

Developing Quality Assurance for Fish Counter Data

Phase 1: An Assessment of the Salmonid Fish Counter Network in England and Wales

R&D Technical Report W2-055/TR

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This report reviews the network of fish counters within the Environment Agency, applying a common assessment process to classify the current level of counter quality and performance and the management uptake of data. It will be of interest to Agency Fisheries staff and others involved in the use of fish counters for assessing salmonid stocks.

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CONTENTS

EXECUTIVE SUMMARY.....	iii
KEY WORDS.....	iv
1. INTRODUCTION.....	1
2. THE NATIONAL REVIEW OF FISHERIES MONITORING	3
3. PROJECT OBJECTIVES	4
3.1 Overall Objective	4
3.2 Specific Objectives	4
3.3 Future Objectives	5
4. PROCEDURE FOR ASSESSMENT OF COUNTER NETWORK	6
4.1 Counter Purpose.....	6
4.1.1 Purpose Categories.....	6
4.1.2 Purpose Category Weighting	7
4.2 Counter Location and Design	9
4.3 Operational Quality of Fish Counter Data.....	9
4.4 Fish Counter Costs.....	10
5. RANKING EACH COUNTER.....	12
5.1 Unknowns and Omissions.....	12
5.2 Assumptions.....	12
6. RESULTS	13
7. CONCLUSIONS AND RECOMMENDATIONS.....	14
8. REFERENCES.....	15

LIST OF TABLES

(These, with the exception of table 1, appear in a section following the main text)

TABLE 1.	Fish counter purpose ranked in order of priority for fishery funding
TABLE 2.	Counter purpose as submitted by Regions
TABLE 3.	Counter purpose guide table
TABLE 4.	Fish counter location and design
TABLE 5.	Counter operation as submitted by regions
TABLE 6.	Counter operation assessment guidelines
TABLE 7.	Counter costs by type of counter, width and type of structure being monitored
TABLE 8.	Fish counter assessment guide, sorted by purpose, then by location and design, then by operational quality

EXECUTIVE SUMMARY

The use of fish counters to monitor and enumerate the annual migrations of salmonids has become well established in the UK since the original concept for fish counters was developed in 1949. There was relatively little further development of note until the late 1960s, however, further development and refinement has continued since then, and during the course of the last 30 years the present network of fish counters in England and Wales has evolved.

In 1999 the fisheries function of the Environment Agency initiated a review of its fisheries monitoring work, and as a part of this the existing National fish counter systems were reviewed in 2000. This review largely confirmed the perceived problems of the absence of consistent protocols and therefore the unacceptable variety in the methods of operation, data collection and validation, and in the analysis, interpretation and reporting of fish counter data. It was clear that criteria for data quality were not always recognised and that no nationally consistent procedures for monitoring data quality were in place.

In order to bring counter operations to an acceptable and consistent standard, it was determined that a programme to determine Best Practice was required, and that subsequently each counter operated by the Agency, for whatever purpose, should be assessed against this standard in a programme of Quality Assurance. It was recognised that this would result in identification of development needs and that a later definition of a network investment plan would be required. This project was carried out to address these concerns.

Each of the 41 fish counters operated by the Environment Agency, either in the past, the present or proposed for the future, were examined in relation to four criteria:

1. Counter Purpose
2. Counter Location and Design
3. Operational Quality of Data Produced
4. Counter Costs

Each of these criteria was further broken down into a number of assessment categories. Individual scores were established for each counter to give a ranking.

The results clearly showed the wide variation in counter operation and design between sites within the counter network and that this variation is irrespective of the relative "value" of that data to the fishery function. These variations reflected two things:

1. An under funding of the counter network in the past.
2. The non-targeted allocation or prioritisation of resources within the fish counter network.

There are no definitive "good practice" guidelines for fish counters, but the results highlight which counters could serve as a model for good practice. Some sites that appear to be well designed and ideally located have a low priority ranking from a fisheries funding perspective. Yet other sites with a relatively high priority appear to have design and location issues and show large scope for improving the quality of data produced.

