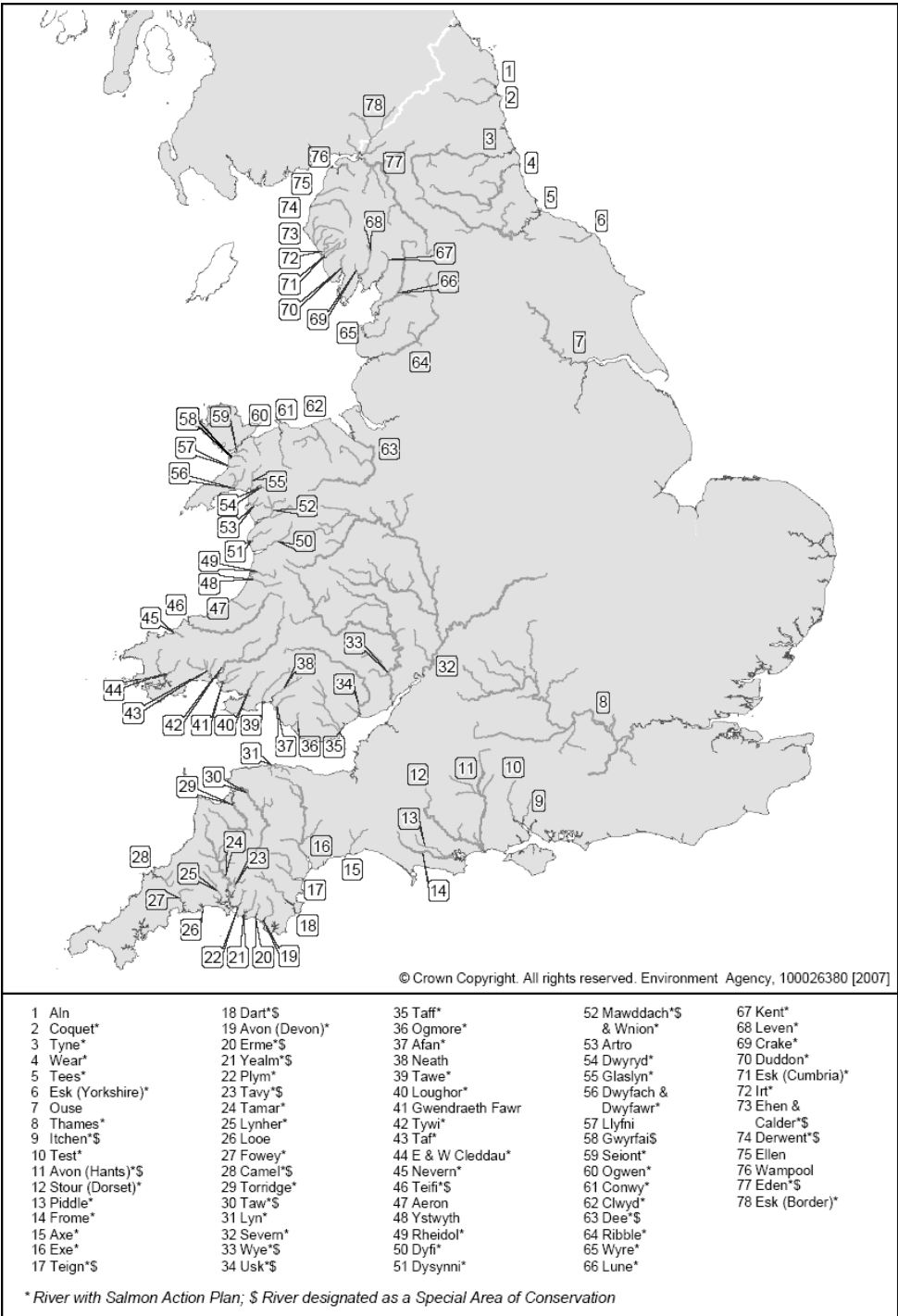


Figure 1. Main salmon rivers in England and Wales

1.1 Administrative arrangements

In England and Wales salmon legislation and policy is determined by the Governments, through the Department of Environment, Food and Rural Affairs (Defra) for England and the Welsh Assembly Government for Wales. Delivery of salmon regulation and management is the responsibility of the Environment Agency.

In 2002, the Environment Agency set one of its corporate targets as to reduce the illegal and unreported catch of salmon from 35 to 25 tonnes. In 2006, the estimated total illegal and unreported catch of salmon was 25 tonnes (Anon. 2007). As illegal catch makes up the major part (see Section 4 below) and its calculation is as a proportion of licensed (legal) reported catch (Section 2.3), this reduction from 35 tonnes in 2002 is in part a factor of reducing legal (particularly net) catch. However, it does also reflect successful efforts by the Environment Agency in improving catch reporting and enforcement against illegal fishing.

Byelaws under the Water Resources Act 1991 (see *Appendix 1*) require that all licence holders must provide the Environment Agency with details of their catch of salmon and migratory trout. They must also provide the number of days fished on each river at the end of each year or, for nets, in each fishery monthly.

The Environment Agency came into being in 1996. Until 1992, its predecessor organisation, the National Rivers Authority was divided into 10 regions (Figure 2 below) and each Region employed different systems of licensing and obtaining anglers catch returns for their respective areas. In 1992 a unified licence regime was introduced across England and Wales that allowed anglers to fish for all species. The licensing system was changed again in 1994 with the introduction of separate licences for migratory salmonids and for trout and coarse fish.

Throughout this period, licences for net or trap fishing for salmon and sea trout have been issued specific to each relevant fishery.

Appendix 2 gives examples of the forms now used for anglers and netsmen to report their catches.

The rivers regulated by the Environment Agency and for which salmon catch returns must be made include the River Border Esk, including that part in Scotland, but do not include any part of the River Tweed or its tributaries (see Figure 1).

References in this report to the Environment Agency, for the period before 1996, should be taken also to include its predecessor bodies.

Figure 2. Map of England and Wales showing the 10 administrative regions that operated prior to the formation of the Environment Agency in 1996.



1.2 Catch reporting by anglers

The five year mean (2002-2006) for the proportion of anglers submitting a return is 87.6% for annual licence holders and 53% for short term (1 & 8 day licences) (Anon., 2007). 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 (Fig. 1, river 63) and Tyne (Fig. 1 river 3) indicated that 89% and 86%, respectively, of short-term licence holders making a return declared a nil catch. It also shows, 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.

1.3 Catch returns by net/trap operators

All net licence holders (321 in 2006) submit a return. Net fisheries operate in a number of estuaries and along some areas of coast and all licence holders are required to make a return to the Environment Agency of the number of salmon and migratory trout caught, their size and the number of days or tides fished.

2. Method used to estimate under-reporting

2.1 Rod catch

The Environment Agency and its predecessor the National Rivers Authority have operated a unified rod catch return system across England and Wales since 1995. The method used to estimate the under-reporting of rod caught salmon is presented in *Appendix 3*. The method utilises a catch reminder system which uses the differences in catch rate between unprompted and prompted returns (Small, 1991).

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. (See *Appendix 4* for details of changes to the system of rod licence sales and catch return distribution.)

These improvements also made possible the issue of a second reminder (sent to all anglers who had not sent in a return by January), in line with NASCO recommendations, in order to reduce the level of unreported catch. This was undertaken nation-wide for the first time early in 2002, in respect of catches for the 2001 season, and has continued in 2003–2006. In 2005 a further improvement resulted from the electronic issuing of licences. This provided a more up-to-date and accurate database for issuing reminders. *Appendix 5* shows a recent example of a reminder letter.

2.1.1 Comparison between national returns and records collated by fishing clubs and/or fishery owners.

Comparisons between catch returns made by anglers to the Environment Agency with those reported to their club on particular rivers has been possible on a few rivers.

River Dyfi

On the Dyfi (Fig. 1, river 50) returns to the New Dyfi Fisheries Association, which accounts for ~ 95% of the declared catch were available for the period 1966 to 2003. In the early part of the time period there was considerable difference in the number of salmon reported caught to the New Dyfi Fisheries Association compared with the Environment Agency (Figure 3). The difference decreased steadily over time such that by 2002 there was close agreement between the two.

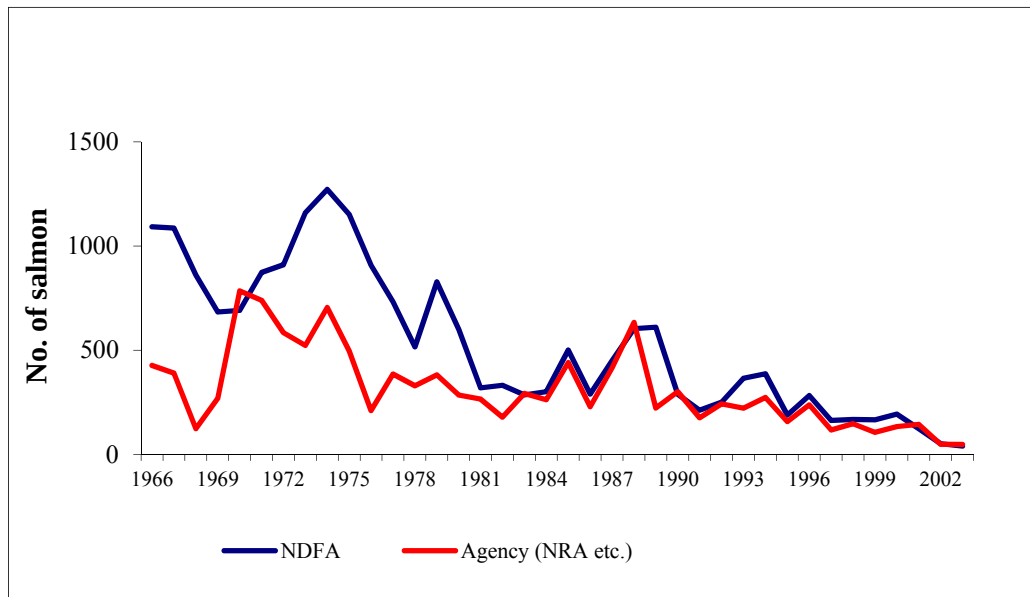


Figure 3. A comparison of reported rod catch on the River Dyfi to the New Dyfi Fisheries Association (NDFA) and to the Environment Agency (Agency) between 1966 and 2003.

River Teifi

On the River Teifi (Fig. 1, river 46) data were available over a similar time period from Teifi Trout Association and Llandysul A.C which accounts for ~ 99% of the salmon fishery of the Teifi. The pattern of catches reported to the angling club and Environment Agency are similar (Figure 4), and for most of the time period the returns made to the Environment Agency were higher.