The conclusions derived from the work were:

1. The current network of fish counters in the Environment Agency comprises systems of various age and design, operating to variable standards. There is no consistent programme of maintenance or validation. Consequently the data produced are of variable and uncertain quality. There have been attempts to remedy this unacceptable position, however, to date these have not been successful.
2. The National Review of Fisheries Monitoring has confirmed that there is an ongoing requirement for data that can be produced by fish counters. This data is needed to inform Salmon Action Plans and catchment water management planning. Additionally there are other drivers for this data, including Catchment Abstraction Management Strategies (CAMS), requirements associated with the Habitats Directive and Asset Management Plan (AMP), and the emerging Water Framework Directive.
3. This work has served to identify, for the first time, the current operating standards of each counter in the network. This has already been used to prioritise systems for resourcing within the future national core fisheries monitoring programme.
4. The work has also identified the way forward from here. A quality assurance programme to confirm current operating protocol at each site, the potential standard that could be achieved there, and to identify site investment plans is now needed.
5. A National Fish Counters Group has been formed in the Agency and this represents a good method for future co-ordination of activities. However a substantial amount of work is needed to address the issues in 4 above, and it is recommended that National resource is provided to facilitate this.

KEY WORDS

Salmonid Fisheries, Fish Counters, Quality Assurance, Evaluation.

1. INTRODUCTION

The use of fish counters to monitor and enumerate the annual migrations of salmonids is well established in the UK (Holden and Struthers, 1998). The original concept for fish counters was developed in 1949 by Lethlean (1953) and this resulted in initial trials in Scotland throughout the 1950's. There was then relatively little further development of note until the late 1960's when the North of Scotland Hydro Electric Board and the Natural Environment Research Council commissioned further research to develop viable counter technologies (Bussell, 1978). Many of the perceived applications at the time were in fish passes constructed at Scottish hydroelectric stations.

Further development and refinement has continued to date (see box 1), and during the course of the last 30 years of development the network of fish counters in England and Wales has evolved.

Box 1	<i><u>The History Of Development Of Fish Counters</u></i>
1949	Initial development of resistivity counter by Lethlean. Subsequently developed and used by North of Scotland Hydro Electric Board (NSHEB)
1950's	Series of NSHEB counters developed and trialled
1953	Lethlean publishes work on resistivity counter research
1967	Salmon and Freshwater Fisheries laboratory (MAFF) commences research into fish counters
1968	Natural Environment Research Council (NERC) sets up a working group on fish counters
1968	NERC grants to : <ul style="list-style-type: none">- NSHEB for development of resistivity counters- University of Birmingham for development of sonar counters (Braithwaite, 1971)
1971	NERC working group reports on research needs
1972	Water Resources Board (WRB) assume leading role and commission research into crump weir-based resistivity counters and sonar systems
1973	WRB abolished and role for counters taken on by Central Water Planning Unit (CWPU, later the Water Data Unit) and Water Research Centre
1975	Water Data Unit (WDU) publish a review of fish counter development (WDU, 1975)
1976	Detailed assessment of strip resistivity and sonar counters at Manley Hall, R.Dece (MAFF, 1977)
1980	Logie counter on the North Esk commissioned (Brown, 1981).
1981	Fish Counters Liaison Group (WDU) convene meeting in Reading to appraise the state of the art of fish counting
1980's	"Aquantic Ltd" commence R&D on new generation resistivity counters
1985	Department of Agriculture and Fisheries for Scotland convene task group in Montrose on Migratory Fish Counters for Rivers
1985	NSHEB produce Mark X counter
1987	Atlantic Salmon Trust (AST) convene workshop in Montrose "The Automatic Counter – A Tool for the Management of Salmon Fisheries". (Holden, 1988)
1994	AST publishes "Automatic salmon counting technologies – a contemporary review" (Fewings, 1994)
1994	National Rivers Authority commences R&D on the use of acoustic fish counters
1997	Environment Agency (EA) publishes R&D Report Design and Use of Open Channel Resistivity Fish counters (Aprahamian et al, 1997)
1997	AST seminar in Perth on Fish Counters (Holden and Struthers, 1998) EA publishes R&D Report "The Use of a Hydroacoustic Counter for assessing Salmon Stocks" (Gregory et al, 1998)
2002	EA publishes R&D Report "The Development of Applications and Validation methods for Hydroacoustic Salmonid Counters" (Gregory et al, 2001)

The history of each counter, from initial recognition of opportunity and need through to site construction and commissioning and operating procedures varies considerably. Often a counter exists only because the opportunity for installation was provided by the construction of a crump weir for hydrometric purposes. Subsequently there has in some cases been a tendency to operate such counters "because they are there", rather than for pressing management issues. In a minority of cases, counters have been commissioned to address specific fisheries management problems, and these understandably are often those that yield more reliable

management data. Increasingly over the past 10 years or so, counters have been deployed to address environmental issues such as water abstraction management and river regulation issues.

Whatever the driver for counter commissioning, systems have generally been deployed to whatever the state of the art was at the time. This has resulted today within the Environment Agency in a network of systems that has been initially deployed, and subsequently developed, in an *ad hoc* way to address local management issues. There have, until recently, been few attempts to co-ordinate National consistency and this has led to a network of variable technological sophistication, with diverse operating methods and standards and, overall, with a poor history of publication and uptake of results.

Inadequate resourcing of the network, presumably resulting from the apparent low-maintenance nature of resistivity counters, has been a major omission. This contention is clearly mistaken, and has been an important factor leading to inadequate or non-existent maintenance programmes and the failure to collect data of sufficient quality.

It is important to recognise that the management requirement for counter data varies. In some cases the requirement is for estimation of the magnitude of whole river runs, whereas in others it might be the determination of relationships between flows and migration. Increasingly there will be requirements simply to demonstrate the ongoing status of conservation features. The management need should determine the operating quality of a fish counter.

The Agency network is currently resourced almost equally by the Fisheries and Water Resources functions. In some cases external funds are also used and it is increasingly likely that funds from organisations such as the conservation agencies might be provided in future.

2. THE NATIONAL REVIEW OF FISHERIES MONITORING

In 1999 the fisheries function of the Environment Agency initiated a review of its fisheries monitoring work, and as a part of this the existing National fish counter systems were reviewed in 2000. This review largely confirmed the perceived problems of the absence of consistent protocols and therefore the unacceptable variety in the methods of operation, data collection and validation, and in the analysis, interpretation and reporting of fish counter data. It was clear that criteria for data quality were not always recognised and that no nationally consistent procedures for monitoring data quality were in place.

In order to bring counter operations to an acceptable and consistent standard, it was determined that a programme to determine Best Practice was required, and that subsequently each counter operated by the Agency, for whatever purpose, should be assessed against this standard in a programme of Quality Assurance. It was recognised that this would result in identification of development needs and that a later definition of a network investment plan would be required.

In practice, the review process re-focussed a planned R&D programme of fish counter work to support the development of the counters component of the future Core Monitoring Programme for the Agency. This was recognised to be an important process to demonstrate current and future potential data quality for internal use by fisheries and water managers. The data contribute significantly to objectives of the Salmon Action Plan process which is the subject of a Ministerial Direction to the Agency. Increasingly data is proving to be valuable for CAMS (Catchment Abstraction Management Strategies) and, in SAC rivers, for the review of consents for the Habitats Directive. Additionally, the Agency has national and international commitments for the collection and dissemination of salmon abundance data.

The review has therefore been the key driver to assess and improve the counter network.

3. PROJECT OBJECTIVES

3.1 Overall Objective

The objective of this R&D, as refined by the specific requirements of the National review of fisheries monitoring, has been:-

“To review the network of fish counters within the Agency, and to apply a common assessment process to classify the current level of counter quality and performance and the management uptake of data.”

This process was then to be applied to identify those systems that were currently operating to an acceptable standard, those that could if they received investment, and those that, for various reasons, were inappropriate for future operations.

3.2 Specific Objectives

To review the technical specification and performance of existing counters, considering:-

Generic

1. Determine counter data quality requirements for specific applications
2. Establish criteria for classifying data quality into "objective" categories that reflect the fitness for their purpose.
3. Determine procedures for assessment of counters

Specific

1. Establish National Agency counters working group
2. Commence counter information data collection
3. Define and categorise aims and objectives of the counter
4. Review current performance of counter, including:-
 - method of interrogation
 - assessment of counter downtime and its causes
 - method and frequency of data reporting
 - reporting links
 - subsequent use and management application of data
 - availability of data within and outwith the Agency
 - data validation procedures
 - count corrections
 - size frequency estimations
 - species apportionment
 - existing and required resources necessary to produce counter data.
5. Assess the two existing counter databases used in Northwest Region and Wales.
6. Examine the requirement for a National Fish Counters Database and recommend how this could be achieved.
7. Compile report on National survey for monitoring review
8. Produce final R&D report

3.3 Future Objectives

Within the timescale of this R&D it was not possible or intended to address a number of other issues for counters, however these are already quite clear and can already be summarised:-

“to develop QA procedures and a National fish counters strategy (resistivity and acoustic) to ensure consistency in operational best practice and the reporting of stock assessments for migratory fish between counters”.

This will specifically involve:-

1. Categorise management need and confirm required operating quality of existing counters
2. Recommend a QA scheme to ensure that counters with different applications meet their data quality and reporting intentions.
3. Identify factors currently limiting quality and uptake of data
4. Determine optimum Agency database for counter data; commission further development of database
5. Draft and consult on recommendations for investment in or decommissioning of National systems.