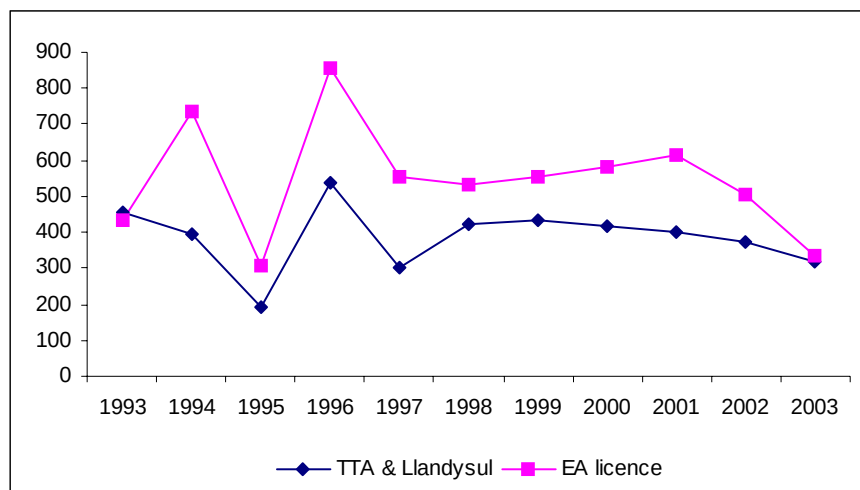


Figure 4. A comparison of reported rod catch on the River Teifi to the Teifi Trout Association and Llandysul A.C (TTA & Llandysul) and to the Environment Agency (EA licence) between 1993 and 2003.

River Derwent

On the River Derwent (Fig. 1, river 74) in 2002, 795 salmon were reported caught to Castle Fisheries, which accounts for ~ 90% of the fishing effort and catch on the Derwent. In the same year, 888 salmon were reported caught to the Environment Agency.

River Tamar

On the River Tamar (Fig. 1, river 24) in 2003, the Tamar River Association recorded the salmon catch from the river as 135 salmon. In comparison 114 salmon (84%) were reported to the Agency. If a 10% under-reporting in the Environment Agency returns is assumed then the total catch for the Tamar is assumed to be 125 salmon, 93% of the Tamar Fisheries Association estimate.

Though the data set is small the indications are that the level of under-reporting of rod caught salmon to the Environment Agency is small.

2.2 Net catch

For the net fishery, surveillance techniques have been used to estimate the level of under-reporting.

The rate of under-reporting for net fisheries is generally considered to be low in most fisheries of England and Wales and a figure of 8% has been used to adjust for the level of under-reporting of the net catch in recent years, based on the best available information. Opinions on the level of under-reporting in net fisheries in England and Wales collected from Environment Agency regional fisheries personnel in February 1998 were 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 (Fig. 1, river 66) were under-reported by around 8%. However, in the Solway Estuary (Fig. 1, rivers 77 & 78) a surveillance operation throughout July and August 2004 linked observed daily catches of salmon and sea trout caught by identified haaf nets-men to the returns they subsequently submitted to the Environment Agency. Assessment suggests that the fishery has been declaring only 50% of its catch. Failure to make a return of catches is an offence and 18 nets-men were prosecuted in 2005 and penalised by the court. Reporting in this fishery is believed to have improved significantly from 2005.

2.3 Illegal catch 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 Environment 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 questionnaire sent to Environment 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 (*Appendix 6*). The results indicated a similar overall level of illegal catches between 12 and 13%, though regional estimates ranged from 5% (Southern Region, with no licensed commercial catch) to 24% (North West Region, with 15% of the national reported catch). The catches of salmon in the North East, South West and Thames 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.

There are no commercial salmon fisheries in the Thames or Thames Estuary, but a questionnaire survey of nets-men fishing for marine species in 2003 indicated a possible by-catch of over 100 salmon that year (Anon. 2007). Investigations in 2006 suggest that this catch is likely to be very variable and was estimated at only 20 to 30 fish in that year.

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, a value of 12% of declared catch is currently applied (as in all years since 1998) to estimate the total illegal catch for England and Wales.

3. Trend in under-reporting

3.1 Rod catch

Between 1986-1991: Until 1992, the 10 different regions of the National Rivers Authority (NRA) (Figure 2) employed different systems of licensing and obtaining anglers catch returns for their respective areas. Different correction factors should therefore be applied in different regions during this period.

Region	Return rate from anglers (%)	Prop. of catch declared	Suggested correction factor
Northumbria	30-40	0.64	1.56
Yorkshire	85-100	0.97	1.03
Southern	100 (General Licence)	1.00	None
Wessex	65-80	0.91	1.10
South West	45-50	0.77	1.30
Severn Trent	65-85	0.91	1.10
Welsh	60-65	0.83	1.20
North West	20-30 (1986-90)	0.50	2.00
North West	70 (1991)	0.88	1.13

Between 1992-1993: In 1992 a unified rod licence for England and Wales was introduced. For these two years there was no separate salmon licence, so the number of salmon anglers is more difficult to estimate than usual. Due to the low licence price, the number of anglers who fished for salmon is thought to have been substantially greater. Also it was impossible to send a catch reminder so the return rate was very poor. It is suggested that just over 50% of the salmon catch was declared to the NRA in 1992 and 1993.

	Return rate (%)	Prop. of catch declared	Suggested correction factor
National	20-30	0.53	1.90

Between 1994-1995: With the introduction of a separate migratory salmonid licence in 1994, a catch return reminder became possible and was introduced. Catch return rates increased three-fold and the accuracy of catch returns substantially improved.

	Return rate (%)	Prop. of catch declared	Suggested correction factor
National	71-76	0.91	1.10

1996-present: The system of collecting declared catch has not changed since 1994. It is believed that return rates are not significantly different from the period 1994-1995 so the same suggested correction factor of 1.10 is applied.

Trend, 1992-present: In terms of changes over time in under-reporting, the estimate for the first two years of the national licence (1992-93) was 47% decreasing to 9% for the period from 1994 to present.

The assessments of salmon stocks reported to ICES incorporate the use of correction factors for rod catches as set out above.

3.2 Net catch

There is little information on the trend in under-reporting for the net fishery. In the Solway Estuary, the surveillance and enforcement effort by the Environment Agency in 2004 reduced under-reporting from that time.

3.3 Illegal catch

The estimate of illegal catch has reduced in recent years (from 23 tonnes in 2002 to 14.5 tonnes in 2006). However, to a significant extent, this is an artefact of this measure being determined as a proportion of reported catch that has reduced, including through the decline in the catch in licensed net fisheries.

Figures 5 and 6 below show the annual numbers of reported illegal fishing incidents in Wales (Fig. 1, rivers 32 to 63) and North East England (Fig. 1, rivers 1 to 5) respectively. These suggest a declining trend in the amount of detected illegal fishing and so, potentially also in illegal catch.

Figure 5. Trend in cases of illegal fishing recorded in Wales

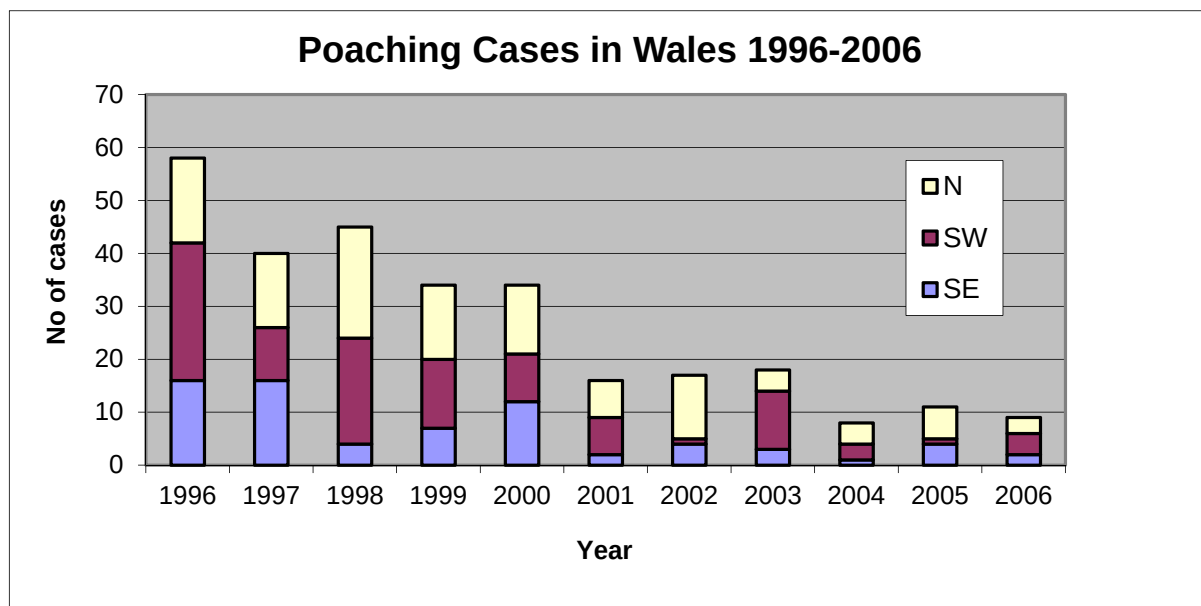
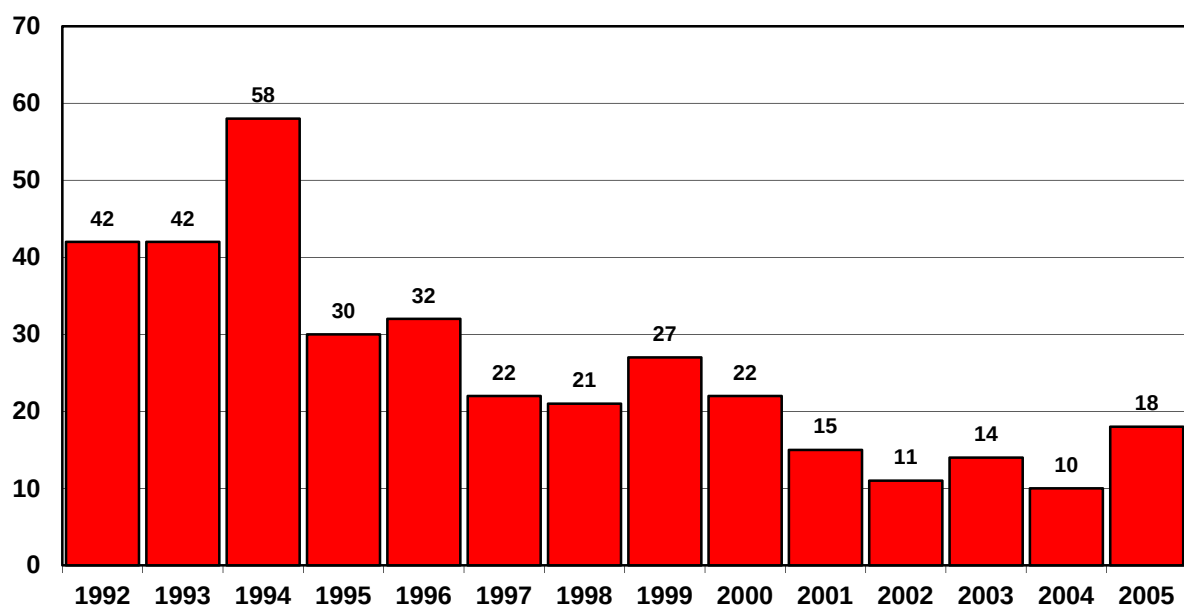


Figure 6. Trend in reports of illegal fishing in Northumbria, North East England

**High Impact Fisheries Enforcement cases
1992 to 2005**



4. The source of the unreported catches

The derivations of the under-reported catch from anglers are from an estimate of undeclared catch using the method of Small (1991), for netsmen through surveillance operations, and the estimated illegal catch is derived from enforcement activities.

The overall contributions to estimated levels of unreported catch for 2006 were as follows.

Source	Estimated number of salmon not reported	Proportion(%) of total England & Wales reported catch	Proportion (%) of total estimated unreported catch
Rod catch contribution	1707	5.2	25.5
Net catch contribution	1086	3.3	16.2
Estimated illegal catch	3905	12.0	58.3
Total	6698		100

Of the total estimated unreported catch in 2006 (6,698 salmon), over half derived from illegal catch and a quarter from under-reporting in the rod fisheries. Net fisheries were assessed as contributing the minor component of 16%.

5. The measures being used or planned to minimise unreported catches

In order to maintain the low level of under-reporting, the Environment Agency annually reviews the rod licence reminder system and methods used to assess the undeclared net catch to see where they can be improved.

Opportunities are also identified to remind anglers and nets-men that they should record and report their catch. These include use of press articles (an example is shown in *Appendix 7*), presentations at relevant events and discussions in fishery group meetings. The option is available of enforcement action against contravention of the legal requirement to report catch as shown in the example of the Solway haaf net fishery in 2004.

The Environment Agency undertakes targeted enforcement of fisheries to ensure illegal catch is minimised. Each management unit sets out an annual plan for its fisheries enforcement. Activities include intelligence gathering, targeted surveillance, incident response and inspections of licensed fisheries and premises that deal in salmon. 200 officers are warranted to enforce relevant fisheries laws. Between 15 and 25 individuals were prosecuted by the Environment Agency for offences involving salmon poaching in each of the last three years.

The Governments in England and Wales are working to improve fisheries laws to support better regulation and enforcement. One intended effect is to prevent the selling of rod-caught salmon that should help further suppress illegal and unreported catch.

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Appendices (attached)

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| Appendix 1 | Byelaw; Reporting of salmon and sea trout catch in England and Wales |
| Appendix 2 | Examples of forms used to report catches in England and Wales |
| Appendix 3 | Method of correction for Rod Catches in England and Wales |
| Appendix 4 | Resume of changes to Environment Agency rod licence sales and salmon catch returns systems |
| Appendix 5 | Example reminder letter |
| Appendix 6 | A review of the estimate currently used to determine the illegal salmon catch for England and Wales |
| Appendix 7 | Example press article (Trout and Salmon Magazine, December 2005) promoting catch reporting |

Appendix 1

Byelaw; Reporting of salmon and sea trout catch in England and Wales

RETURNS TO BE MADE

NATIONAL

3. Migratory Salmonid Catch Returns

- (1) Any person to whom a licence is issued by the Agency to fish by rod and line for salmon or migratory trout shall not later than the 1st day of January in the following year, make a return on a form provided by the Agency giving particulars of dates, the locations and the time spent fishing and the number and weight of any salmon or migratory trout caught (except in relation to small sea trout (500 g or less) where only the number caught need be returned) including those returned alive giving details of whether they were caught on fly, spinner or bait, or a statement that no salmon or migratory trout were caught by the licence holder.
- (2) Any person to whom a licence is issued by the Agency to fish with any instrument other than rod and line for salmon or migratory trout shall within 7 days of the end of each month during the fishing season make a return on a form provided by the Agency giving particulars of dates, the locations and the time spent fishing and the number and individual or aggregate weight of any salmon or migratory trout caught by each instrument, or a statement that no salmon or migratory trout were caught by the licence holder or his agents.

(Confirmed 18 December 1996)

Appendix 2

Examples of forms used to report catches in England and Wales

A. For rod fishing



ENVIRONMENT
AGENCY

No. SWH72400667

2006 CATCH RETURN

If you have not yet made a return, could you please **complete Parts 1, 2 and 3** of this form, tear it off, insert the completed return in the pre-addressed FREEPOST envelope provided, and post it. **No stamp is required – the postage is paid.**

- **Your fishing effort is important, even if you didn't catch anything.**
If you didn't fish – please say so in Part 1
- Please don't forget to record any salmon or sea trout you have released, other than kelts. If weight not known, please indicate an estimate.

Part 1 records details of your fishing effort - please give the river name, nearest town and County in which you were fishing. Please record your effort even if you had a 'nil' catch. Please show the number of days you fished for salmon or sea trout.

Main River Name	Nearest Town	County	Number of days fished for Salmon or Sea Trout	
			Before 16 June	After 15 June
Example Wyere	Newbridge	Midshire	5	8
LUNE	HALTOW	LANCS	0	10

Part 2 if you took a large catch of small sea trout (1lb or less) please show them all together here, separating the catch by month, otherwise please use part 3.

Month	Main River	County	Show no. of small sea trout caught by each method			Fish released (Numbers)
			Fly	Spinner	Bait	
Example June	Wyere	Midshire	3	7	5	14

[illegible]

Please continue on a separate sheet of paper if necessary.

SALMON AND SEA TROUT CATCH RETURN COMMERCIAL FISHERY

AREA OR RIVER FISHED:

TYPE OF GEAR USED:

[illegible]

Appendix 3

Method of correction for Rod Catches in England and Wales (*Taken from Small, 1991*).

The total catch from licence returns is recorded and a simple multiplier applied to this number to give an estimate of the catch from all licences.

$$\text{Multiplier} = \frac{\text{Total licences} \times M}{\text{Total returns} \times M_u} = \frac{\text{Licences} \times \text{catch/licence}}{\text{Returns} \times \text{catch/return}} = \frac{C}{C_u}$$

Or it can be written as

$$C/C_u = 1/P_u \times M/M_u \quad (1)$$

The number of licences sold and the numbers of returns made are known and therefore catch per return can be calculated. Catch per total licences sold is unknown. We cannot assume that these two catch rates are the same since the anglers that make a return are more likely to have higher catches. Therefore need to find this unknown.

The estimated total number of fish caught in a defined period of time is:

$$N = (P_u M_u) + (P_p M_p) + (P_m M_m)$$

Where P_u = unprompted returns

M_u = Average CPUE from unprompted returns

P_p = Prompted returns

M_p = Average CPUE from prompted returns

P_m = Missing returns

M_m = Average CPUE from missing returns.

To estimate M , M_m must first be estimated

Looked at studies with a reminder system in place WWA and SWWA.

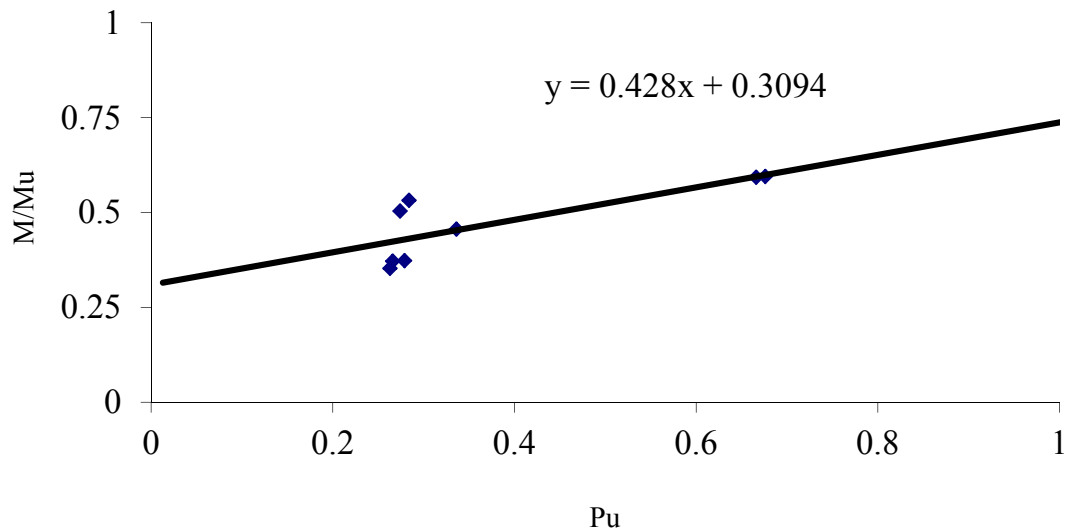
	Year	Proportion of N			Average Catch Rates			Assumption 1	
		P_u	P_p	P_m	M_u	M_p	M_p/M_u	M_m	M/M_u
WWA	1977	0.266	0.358	0.376	0.802	0.191	0.238	0.045	0.372
	1978	0.263	0.329	0.408	0.734	0.158	0.216	0.034	0.353
	1979	0.274	0.265	0.461	0.567	0.264	0.474	0.128	0.504
	1980	0.279	0.338	0.383	0.852	0.190	0.223	0.042	0.373
	1981	0.336	0.282	0.382	0.627	0.189	0.301	0.057	0.456
	1982	0.284	0.353	0.363	0.558	0.264	0.473	0.125	0.532
SWWA	1980	0.593	0.267	0.140	1.865	0.455	0.244	0.111	0.666
	1981	0.595	0.227	0.178	1.665	0.485	0.291	0.141	0.676

M_m is the only unknown and it is assumed that the ratio of $M_u:M_p$ is the same as $M_p:M_m$.

Therefore $M_m = M_p/M_u \times M_p$.

M/Mu is then plotted against Pu for each of the datasets where a reminder system exists.

The relationship fitted can be quadratic or linear. For the Environment Agency reporting rates, a linear relationship is fitted, taken from Small 1988. From the data containing reminder systems, it can be seen that the intercept of the M/Mu axis is approximately 0.3.