This approach will ensure the delivery in future of a network comprising counters that each clearly address a number of Agency business needs and objectives. Many of these will be fisheries business needs but an increasing number will relate to water management needs. The Agency overall has a clear need to ensure the quality of data from counters meets these requirements, and it may be viewed that it is the functional responsibility of fisheries to provide this.

The project supports the Agency’s Vision for our Environment in the following ways:

Key Themes

Indicator / Means

“An Enhanced environment for wildlife”

Increased populations of BAP species
Condition of SSSI’s
Develop Salmon Action Plans
Improved salmon catches

“Improved and protected inland and coastal waters”

Development of CAMS
(Sustainable management of water resources)

4. PROCEDURE FOR ASSESSMENT OF COUNTER NETWORK

Each of the 41 fish counters operated, either in the past, the present or proposed for the future, were examined in relation to four criteria:

1. Counter Purpose
2. Counter Location and Design
3. Operational Quality of Data Produced
4. Counter Costs

Each of these criteria were broken down into a number of assessment categories.

4.1 Counter Purpose

4.1.1 Purpose Categories

Categories of counter purpose were derived after a consultation exercise involving a range of internal and external fishery scientists and managers as listed below:

Guy Mawle	Environment Agency, Head Office, Bristol.
Nigel Milner	Environment Agency National Salmon & Trout Fisheries Centre
Martin Williams	Environment Agency South West Region
Alan Winstone	Environment Agency Wales
Miran Aprahamian	Environment Agency North West Region
Ted Potter	CEFAS
David Solomon	External Consultant

Each was given a list of reasons for counting fish, or uses that could be made of fish counter data, and asked to rank their relative priority from: a) fishery science perspective b) fishery function perspective. As they included all the purposes given by each of the 41 sites as to the use made of counter data, the categories were not necessarily exclusive, but they were "real" examples.

The results of this exercise are shown in Table 1. The purpose categories are listed by the median ranking from a fishery funding perspective.

Table 1. Fish counter purpose ranked in order of priority for Fishery Funding.

	Scientific Perspective			Issue Primarily for Fishery Function.	Priority for Fishery Funding		
	Mean	Mode	Median	Yes/No	Mean	Mode	Median
Legally Required	1.1	1	1	no	1.2		1
Index River	2.6	3	3	yes	3.0		2
Catchment Abstraction Management Strategy issues	3.7	2	2	no	8.6		3
Subject to NLO	7.3	11	5	yes	7.0		5
Failing conservation limit	5.0		5	yes	8.4		5
Historical length of reliable counter data (years)	7.6	6	6	yes	8.8		7
SAC	8.3	12	9	no	7.8		7
ICES/NASCO annual returns	3.5		3.5	yes	8.3		7
In season assessment/real time reporting	7.0		7	yes	9.3		7.5
SSSI	9.9	13	11	no	10.0		8
Other (local) Exploitation Issues	9.3		9	yes	9.3		9.5
Stock type/Run timing significance	7.3	7	7	yes	9.0		10
Socio-economically valuable fishery	6.5		6.5	yes	10.0		12
SAP River	8.6	10	10	yes	10.2		13
Fish numbers "bucking" local/national trend	10.3	10	10	yes	12.4		13
R&D on movements & exploitation rates	14.0		14	yes	12.0		13
Geographical Significance	9.2		8	yes	13.0		13.5
Recovering River	10.5		12	no	13.3		15.5

4.1.2 Purpose Category Weighting

The consultation exercise that produced Table 1. was used to weight each purpose for fish counter data from a fishery function perspective. The weighting system derived is shown below.

Weighting Criteria for Assessment of Counter Purpose

Purpose	Explanation	Score
Index River	- The Dee, the Tamar, the Tyne, the Lune.	4
NLO	- Is a NLO in place? Taken from Salmon Stocks and Fisheries in England and Wales 1999 and includes rivers with "phase out" schemes	4
Failing Conservation Limit	- Rivers that have failed conservation limit in 1997, 1998 and 1999.	4
Report to ICES/NASCO	- Rivers that report a reliable, verified count, separated for species and are due for inclusion in Salmon Stocks and Fisheries in England and Wales, 2000.	3
No. of years of reliable data	- How many years have reliable counts been reported to ICES?	0.5 If >5 years
Local Byelaw/Exploitation Issues	- Rivers where a restriction on fishing method is in force.	2
Stock/run timing issues	- Included here are rivers where a particular component of the stock are under threat, such as MSW fish on the Wye, or where local pressure exists to extend or decrease Angling season. This has not been applied to any counter.	2
Quarterly reporting	- Counters that produce a quarterly report of verified fish numbers.	0.5
Value of fishery	- As calculated for SAPS. The median fishery value for rivers that have a fish counter is £7 million. A score is given for this if the river has a fishery value above the median.	1 if >£7m
SAP	- Does one exist for the river?	1
Geographical Significance	- Is the count representative of a particular geographical area? <i>N.B. This has not been applied to any counter.</i>	1