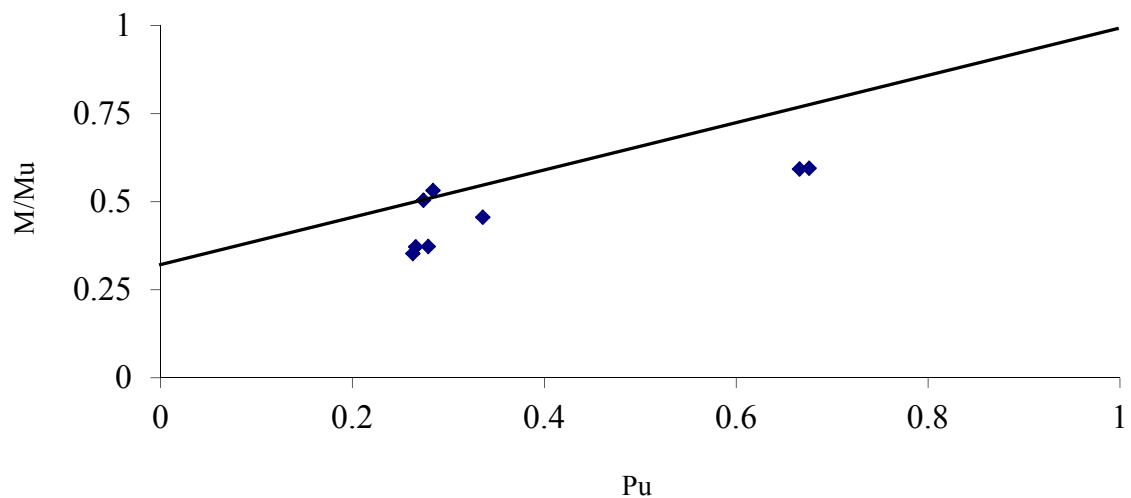


If 100% returns are received unprompted then M/Mu must equal 1, so the line must proceed from 0.3 up to 1 and that gradient is $1 - 0.3 = 0.7$.

The equation of this is then:

$$M/Mu = Y + (1-Y) \times Pu$$

$$M/Mu = 0.3 + (1-0.3) \times Pu$$



And so from equation 1,

$$C/C_u = 1/P_u \times M/M_u$$

$$\text{Where } M/M_u = Y + (1-Y) \times P_u$$

$$C/C_u = 1/P_u \times Y + (1-Y) \times P_u$$

$$C/C_u = Y/P_u + (1-Y).$$

$$C = C_u \times (Y/P_u + (1-Y))$$

$$C = C_u \times ((0.3/P_u) + (1-0.3))$$

Final equation: ***Actual Catch = declared catch $\times ((0.3/\text{return rate}) + 0.7)$***

Appendix 4

Resume of changes to Environment Agency rod licence sales and salmon catch returns systems

To 1992: 10 operational regions each managed sales of regional rod licences independently. Sales were predominantly through independent fishing tackle shops and on-fishery outlets. Salmon catch return forms were issued with licences in most regions and were collected in and collated in each region. Only some regions issued reminders.

1992-1993: Licence sales were managed once for all England and Wales. A single licence was issued for angling in all regions and for all species (salmon, trout, freshwater fish and eel). Sales continued through independent fishing tackle shops and on-fishery outlets. Catch return forms were issued to purchasers stating an intention to fish for salmon or sea trout. There was no capacity to issue reminders and salmon anglers could not be separately identified.

1994-1999: The licence system was altered to include a separate licence for fishing for salmon or sea trout (for all England and Wales) and a new single contract for licence sales was established through one principal contractor that controlled 17,000 sales points (Post Office Ltd). Catch return forms could now be targeted to salmon and sea trout anglers and central collation of sales allowed for the issuing of reminders. Initially reminders were issued in January, moving to November in 1995.

2001- 2004: Environment Agency implemented a new database for capture of licence sales information. This improvement allowed for the issuing of two catch return reminders, in November and January that prompted a higher level of reporting.

2005-2007: The licence sales contractor implemented automated capture of sales information with rapid transfer of data to the Environment Agency. This supports more up to date and accurate information on which to base reminders.

2007: The review of the contract to sell rod licences is underway to secure a new contract from 2009. The aim is to seek a cost-effective solution including optimising the opportunity for data capture.

Appendix 5

Example reminder letter



2006 CATCH RETURN REMINDER

Dear Angler,

PLEASE IGNORE if 2005 return already sent

May I remind you that the law requires all salmon licence holders to submit a personal return direct to the Environment Agency giving details of catches and fishing effort as indicated on the attached form. Your return is vital – please send it as soon as possible; it is due by 1 January 2007 at the latest.

Thank you for your help.

Dafydd Evans, Head of Fisheries

ROD CATCHES IN 2005

Overall is a summary of catches from rivers in England & Wales, with two graphs showing the national catches for 1995 to 2005. Some key statistics from 2005 are:

- 34,062 salmon and sea trout rod licences sold compared with 32,758 in 2004 (4% increase).
- 166,877 days declared fished for salmon and sea trout, compared with 181,300 in 2004, a decrease of 2%.
- 21,416 salmon caught in 2005 (27,336 in 2004).
- 40,319 sea trout caught in 2005 (36,100 in 2004).

Since 15 April 1999, any salmon caught before 16 June must be released under byelaws, but anglers are also voluntarily returning an increasing proportion later in the season, especially larger fish, to help enhance stocks.

- 58% (11,933 fish) of rod caught salmon were released in 2005, the highest release rate recorded to date.
- 59% (23,729) of rod caught sea trout were released, also the highest release rate recorded to date.

Further details can be obtained from: Rob Evans,

The Environment Agency, Cambria House,
29 Newport Road, Cardiff, CF24 0TP

or our web site:

www.environment-agency.gov.uk/fish

Direct Debit

We are now able to offer a paperless direct debit scheme. If you contact 08700 506505 and have your bank details to hand, we will be able to set a direct debit up within a couple of minutes. You can purchase full and concession licences on this scheme, and this will automatically renew every year.

www.environment-agency.gov.uk/subjects/fish

Appendix 6

A review of the estimate currently used to determine the illegal salmon catch for England and Wales

Introduction

The purpose of this report is to review the current estimate used to determine the illegal salmon catch for England and Wales as reported in the annual EA/CEFAS salmon stock assessment report to The International Council for the Exploration of the Seas (ICES) and, if appropriate, to recommend a revised estimate for the 2003 report. It is recognised that by their very nature illegal catches are extremely difficult to quantify, however, the Agency is required to provide a best estimate for ICES purposes (e.g. for models used to determine Pre Fishery Abundance).

Consultation with EA Regional fisheries personnel in 1998 was used as a basis of the current estimate. Regional assessments in 1998 ranged from 5% to 18% of the declared catch. Since 1998 a figure of 12% of the declared catch has been used to estimate the total illegal salmon catch for England and Wales.

Method

Appropriate Area fisheries staff were identified and sent a brief questionnaire in July 2003. Representatives were asked to either agree with the current estimate or to provide a revised estimate together with any justification for their decision. A deadline of 1 October was given to allow time for consultation within Areas.

Results

A summary of Area responses is presented in Table 1. Regional averages together with a national estimate derived from an average of all the regional responses are presented in Table 2. [Please note: the national average excludes Thames and Anglian regions]. Area estimates ranged from 5% (Hants. & Isle of Wight, Southern Region) to 27% (Northern, North West Region – which included an estimate of 50% for SW Cumbria) and Regional estimates ranged from 5% (Southern) to 24% (North West). The national average at 12.6% was 0.6% higher than the 1998 estimate.

Some common issues raised by Areas during the consultation included:-

- salmon by-catch taken by nets targeting bass and other marine species
- resource issues, particularly in areas where salmon stocks are recovering and in areas with many, diverse salmon fisheries
- the opportunistic nature of in-river poaching which remains a problem in many areas (premium paid for wild salmon may be partly driving this).

Discussion and Conclusion

It is recognised that the use of a national average might not be entirely appropriate given the variation in the Regional estimates and the proportion of the England and Wales catch declared by each Region (for example, North West estimate = 24% with

17% of the national catch and Southern Region estimate = 5% with just 1% of the national catch).

Despite the above concern it is recommended that an estimate of 12.6% (rounded up to 13%) of the legal catch is used to determine the illegal catch for 2003. It is also recommended that more novel approaches to determining the illegal catch are investigated and possibly adopted in time for any future review.

Table 1. Summary of illegal catch estimates provided by Area representatives

Region	Area	Estimate (%)
North East	Ridings	12
	Northumbria	12*
	Dales	12*
Thames	Tidal	
Southern	Hants; IoW	5
South West	Wessex	12*
	Devon	12*
	Cornwall	12
Midlands	Severn Estuary	5
	River Severn	15
Wales	South West	10
	North	12*
	South East	12
North West	North Cumbria	20
	South Cumbria	12
	SW Cumbria	50
	Central	12
	South (Mersey)	

* - no estimate provided, therefore, current 12% assumed acceptable

Table 2 Regional and national estimates of the illegal catch

Region	Illegal catch estimate (%)
North East	12
Southern	5
South West	12
Midlands	10
Wales	11
North West	24
England & Wales	12.6%

Rob Evans, National Fisheries Technical Team (20 October 2003)

Appendix 7

Example press article (Trout and Salmon Magazine, December 2005) promoting catch reporting

Vital statistics

ROB EVANS, Environment Agency fisheries scientist, explains how sending in your rod licence catch return data helps in the management of salmon and sea-trout stocks in England and Wales

ANOTHER FISHING SEASON draws to a close, tackle is cleaned and stored away and thoughts turn to what the coming season might bring. Before plans are laid, however, there is one last task to take care of. Details of salmon and sea-trout caught in England and Wales during the season must be reported to the Environment Agency via the rod licence catch return form. Indeed, anglers are legally obliged to submit a return each year. Rivers, days fished, species, dates, weights, methods, and whether or not the fish was released must all be recalled and entered on to the form before it is sent off to the Agency's Warrington office for processing.

For many this is a quick and easy task. The single trip squeezed in during the summer holidays, when the river was too low and the sun too bright can be swiftly dealt with (nil – again!). For the more successful angler, recording the individual details of perhaps 50 or more fish can take a little longer, but perhaps provides a welcome break from writing Christmas cards.

But whether just one or 50 fish have been caught, the Agency needs to know about it. Even if no fish were caught, the number of days fished must be recorded. The amount of fishing that led to a particular level of catch and effort can provide useful insights into stock abundance.

All countries with salmon stocks and fisheries record and use returns in their stock assessments. The Agency takes its role in this respect seriously and is unique in that it issues two postal reminders to all licence holders – one in November and a second one early in the New Year. As a result, approximately 25,000 individual returns are received and processed each year. In an average season, details of 60,000 individual fish will be recorded on to the Agency's Rod Catch database.

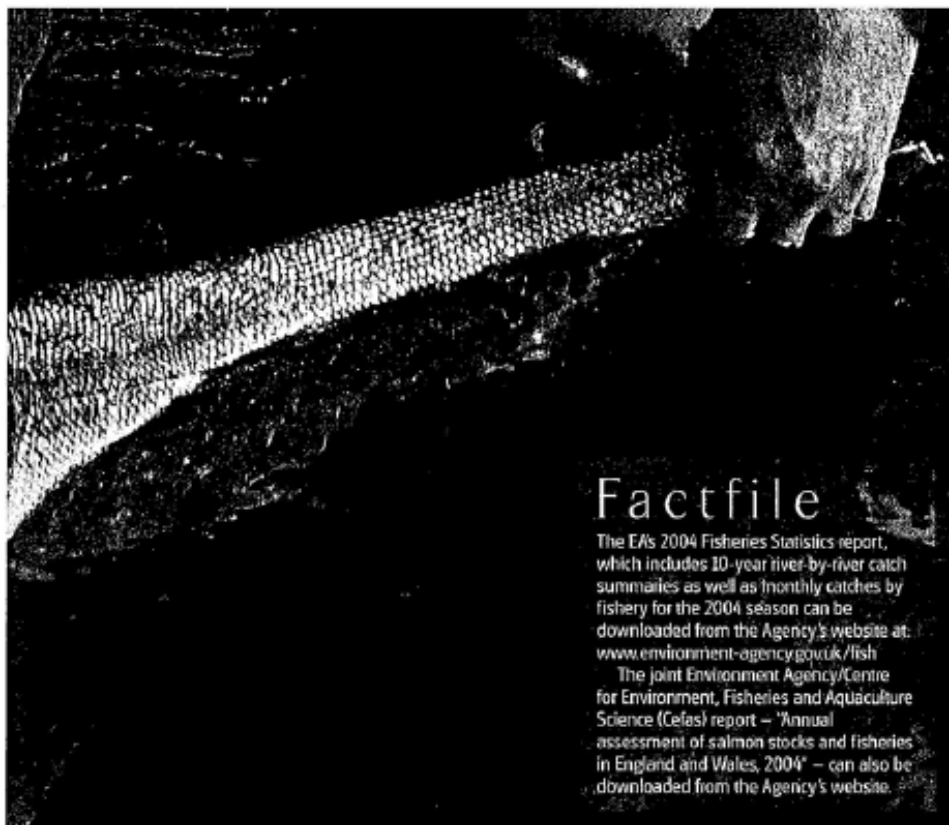
Reporting rates are currently estimated at 85 per cent for full licence holders and the Agency is confident that approximately 90 per cent of salmon and sea-trout caught in England and Wales are now reported by anglers, although it recognises that this figure will vary between rivers. Accurate catch

Results from tagging and recapture experiments undertaken on the Welsh Dee since 1992, below, have been used to refine EA stock assessment models.



statistics are important for many reasons. A number of researchers have demonstrated a statistical relationship between rod catch and stock size (the bigger the run of fish, the bigger the catch), although the relationship can be modified by factors such as flows and fishing effort. Great care must, therefore, be taken when interpreting catch data.

On some rivers, detailed records go back to the middle of the 19th century, revealing long-term trends in stocks and fisheries performance. Trends in monthly rod catches were important in highlighting the decline in runs of "spring" salmon and were part of the justification behind the introduction of conservation measures in 1999. Numerous authors of books, reports and scientific papers have referred to rod catches over the years to illustrate changes in fisheries in relation to environmental or other influences. Augustus Grimble in his book, *The Salmon Rivers of England and Wales* (1904), recorded catches and licences issued for all the major salmon rivers in England and Wales at the beginning of the 20th century and recognised, even then, the value of maintaining accurate records. Grimble's book remains an important reference to this day. Fisheries managers, academics, angling clubs, river trusts, economists, individual anglers and fisheries owners all have their uses for catch data. The long-term data sets are of huge value now



Factfile

The EA's 2004 Fisheries Statistics report, which includes 10-year river-by-river catch summaries as well as monthly catches by fishery for the 2004 season can be downloaded from the Agency's website at: www.environment-agency.gov.uk/fish

The joint Environment Agency/Centre for Environment, Fisheries and Aquaculture Science (CEFAS) report – 'Annual assessment of salmon stocks and fisheries in England and Wales, 2004' – can also be downloaded from the Agency's website.

and will be for coming generations.

The Environment Agency has its own important reasons for ensuring catches are reported as fully and as accurately as possible. Catches are integral to the Agency's annual, river-by-river salmon stock assessments. Electronic fish counts and run estimates derived from annual trapping and tagging studies are, at present, available for only a limited number of rivers. On the remaining rivers, catches form the basis of statistical models used to estimate the number of adult fish returning to spawn each year. The results of these assessments are, in turn, submitted to the International Council for the Exploration of the Seas (ICES), the body responsible for providing scientific advice to the North Atlantic Salmon Conservation Organisation (NASCO).

Assessment methodologies adopted by the Agency are recognised by NASCO and, as well as contributing to our international obligations, are integral to national and local assessments. The Agency, following consultation with interested parties, and in line with Government requirements, has now published Salmon Action Plans (SAPs) for 64 rivers in England and Wales. Each SAP examines stocks and fisheries and sets out a list of actions aimed at improving stocks.

Central to each SAP is the concept of Conservation Limits (CLs). Put simply CLs provide an estimate of

Salmon, including returned fish like this one, must all be entered on the EA catch return.

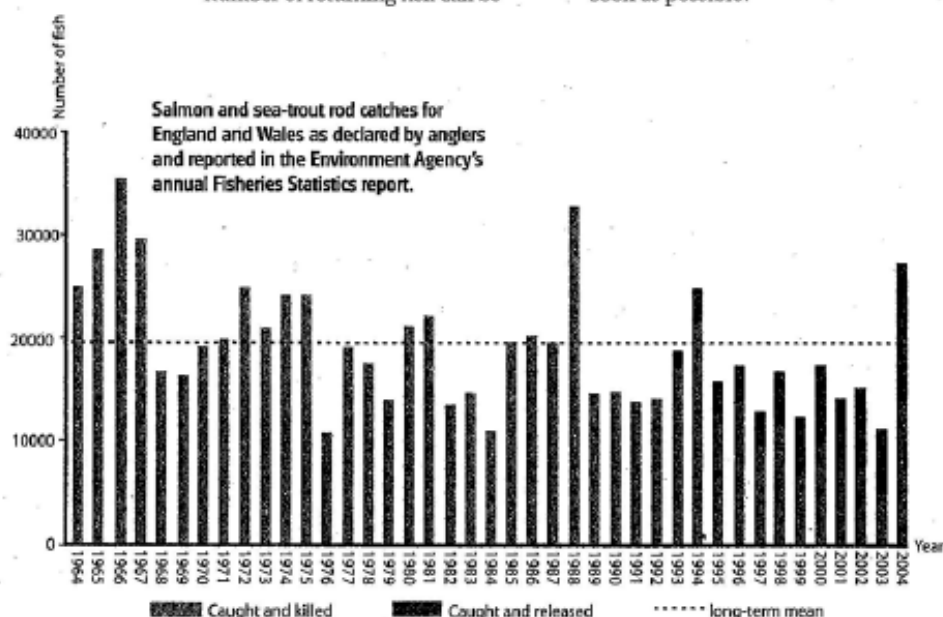
the number of spawning fish required to ensure stocks remain sustainable. Each year the Agency assesses compliance (the actual number of spawning fish) against the Conservation Limit and reports the results to ICES. The Agency has developed a computer model utilising the relationship between catchment size and fishing effort to determine the rod-exploitation rate. Once the exploitation rate is known and the declared catch has been corrected for under-reporting (currently by a factor of 1.1), the number of returning fish can be

estimated and compliance determined. A compliance failure will trigger appropriate responses.

It should be pointed out that in addition to rod catches, other factors such as results from juvenile electrofishing surveys and net catches are considered in the overall assessment. In addition, more intensive monitoring is undertaken on a number of index rivers around the country including the Dee (Wales), Lune (North-west), Tyne (North-east) and Tamar (South-west) and results from these studies are used to calibrate the models where possible. Even if resources became available to deploy counters on all rivers, the difficulties of finding suitable sites would exclude their widespread use, so rod catches are likely to continue to play a central role in the assessment process for the foreseeable future. The Agency will continue to improve existing models and subject them to scrutiny by the international scientific community so the best available science is used and errors are minimised.

Plans for 2006 and beyond include refining and improving the current exploitation model by splitting salmon and sea-trout effort. In addition, estimates of under-reporting will be reviewed regularly and steps taken to ensure reporting rates are maximised.

So the message from the Agency is clear. Please don't delay. You must send in your return as soon as possible!



European Union - UK (Northern Ireland)

Introduction

This paper summarises the methods that have been used to estimate unreported catches of Atlantic salmon in UK (Northern Ireland), describes how these methods have evolved, provides evaluation of the reliability of the methods used and presents data on trends in unreported catches. Two distinct statutory fishery agencies exist in UK (Northern Ireland) namely the Fisheries Conservancy Board for Northern Ireland (FCB) and the Loughs Agency (LA) which is a cross-border body responsible for the Foyle and Carlingford catchments.

Methods of estimating unreported catches and evaluation of methods used (1983-2001)

Estimates of unreported catches of salmon in UK (Northern Ireland) have been made since 1984, coincident with the introduction by DARD of a CWT tagging programme at the River Bush Salmon Station. Estimates of unreported catches were required in order to allow evaluation of exploitation rates in coastal salmon fisheries, based on raising of tag return data collected from tag scanning programmes in commercial catches.

Unreported catches were separated into two categories for the purpose of estimation: unreported legal catches and unreported illegal catches.

Unreported legal catches

Estimates were based on observation of catches by staff engaged in tag recovery programmes. Daily visits were made to dealerships and individual netmen. In the latter case, staff were frequently present when catches were being landed from individual nets and therefore total numbers of fish taken were observed. Although not a truly systematic method, the high degree of coverage of the fishery, both in terms of frequency of visits and distribution and number of netmen cooperating with tag recovery at place of landing, is believed to have provided robust estimates of the legal catch unreported.

No estimates were made of unreported legal catches in the rod fisheries.

Unreported illegal catches

By definition, estimation of unreported illegal catches is more difficult than those from legal catches, in part due to the variety of illegal methods available. For UK (Northern Ireland) estimates of illegal unreported catches have been based on local knowledge of fisheries, sometimes from scientists involved in tag recovery programmes, but more usually from experienced fishery officers. No systematic methods of estimation were employed to assess unreported illegal catches.