The purpose for the operation of each fish counter operated by the Environment Agency, gathered from information submitted by each Region, is shown in Table 2 for every fish counting site.

The weightings associated with each purpose are shown in Table 3.

4.2 Counter Location and Design

Each counter was assessed and scored on three criteria:-

1. Does the counter site meet the design criteria set out in R&D Technical Report W23: Design and Use of Open Channel Resistivity Fish Counters; and/or R&D Technical Report W234: Operational Guidelines for the Commissioning, Operation and Validation of Hydroacoustic Fish Counters. Part 1: Overview of acoustic fish counting techniques.

Yes = 4, No = 0.

2. What is the extent of spawning activity that takes place below the counter site? Expressed as a percentage of total spawning activity.

0% = 3, < 20% = 2, < 50% = 1, > 51% = 0

3. What proportion of the river width available for fish migration is sampled by the counter? Expressed as a percentage of the total width.

100% = 3, >80% = 2, >50% = 1, < 49% = 0.

The results and scores for each fish counting site are shown in Table 4.

4.3 Operational Quality of Fish Counter Data.

The categories upon which the quality of fish counter data has been assessed were identified as elements of a "best practise" approach. These were as follows:

Criteria for Estimating Operating Quality of Counters

Purpose	Explanation	Score
Status	Is this an active counting site? Is it being used?	1
Calibration Method	Score given if a standard target is used to calibrate the system.	2
Calibration Frequency	Monthly or more frequently	1
Verification	Each fish event verified after data collection.	3
Up/Down Verification	Verification applied equally to up and downstream counts	1
Downtime Recorded	A record exists detailing periods of system "downtime".	1
Downtime Recording Frequency	Details exist for every day when downtime occurred	1
Up/Down extrapolation	Counts are extrapolated for downtime	3
Validated?	The counter has been validated.	3
When Validated?	Validated since 1/4/1997	2
Validation applied	Validation results applied to fish counts	3
All Channels Validated?	All resistivity channels or sampling width (with acoustic systems) validated?	1
Downstream Subtraction	Downstream fish events are subtracted from upstream events in the presentation of results	1
Species Apportioned?	Counts are reliably split for salmon and sea trout.	3
Counter Checking Frequency	Counter checked weekly or more frequently	1

Information, as submitted by each Region, relating to the issues set out above is shown in Table 5 for every fish counting site.

The subsequent scores for each counter are shown in Table 6.

4.4 Fish Counter Costs

Each region attempted to submit annual running costs for individual counter operation. These costs ranged from £50 pa to £15,000 p.a.! The large discrepancies between sites indicate the

variability of operating rigour, but more worryingly, awareness of the resource needed to maintain counter reliability and to maximise returns for the large investment. Clearly many Area staff were not aware of the hidden cost components, and in many cases some of the more obvious components were also ignored.

It was assumed that many sites had given accurate assessments of actual budgets for annual running costs. This clearly indicates the substantial resource shortfall in resources for general site operation and maintenance, and it is concluded that this is the crucial factor limiting the performance of individual counters.

To overcome these issues and estimate the current true cost of the fish counter network, the counters were divided between four categories. After removing certain extreme values, the costs most commonly cited for the operation of a counter in each category was then applied to all the remaining counter sites within that category. The categories and costs applied are shown below.

Category	Cost
Acoustic Counter	£15,000
Resistivity: Fish Pass	£12,000
Resistivity: weir > 20m	£12,000
Resistivity: weir < 20m	£12,000

Table 7 shows each fish counter sorted by these four categories.

It must be noted that this analysis of costs, although representing current best estimates, is not sufficient for future planning. A closer scrutiny of operating standards, maintenance and depreciation will be needed before the full cost of network operation can be accurately assessed.

5. RANKING EACH COUNTER

Individual scores for Purpose, Location and Design and Operational Quality are displayed in Table 8, together with their cost to the Fisheries Function as calculated from Table 7.