Methods of estimating unreported catches and evaluation of methods used (2001-present)

A carcass tagging and logbook scheme for all salmon fishing was introduced into both fishery areas of Northern Ireland for the first time during September 2001. The scheme was designed *inter alia* to improve records/returns for commercially-caught and rod-caught fish and to facilitate regulation of numbers caught (by quota) should this be necessary. The first six years of the scheme, 2001-2006, have proved successful and facilitated the development of a database charting salmon exploitation in different areas and fisheries throughout each season. Assessment of the performance of the carcass tagging scheme in commercial fisheries in both fishery areas of Northern Ireland has indicated excellent rates of compliance with the tagging legislation. The total commercial catch has been quantified annually since 2002 with return rates approaching 100% consistently recorded in both fishery areas of Northern Ireland.

Angling exploitation has been quantified through the carcass tagging scheme since 2002. The angling database relies on logbook/tag information returned by anglers to the statutory authorities. This scheme provides a basis for the estimation of unreported rod catch. In the FCB area the annual angling return rates are calculated from examination of the number of tags issued to anglers in relation to the number returned from the angling community; a raising factor can then be developed to account for the unreported rod catch from salmon producing rivers in the FCB area. The Loughs Agency also utilise rod catch returns from their carcass tagging scheme to estimate unreported catch using a raising factor based on Small (1991). In this way the total annual recreational catch can be estimated for each fishery area. The return rates evident in the FCB area have ranged between 21.7%-36.9% and for the Loughs Agency area similar returns have been recorded of between 20-26%. The tag return from UK (Northern Ireland) in 2005, for example, accounted for 2,548 salmon (506 from FCB region and 2,042 from Loughs Agency region¹), after the regional adjustments were made the unreported catch accounted for 3,184 salmon, producing a grand total rod catch of 5,732 salmon for the year.

Trends in unreported catches for UK (Northern Ireland)

Estimates of unreported catches in rod fisheries had not been available until the introduction of the carcass tagging scheme. Total unreported angling catch (number of salmon) in the UK (Northern Ireland) has varied between around 3,000-4,000 fish since the introduction of the tagging scheme (Table 1). The number fluctuates depending on prevailing angling conditions, effort and logbook/tag return rates. The total rod catch figure reported to ICES and NASCO each year accounts for the unreported catch and has done since the beginning of the carcass tagging programme in 2002.

Unreported catches in the commercial salmon fishery (as a percent of total catch) have fallen considerably during the time series, reflecting both a real decrease in

¹. By agreement with the Irish authorities, Loughs Agency area salmon catches are allocated to Ireland: Northern Ireland on a 50:50 split for reporting purposes. Hence the total UK (Northern Ireland) national catch reported to ICES and NASCO represents 50% of the Foyle area catch, plus all the FCB area catch.

levels of unreporting and refinements in methods of assessment, falling from around 50% to around 10% between 1984 and 1996. Levels of unreported catch appear to have stabilised at around 10% from 1996 until the introduction of the carcass tagging scheme in 2001 (introduced part-way through the year). The carcass tagging scheme has further reduced the unreported catch to under 5% with some years exhibiting less than 1%. The scheme has placed a legislative onus on fishermen to tag wild salmon and record fishing effort/catch, and has represented a deterrent to the capture and sale of untagged wild salmon.

Figure 1 presents data on estimated unreported catches of salmon in the UK (Northern Ireland) commercial salmon fishery and is based on the methods described above. These data are taken from annual UK (Northern Ireland) national reports to ICES.

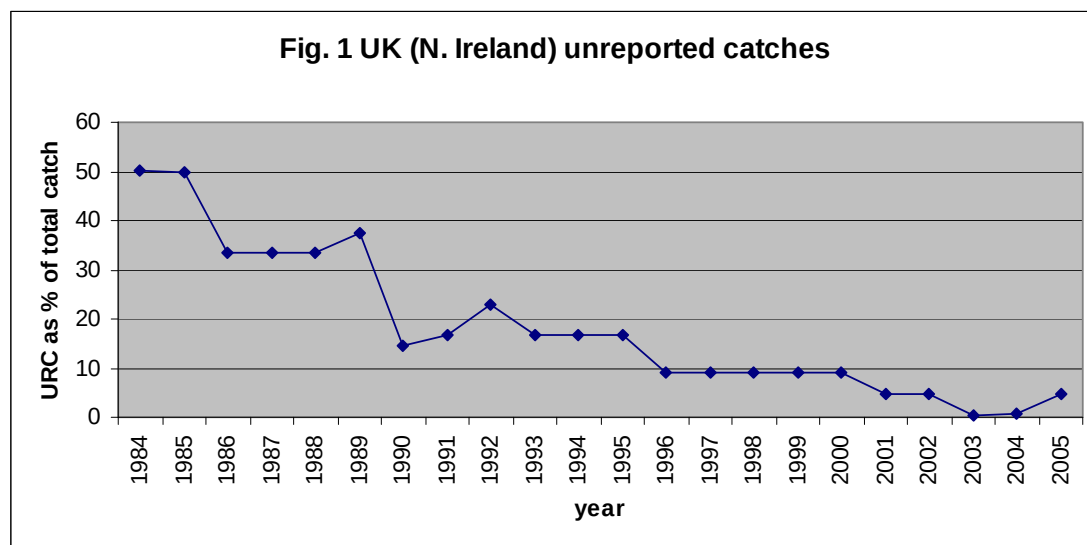


Figure 1 Unreported catch as a percentage of total catch from commercial salmon fisheries in UK (Northern Ireland) from 1984-2005.

<i>Fishery Year</i>	<i>Reported Catch</i>	<i>Unreported Catch</i>	<i>Total Catch</i>
2002	3,437.5	3,875	7,312.5
2003	1,468	3,018.5	4,486.5
2004	1,853.5	3,886.5	5,740
2005	2,548	3,184	5,732

Table 1 Unreported catch (nos. salmon) in comparison to the reported catch in recreational salmon fisheries in UK (Northern Ireland) from 2002-2005.

References

Small, I., 1991. Exploring data provided by angling for salmonids in the British Isles. In: Catch effort sampling strategies (ed. I. G. Cowx), pp 81-91. Fishing News Books, Oxford.

European Union – Tabled by UK (Scotland)

Methods used in assessment

The size of the unreported catch in Scotland, as elsewhere, is difficult, by definition, to ascertain.

Unlawful fishing: Unlawful fishing is a clandestine operation, no records of catches are kept, and in most instances, there is little evidence that it has occurred.

Among its range of fisheries protection duties, the Scottish Fisheries Protection Agency (SFPA) patrols inshore waters and cooperates with District Salmon Fisheries Boards (DSFBs) on salmon fishery-related matters. A helicopter is available for specific projects. In recent years, SFPA has recorded few or no illegal nets being deployed, and no requests have been received from DSFBs for helicopter or inshore patrols.

Non-reporting of fish taken lawfully: Where lawful catches are unreported or under-reported, it is extremely difficult to derive any robust measurement of the level of non-reporting. As it is an offence for any salmon caught by rod and line to be sold in Scotland, it is not possible to compare rod catches with any market sales. As most fish taken by the net fisheries are sold to long-standing customers rather than via fish markets, comparison with market sales is again of limited value. The principal net fisheries in Scotland are sampled on a regular basis throughout the fishing season, and fishery scientists are confident that the recorded catches are substantially correct.

Intelligence gathering: In the late 1980s, local management groups were approached and asked for their views on the subject. Local enforcement officers (principally water bailiffs) are asked to provide information on their perception of the size of unreported catches, although this is necessarily anecdotal evidence.

Assessment of unreported catches

The results of these surveys, modified by our best understanding of the situation, prior to and since the survey, are used to provide a range of likely unreported catch rates (expressed as a percentage of the total catch (min and max)) for 1SW and MSW salmon separately for use in the national run reconstruction model. The mid-points of the exploitation rates ranges are applied to the catch to provide an estimate of the unreported catch in tonnes.

Additional measures coming into force

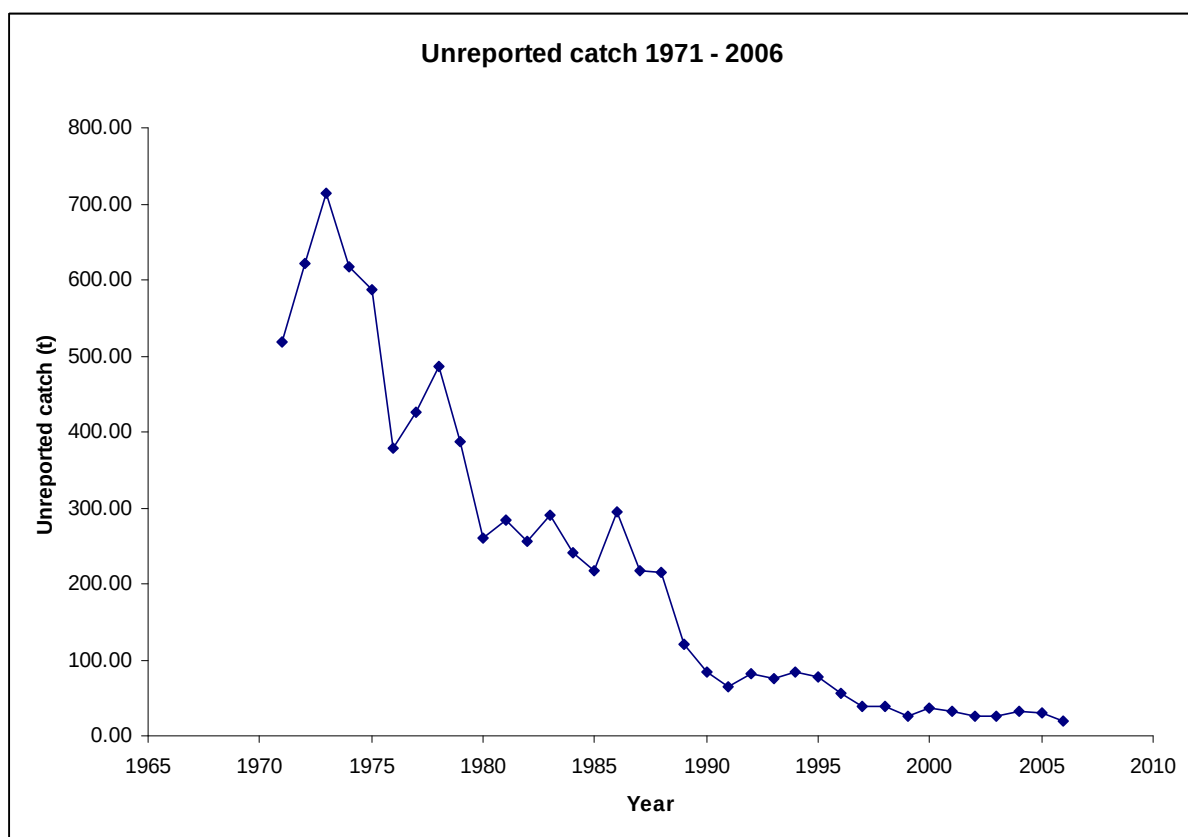
There has been a statutory requirement for the proprietors or occupiers of salmon fisheries in Scotland to provide to the government, annually, records of the numbers of salmon caught at their fisheries. Return rates of around 95% are achieved, and best intelligence indicates that those that do not make returns have not operated their fisheries. The database is continually being updated to take account of changes in ownership.