This list includes counters that are decommissioned, not active, active and proposed.

5.1 Unknowns and Omissions

The extent to which fish counters on the same river relies on each other to obtain a count. The extent to which counters rely on the use of fish traps or other methods to produce fish counts (for sizing, species apportionment, validation, etc.). What are the associated running costs of such methods?

Only counters operated by the Environment Agency have been included. The Agency may want to pay the operators of non-Agency counters (on the Frome and the Tees for example) for fish counter data in the future. The potential cost of this has not been accounted for.

No overhead costs have been added to any of the results shown here.

5.2 Assumptions

It is assumed that the information given from each site relating to individual counters is correct. It is also assumed that a site has "signed up" to operating and producing data to at least the same standard as they say they do now.

The results returned from sites will be audited to ensure they reflect site operation rather than an idealised version of site operation.

Many sites will be expected to improve data quality in line with future recommendations of the current R&D project to develop quality assurance procedures for counter operation.

6. RESULTS

At the very least the results clearly show the wide variation in counter operation and design between sites within the counter network and that this variation is irrespective of the relative "value" of that data to the fishery function. These variations reflect two things:

1. An under funding of the counter network in the past.
2. The non-targeted allocation or prioritisation of resources within the fish counter network.

Table 8 highlights those sites where further operational development or capital investment or both is required in order to obtain monitoring data that can be compared nationally. There are no definitive "good practice" guidelines for fish counters, but the results highlight which counters could serve as a model for good practice (such as the Lune, Tamar, Wye, Ribble, Test and Itchen).

Some sites that appear to be well designed and ideally located (on the Llyfni, Derwent and Western Rother for example) have a low priority ranking from a fisheries funding perspective. Yet other sites with a relatively high priority (the Tyne at Chollerford, the Dee and Hampshire Avon) appear to have design and location issues and show large scope for improving the quality of data produced.

7. CONCLUSIONS AND RECOMMENDATIONS

1. The current network of fish counters in the Environment Agency comprises systems of various age and design, operating to variable standards. There is no consistent programme of maintenance or validation. Consequently the data produced are of variable and uncertain quality. There have been attempts to remedy this unacceptable position however to date these have not been successful.
2. The National review of Fisheries Monitoring has confirmed that there is an ongoing requirement for data that can be produced by fish counters. This data is needed to inform Salmon Action Plans and catchment water management planning. Additionally there are other drivers for this data, including CAMS, requirements associated with the Habitats Directive and AMP, and the emerging Water Framework Directive.
3. This work has served to identify, for the first time, the current operating standards of each counter in the network. This has already been used to prioritise systems for resourcing within the future national core fisheries monitoring programme.
4. The work has also identified the way forward from here. A QA programme to confirm current operating protocol at each site, the potential standard that could be achieved there, and to identify site investment plans is now needed.
5. A National Fish Counters Group has been formed in the Agency and this represents a good method for future co-ordination of activities. However a substantial amount of work is needed to address the issues in 4 above, and it is recommended that National resource is provided to facilitate this.

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Table 2. Counter Purpose As Submitted by Regions.