The Conservation of Salmon (Collection of Statistics) (Scotland) Regulations 2006 came into force on 1 January 2007. This will allow DSFBs to collect salmon catch statistics from salmon fishery proprietors or operators within their districts up to twice per annum. These data will be available for comparison with the reported catches returned to the Scottish Executive.

Trends in unreported catches

The trend in the estimated unreported catch shown below (Figure 1). The observed declining trend is a function of both reduced catches and a progressive reduction in the unreported rate throughout the series.

Figure 1. Estimated unreported catch (t), 1971-2006. (Note: 2006 value is provisional).



Iceland

Introduction

Unreported catches from legal salmon fisheries have so far not been considered a major issue in Iceland. It has been mandatory for over 50 years to provide salmon statistics both from angling and net fisheries. The Icelandic statistics from salmon angling are some of the best in the world, which is the main basis for the high value of salmon angling in Iceland along with a restricted number of rods. The number of riverine salmon nets was kept constant after 1952 and statistics were willingly provided by the proprietors as they realized that some day their fishing rights might be a valuable commodity, which would increase the value of their land. These expectations have more or less been realized. The statistics from freshwater trout angling are somewhat more inaccurate but improving.

Coastal net fisheries for salmon have been banned by law since 1932. Only a few farms holding hereditary rights were allowed to fish during the early periods but these have now all been eliminated either through allocation of dividends from the local river association or through a total buy-out. There are thus currently no legal coastal fisheries for salmon.

Illegal fisheries targeting salmon were not uncommon in the 1960 and 70s, when salmon were sold at a premium price matching those of lamb and beef. After the huge development of salmon aquaculture in the 1980s the price of salmon dropped sharply and poaching of salmon was no longer profitable. During the peak of the ranching period in the 1990s, however, when approximately 100 thousand salmon of ranch origin were migrating inshore in western Iceland, there was an increase in poaching, especially around rural towns where salmon entering harbours were being snagged on illegal hooks and in nets, which led to increased enforcement in those areas. This fishing frenzy, however, came to an end after the closure of the ranching stations in the mid 1990s.

When coastal salmon fishing was banned in the 1930s it remained lawful to catch sea-char and sea-trout in coastal nets. Although the mesh size used for char fishing is by law much smaller than the mesh used for salmon netting there have been incidences of by-catches of salmon in char nets, especially in areas bordering the riverine habitat of salmon and char. Some of these fisheries have been banned by the management authorities through annual closures during the peak of salmon migration but some areas especially around northwestern Iceland are still open. Such fisheries, however, must by law be closed during half the week, i.e. from Friday night through Thursday morning, which gives the salmon great protection and is being strictly enforced.

From the above it can be concluded that the greater source of unreported catches in Iceland would be by-catches in various fisheries, which will be discussed in the following section.

Unreported by-catch

As has been reported in the annual returns to NASCO , there might be incidental catches of salmon in a number of fisheries for other species. There has already been a reference to legal char fisheries but fisheries for a number of marine species may also be a source of salmon mortality. Lump fish are being caught around the Icelandic coast during the early part of the salmon's migration and although the mesh sizes are large and the nets deep in the water they have been known to catch large salmon. Net fishing for haddock or even cod in inshore water may also be a source of a salmon by-catch. As reported in CNL(07)10 on unreported catches it has been estimated that these types of inshore fisheries in Iceland may be responsible for over 75 % of the unreported catch, which has been estimated as 2 % of the annual salmon catch. This is a relatively small figure amounting to 2 - 4 tonnes annually with a large error margin.

In addition to these inshore catches, which would primarily be affecting Icelandic salmon stocks, there have been confirmed reports of adult salmon being caught in bottom trawls as well as pelagic ones. In a NASCO paper (CNL(03)27) Iceland reported incidences where up to 200 salmon were caught in a short period as a by-catch in herring fisheries using expandable pelagic trawl in the Svalbard area. One of these salmon was confirmed as a tagged fish from Norway. In the 1960s the Icelandic Institute of Freshwater reported that up to 30 salmon were caught per purse seine haul in Atlanto-Scandian herring fisheries east of Iceland (CNL(00)20). According to scientific estimates the Atlanto-Scandian herring populations have now had a phenomenal recovery and millions of tonnes are now migrating far into international waters. With heavy fisheries developing on those herring, probably with pelagic trawls, there might be a great increase in the by-catch of salmon east of Iceland and possibly in other areas.

The Institute of Freshwater Fisheries in cooperation with the Association of Icelandic River Associations did a survey among Icelandic trawler fishermen to estimate the number of salmon being caught in pelagic trawls. From this survey it was estimated that about 5000 salmon were caught in 2005 with an upper and lower 95 % confidence limit of 3100 to 7000 salmon. Most of these were caught in the summer on distant fishing grounds, making the origin of these fish uncertain. It is quite clear that there would be a great increase in the Icelandic unreported catches if these figures were to be included, but one must assume that similar figures should emerge from the scrutiny of pelagic fisheries by other NASCO as well as non-NASCO Parties and they should thus be treated separately.

Although there may be a general feeling among salmon scientist that by-catches of salmon in trawl fisheries are not a major cause of marine mortality, one must bear in mind the relatively small numbers of migrating salmon amongst the millions of pelagic species such as capelin and herring. One can thus certainly theorize that by-catches of salmon in many unrelated fisheries for marine species may a considerable source of mortality for adult salmon as well as the smaller post-smolts which would quickly disappear in the thousands of tonnes of herring, mackerel or capelin scooped up in a single haul.

We see the numbers of salmon dwindling in spite of a major conservation efforts and cut-backs in all targeted salmon fisheries. The 2SW component is doing worst and those fish spend the longest time in the marine environment and are thus exposed to

“hazards” for a longer period. They are also more likely to be preying upon relative large fish such as herring and would be found in the vicinity of such schools as demonstrated by the Icelandic herring seine catches in the 1960s. Greater surveillance and documentation of these by-catches must thus be of high priority in any research program dealing with marine survival. In the light of the “Precautionary Approach” we must indeed stay vigilant and explore all possible sources of marine mortality of salmon. Man is after all the most efficient predator as proven by his track record in a number of fisheries.

Norway

Legal basis for catch reports

The duty to report catches is regulated by law. Everybody who catches anadromous salmonids has to report its catch either directly to Statistics Norway (sea fishery) or the fishing right owner. Fishing right owners report the catch to the County Governors. CG's compile data for rivers and report to Statistics Norway.

Main approach to estimate unreported catches

The main approach to estimate unreported catch is to divide total unreported catch into components and then establish estimates for each component in relation to reported catches. Trends on the size of the fishery or catches from year to year are taken into account. Total unreported catch is divided into the following components:

- Illegal takes in sea
- By-catch in marine commercial fisheries
- Legal takes in sea by bag net and bend net
- Legal takes in sea by angling
- Illegal takes in rivers
- Legal takes in rivers, mainly by angling

In total we estimate the unreported catches to be about 30% of the total catches. The uncertainty is considered to be +/- 25%.

Overall trends in all fisheries in recent years give reason to believe that unreported catches are slightly declining.

Illegal takes in sea – about 20% of reported sea catch

A study on illegal fishing in Norway (ØF-Rapport nr. 23/1996) was conducted in 1996. In the report the extent of illegal fishing in sea (mainly gill nets, but also drift nets) and the size of illegal catches were estimated. The study indicated that catches might be significant. Since then information on annual numbers of confiscation of fishing gear and reported offences are used to estimate trends in levels of illegal fishing and illegal catches. Estimates are based upon this study and trends from reports on surveillance activities. Trend in recent years: stable or slightly declining. Estimates are considered to be very uncertain.

By-catch in marine commercial fisheries – about 5% of reported sea catch

A system for reporting by-catch of salmon in marine commercial fisheries is not established, and the knowledge on by-catches from different types of these fisheries is limited. However, by-catch by marine commercial fisheries in home waters is in general not considered to be a major contributor to the total figure of unreported catches. Test fishing by mackerel gill nets,

which are considered to be the most likely problem, has given information about by-catch of salmon in this type of fishery. Estimates are based upon these studies, reports on the increase or decrease of this fishery and an overall consideration of potential by-catch in other commercial fisheries. Trend in recent years: most likely stable. Estimates are considered to be reasonably certain.

Legal takes in sea by bag net and bend net – about 20 % of reported sea catch

The reporting system for legal takes by bag net and bend net has been improved by introduction of catch journals in 1993 mailed directly to Statistics Norway by the fishermen themselves. The return rate of catch journals has been about 95 % ever since. A study by Mørkved & Krokan conducted in 1996 “An analysis of Norwegian bag- and bend net fishermen” indicates that catches are slightly underreported. However, this study was not specially designed to explore the size of unreported catches. The introduction of a buy-out scheme of the bag-net fishery in the Trondheimfjord also indicates that catches in this fishery might have been underreported – maybe significantly, although return rates of catch journals have been high.

Current estimates are based on the study from 1996 and adjustments made based on more “common knowledge” of the fisheries, which still gives reason to believe that catches are underreported. Trend in recent years: stable or slightly declining. Estimates are considered to be reasonably certain.

Legal takes in sea by angling – about 15 % of reported sea catches

Although every fisherman has an obligation to report salmon catches in sea by angling to the Statistics Norway, there is no specific system in place to report these catches. The lack of a specific system is mainly due to the fact that no fishing license is necessary, and it therefore is difficult and costly to contact these fishermen and to implement an effective control system.

A few surveys on the size of catches in this type of fishery have been carried out for some rather limited geographical areas like fjords. In order to try to get an oversight on catches a nationwide study (ØF-rapport nr.7/1997) was conducted in 1996 in co-operation with Statistics Norway. This study indicated that there might be substantial catches in this fishery – on the other hand these estimates were statistically rather uncertain. Estimates are made on the background of these studies. Trend in recent years: most likely stable. Estimates are considered to be very uncertain.