1. River Name	2. Site Name	Index River	NLO	Failing Conservation limit	Report to ICES/NASCO?	Years of Reliable Data	QuarterlyReport Verified data	Local Byelaw issues	Stock/run timing issues	Value of fishery (£m)	SAP river?	Geographically significant
Severn	Dolwen, Llanidloes	FALSE	FALSE	TRUE	FALSE		FALSE	FALSE	FALSE	1.1	TRUE	FALSE
Severn	Shrewsbury	FALSE	FALSE	TRUE	FALSE		FALSE	FALSE	FALSE	1.1	TRUE	FALSE
Severn	Upper Lode fish pass	FALSE	FALSE	TRUE	FALSE		FALSE	FALSE	FALSE	1.1	TRUE	FALSE
Tanat	Carreghofa	FALSE	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE		FALSE	FALSE
Tanat	Llanyblodwel	FALSE	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE		FALSE	FALSE
Teme	Ashford Weir	FALSE	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE		FALSE	FALSE
Coquet	North Pass	FALSE	TRUE	FALSE	FALSE		FALSE	TRUE	FALSE	4.0	TRUE	FALSE
Coquet	South Pass	FALSE	TRUE	FALSE	FALSE		FALSE	TRUE	FALSE		TRUE	FALSE
Ouse	Naburn Weir	FALSE	TRUE	FALSE	FALSE		FALSE	FALSE	FALSE		FALSE	FALSE
Tyne	Chollerford	TRUE	TRUE	FALSE	FALSE		TRUE	TRUE	FALSE	16.0	TRUE	FALSE
Tyne	Riding Mill	TRUE	TRUE	FALSE	FALSE		TRUE	FALSE	FALSE	16.0	TRUE	FALSE
Wear	Durham	FALSE	TRUE	TRUE	FALSE		FALSE	FALSE	FALSE	5.1	TRUE	FALSE
Yorkshire Esk	Sleights Weir	FALSE	TRUE	TRUE	FALSE		FALSE	FALSE	FALSE	0.6	TRUE	FALSE
Derwent (Cumbria)	Yearl	FALSE	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE		TRUE	FALSE
Eden	Corby Hill	FALSE	TRUE	TRUE	FALSE		FALSE	FALSE	FALSE	34.0	TRUE	FALSE
Hodder	Winckley	FALSE	TRUE	FALSE	FALSE		FALSE	FALSE	FALSE		FALSE	FALSE
Kent	Basinghyll	FALSE	TRUE	FALSE	TRUE	11	FALSE	FALSE	FALSE	7.1	TRUE	FALSE
Leven	Backbarrow	FALSE	TRUE	TRUE	TRUE	7	FALSE	FALSE	FALSE	2.0	TRUE	FALSE
Lune	Broadrairie	TRUE	TRUE	FALSE	TRUE	11	FALSE	FALSE	FALSE	30.0	TRUE	FALSE
Lune	Forge	TRUE	TRUE	FALSE	TRUE	11	FALSE	FALSE	FALSE	30.0	TRUE	FALSE
Ribble	Locks	FALSE	TRUE	TRUE	FALSE		FALSE	FALSE	FALSE	6.8	TRUE	FALSE
Ribble	Waddow	FALSE	TRUE	TRUE	FALSE		FALSE	FALSE	FALSE	6.8	TRUE	FALSE
Adur	Sakeham Weir	FALSE	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE		FALSE	FALSE
Itchen	Gaters Mill	FALSE	FALSE	TRUE	TRUE	12	TRUE	TRUE	FALSE	6.0	TRUE	FALSE
Ouse	Andrews Weir	FALSE	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE		FALSE	FALSE
Test	Conegar Bridge	FALSE	FALSE	TRUE	TRUE	12	TRUE	TRUE	FALSE	2.0	TRUE	FALSE
Test	Nursling Mill	FALSE	FALSE	TRUE	TRUE	12	TRUE	TRUE	FALSE	2.0	TRUE	FALSE
Western Rother	Hardham Weir	FALSE	FALSE	FALSE	FALSE		TRUE	FALSE	FALSE		FALSE	FALSE
Fowey	Restormel	FALSE	TRUE	TRUE	TRUE	2	TRUE	FALSE	FALSE		FALSE	FALSE
Hampshire Avon	Knapp Mill (Great Weir)	FALSE	TRUE	TRUE	FALSE		FALSE	TRUE	FALSE	1.8	TRUE	FALSE
Hampshire Avon	Knapp Mill (Turbine House)	FALSE	TRUE	TRUE	FALSE		FALSE	TRUE	FALSE	1.8	TRUE	FALSE
Tamar	Gunnislake Weir	TRUE	TRUE	FALSE	TRUE	6	TRUE	TRUE	FALSE	12.0	TRUE	FALSE
Tavy	Lopwell	FALSE	TRUE	FALSE	FALSE		FALSE	TRUE	FALSE		TRUE	FALSE
Conwy	Conwy Falls Fishpass	FALSE	FALSE	FALSE	FALSE		TRUE	TRUE	FALSE	3.2	TRUE	FALSE
Dee	Manley Hall	TRUE	TRUE	FALSE	FALSE		FALSE	TRUE	FALSE	10.0	TRUE	FALSE
Dyfi	Newlyn Run	FALSE	TRUE	TRUE	FALSE		FALSE	TRUE	FALSE		TRUE	FALSE
Llyfni	Pont Llyfni Gauging weir	FALSE	FALSE	FALSE	FALSE		TRUE	TRUE	FALSE		FALSE	FALSE
Teifi	Glantefi	FALSE	TRUE	FALSE	FALSE		TRUE	TRUE	FALSE	10.8	TRUE	FALSE
Tywi	Ty Castell	FALSE	TRUE	TRUE	FALSE		TRUE	FALSE	FALSE	10.2	TRUE	FALSE
Usk	Trostrey weir	FALSE	TRUE	FALSE	FALSE		FALSE	TRUE	FALSE	12.0	TRUE	FALSE
Wye	Redbrook	FALSE	FALSE	TRUE	TRUE	1	TRUE	TRUE	FALSE	16.4	TRUE	FALSE