Illegal takes in rivers – about 5% of reported river catches

Information derived from reports on surveillance activities is used to estimate trends in illegal fishing and catches in rivers. There is reason to believe that surveillance activities in rivers by fishing right holders have increased over the years due to substantial efforts for better organization and local management of salmon rivers. Illegal takes in rivers are in general not considered to be a major contributor to the total figure of unreported catches. Current estimates are based on these reports and detected trends. Trend in recent years: stable or slightly declining. Estimates are considered to be reasonably certain.

Legal takes in rivers, mainly by angling – about 15% of reported river catches

The reporting system for legal takes in rivers by angling has been improved due to better organization of fishing right holders and local management of salmon rivers. Several studies conducted in different rivers show that a catch report return-rate of 30-50%, which was common in Norway some years ago, equals about 60%-75% of the total catch. In later years deposits on fishing licenses have been introduced in many rivers, which are refunded when catch reports are returned. In these rivers catch-reports are improved and the return-rate of catch reports has risen to 85-95%. However there is still reason to believe that also catches in rivers are underreported. Trend in recent years: most likely declining. Estimates are considered to be reasonably certain.

Example for the 2006 fisheries - total catch, reported and unreported catches

	2006	
	Tonnes	%
Total catch	1330	100 %
Reported catch - total	931	70 %
Reported catch sea fisheries	511	
Reported catch river fisheries	420	
Unreported catch *)	399	30 %

Uncertainty total and unreported catch	± 100	
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*) Uncertainty 25%

Estimated unreported catches by components

	2006	
	Tonnes	ca. % of reported sea catch
Illegales takes in sea	102	20 %
By-catch by commercial sea fishing	26	5 %
Legal takes in sea by bag-net and bend net	102	20 %
Legal takes in sea by angling	77	15 %
	Tonnes	ca. % of reported river catch
Illegal takes in rivers	21	5 %
Legal takes in rivers, mainly by angling	63	15 %
Total unreported	391	

Russian Federation

Unreported fishing for Atlantic salmon in Russian rivers has, apparently, existed to a varying extent since after the ownership for rivers, their parts and sea netting stations was introduced, with proprietors having exclusive fishing rights in areas they owned. However, first references in the literature relating to undeclared catch of Atlantic salmon in Russia do not date further back than the beginning of the 20th century (Soldatov, 1903). The first estimation was undertaken by A.G.Smirnov (1935) in the 1930s, who estimated unreported catch in rivers and coastal areas of the Kola Peninsula as 20-25% of the catch landed at factories.

Thereafter attempts were made repeatedly to estimate the undeclared catch. For instance, according to the estimate by R.V.Kazakov (1983) illegal catch of salmon in northwest Russia was as high as 50%, and even 100% sometimes. For the Pechora river the level of illegal catch was estimated at 30-50% (Martynov, Zakharov, 1990). According to A.V.Zubchenko (Zubchenko, 1994) the illegal catch in the Tuloma river system was 25% in 1992 and about 50% in 1991. For the Kola river the figure was 25-33% in 1991-1993 (Zubchenko et al., 1995). For the Umba river the level of illegal catch was estimated at 26% (Zubchenko, Kuzmin, 1994).

Undeclared catch in Russia is mainly illegal catch. Besides, a new practice developed in the second half of the 20th century of suppressing information on catch, which was used for tackling local problems, such as paying for various services. Suppression of information on catches is also one of the ways to reduce taxes. There is also illegal retention of some of the catch for local sale and consumption at sea and in-river netting stations, landing stations etc.

As it is quite difficult to reliably quantify the undeclared catch, in most cases guess-estimation was applied and only in some instances indirect methods were used.

For example, V.G.Martynov and A.B.Zakharov (1990) estimated the losses due to illegal fishing on the Pechora river on the basis of anonymous questionnaire surveys, predominantly, in rural communities (of 5670 questionnaires distributed 1820 were returned, which made up 32%). Anonymous questionnaire surveying is as before applied on the Pechora river. A.V.Zubchenko and O.G.Kuzmin (1994) used catch statistics and reports from enforcement activities for estimating the illegal catch on the Umba river. To evaluate the pressure from illegal fishing on salmon stocks on rivers Kola and Tuloma a comparison of actual parr densities and estimated densities was undertaken (Zubchenko, 1994; Zubchenko et al., 1995).

In recent years following recommendations of the ICES North Atlantic Salmon Working Group the impact of legal and illegal undeclared catch on Atlantic salmon stocks in Russian rivers is estimated for each type of fishery separately - coastal fisheries, in-river net fishery, in-river rod fishery. The following methods of estimating the unreported catch are applied:

For legal coastal fisheries the estimate is based on the knowledge of local fisheries, predicted catch, logbook data, catch statistics for the current year and a number of years before and catch per unit effort data from different netting stations.

Legal in-river net fishery is now conducted in the Archangelsk region only. The estimate of legal undeclared catch is based on the comparison of catch per unit effort at a monitored site with an average catch per unit effort at all other sites.

For legal in-river rod fishery the estimate is derived on the basis of comparison of catch statistics from fishing by local anglers with catch statistics from foreign anglers, which is more accurate.

Estimate of illegal catch in coastal fishery, in-river rod fishery and poaching is based on the local knowledge of fisheries. On some rivers the estimate is derived through anonymous questionnaire surveys among local people.

In addition to anonymous questionnaire surveys a mathematical simulation model was used for estimating the illegal catch on one of the rivers, the Uмба, the White Sea basin (Alekseev et al., 2006). The model includes functional sections, which describe the recruitment, natural mortality of salmon as fry and post-smolt and in the period of feeding migrations in the sea, fishing mortality, maturation and spawning stock.

For estimating the illegal catch of salmon on the river Uмба at present, a simulation run was carried out. Since a part of the spawning stock was exploited legally by the hatchery, in catch-and-retain and catch-and-release fisheries and in coastal fishery at netting stations a constant mortality was used in the model for the above types of fishery. This mortality arose as a result of non-selective fishery over the whole period of salmon run and the uptake in this case was estimated at 20-30% of the returns to the river. The rest of the catch fell into the category of illegal catch. The mortality rate from selective fishing targeting, mainly, the autumn run salmon was chosen such that the average contemporary stock abundance in the model was 2500-2700 fish, in other words, was corresponding to the level observed in recent years. It was found out that the simulated population stabilized at the above level, when the uptake constituted, approximately, 67-73% of the autumn run. These findings correspond quite well to the actual situation observed on this river and are comparable with data for salmon populations in other rivers.

In conclusion, it should be noted that despite all efforts to develop effective methods for estimating the unreported catch, estimations have not so far been very accurate, with estimates relying mainly on the local knowledge of fisheries, data from logbooks and catch statistics.

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USA

As has been reported previously and through other returns to NASCO this year, commercial fisheries for sea-run Atlantic salmon are closed in US waters, including freshwater systems, coastal/ estuarine systems, and marine waters within the US Exclusive Economic Zone (EEZ). In 2006, as in the last several years, a limited recreational fishery was conducted on reconditioned surplus broodstock released in the Merrimack River. In 2006, the State of Maine Atlantic Salmon Commission (MASC) authorized a one-month experimental recreational catch-and-release fishery on the Penobscot River, Maine from 15 September to 15 October 2006. Prior to authorization of the fishery, a structured risk assessment was conducted which considered a suite of alternatives. The MASC had the authority to close the fishery during the open season as necessary to protect the resource. For both of these limited recreational fisheries, management and enforcement presence was maintained at a high level to prevent illegal activities, including poaching.

Documenting Unreported Catches in Commercial Fisheries

NOAA's National Marine Fisheries Service (NMFS), as well as state fisheries management agencies, place trained fisheries observers on commercial fishing vessels to obtain information about these fisheries, particularly information about bycatch. Over the last several years, there have been no documented observations of Atlantic salmon through any state or Federal fisheries observation program. Offloading from commercial vessels is also monitored by enforcement agents, and often by port agents and other state and Federal personnel. There have been no documented incidents of Atlantic salmon being offloaded during such monitoring efforts.

Federally licensed commercial fishing vessels in the U.S. are required to complete and submit logbooks. Each year, NMFS reviews these logbooks, as well as reported purchases from vessels from seafood dealers, to document any reports of Atlantic salmon. There have been no reports of Atlantic salmon over the last several years.

It should be noted that at-sea and dockside observation efforts are not designed to achieve 100 percent coverage, and rarely achieve 25 percent coverage of overall fishing effort. Despite this level of coverage, the amount of bycatch and/or unreported catch of Atlantic salmon in U.S. commercial fisheries is expected to be minimal and approaching zero.

Documenting Unreported Catches in Recreational Fisheries

Unreported catches of Atlantic salmon can be difficult to evaluate, and can happen in several ways. For those limited fisheries allowed for Atlantic salmon in the U.S., an angler could catch a salmon, but not report it. Because of high enforcement presence at these limited (in both time and area) fisheries, this is expected to be minimal. Unreported catches could be occurring outside of these fisheries, and could be happening through intentional effort (poaching), or by unintentional catches of Atlantic salmon by anglers fishing for other species. In the U.S., we have attempted to address the potential for unreported catches via enforcement efforts, closure of particular areas known to hold salmon to fishing of any kind, and through outreach efforts. Over

the last several years, NMFS has provided funds to Maine particularly for use in Atlantic salmon enforcement efforts. This has resulted in additional patrols and surveillance efforts in Atlantic salmon rivers. There are also Federal enforcement agents in Maine and other states that work with local authorities in monitoring areas that might be particularly vulnerable to poaching.

To address the issue of unintentional recreational catch of Atlantic salmon, and the potential for misidentification of juvenile Atlantic salmon with other species, NMFS, FWS, and several state agencies provide species identification materials in recreational fishing brochures, and post information in kiosks in fishing areas where this may happen. Information is also distributed through permit mailings, informing and reminding anglers of the regulations associated with Atlantic salmon.

Despite these efforts, there are occasional anecdotal reports of Atlantic salmon caught, either intentionally or unintentionally. When these reports reach state or Federal management agencies they are fully investigated. These reports are very infrequent, on the order of one or two each year – none in some years.

Summary and Conclusion

Despite the almost complete closure of all Atlantic salmon fisheries in the U.S., and strict control over the limited authorized recreational fisheries and associated regulations, there is the potential for illegal harvest and unreported catches. The U.S. makes a concerted effort, through fisheries observation and monitoring, enforcement activity, and outreach to deter, prevent, and document any illegal harvest and unreported catches. As a result of these efforts, and due to the poor status of stocks in the U.S., unreported catches of Atlantic salmon in both recreational and commercial fisheries in the United States are expected to be minimal, and approaching zero.