Table 3. Counter Purpose Guide Table

Region	1. River Name.	2. Site Name	Index Score	NLO Score	Conservation Score	ICES/NASCO	> 5 Years Data to ICES	Quarterly Reporting	Byelaw/Exploitation issues	Stock/run timing	Value of fishery >£7m	SAP?	Geography	Total
M	Severn	Dolwen, Llanidloes	0	0	4	0	0	0	0	0	0	1	0	5
M	Severn	Shrewsbury	0	0	4	0	0	0	0	0	0	1	0	5
M	Severn	Upper Lode fish pass	0	0	4	0	0	0	0	0	0	1	0	5
M	Tanat	Carreghofa	0	0	0	0	0	0	0	0	0	0	0	0
M	Tanat	Llanyblodwel	0	0	0	0	0	0	0	0	0	0	0	0
M	Terne	Ashford Weir	0	0	0	0	0	0	0	0	0	0	0	0
NE	Coquet	North Pass	0	4	0	0	0	0	2	0	0	1	0	7
NE	Coquet	South Pass	0	4	0	0	0	0	2	0	0	1	0	7
NE	Ouse	Naburn Weir	0	4	0	0	0	0	0	0	0	0	0	4
NE	Tyne	Chollerford	4	4	0	0	0	0	2	0	1	1	0	12
NE	Tyne	Riding Mill	4	4	0	0	0	0.5	2	0	1	1	0	12.5
NE	Wear	Durham	0	4	4	0	0	0	0	0	0	1	0	9
NE	Yorkshire Esk	Sleights Weir	0	4	4	0	0	0	0	0	0	1	0	9
NW	Derwent (Cumbria)	Yearl	0	0	0	0	0	0	0	0	0	1	0	1
NW	Eden	Corby Hill	0	4	4	0	0	0	0	0	1	1	0	10
NW	Hodder	Winckley	0	4	0	0	0	0	0	0	0	0	0	4
NW	Kent	Basinghyll	0	4	0	3	0.5	0	0	0	1	1	0	9.5
NW	Leven	Backbarrow	0	4	4	3	0.5	0	0	0	0	1	0	12.5
NW	Lune	Broadrairie	4	4	0	3	0.5	0	0	0	1	1	0	13.5
NW	Lune	Forge	4	4	0	3	0.5	0	0	0	1	1	0	13.5
NW	Ribble	Locks	0	4	4	0	0	0	0	0	0	1	0	9
NW	Ribble	Waddow	0	4	4	0	0	0	0	0	0	1	0	9
S	Adur	Sakeham Weir	0	0	0	0	0	0	0	0	0	0	0	0
S	Itchen	Gaters Mill	0	0	4	3	0.5	0.5	2	0	0	1	0	11
S	Ouse	Andrews Weir	0	0	0	0	0	0	0	0	0	0	0	0
S	Test	Conegar Bridge	0	0	4	3	0.5	0.5	2	0	0	1	0	11
S	Test	Nursling Mill	0	0	4	3	0.5	0.5	2	0	0	1	0	11
S	Western Rother	Hardham Weir	0	0	0	0	0	0.5	0	0	0	0	0	0.5
SW	Fowey	Restormel	0	4	4	3	0	0.5	0	0	0	0	0	11.5
SW	Hampshire Avon	Knapp Mill (Great Weir)	0	4	4	0	0	0	2	0	0	1	0	11
SW	Hampshire Avon	Knapp Mill (Turbine House)	0	4	4	0	0	0	2	0	0	1	0	11
SW	Tamar	Gunnislake Weir	4	4	0	3	0.5	0.5	2	0	1	1	0	16
SW	Tavy	Lopwell	0	4	0	0	0	0	2	0	0	1	0	7
W	Conwy	Conwy Falls Fishpass	0	0	0	0	0	0.5	2	0	0	1	0	3.5
W	Dee	Manley Hall	4	4	0	0	0	0	2	0	1	1	0	12
W	Dyfi	Newlyn Run	0	4	4	0	0	0	2	0	0	1	0	11
W	Llyfni	Pont Llyfni Gauging weir	0	0	0	0	0	0.5	2	0	0	0	0	2.5
W	Teifi	Giantteifi	0	4	0	0	0	0.5	2	0	1	1	0	8.5
W	Tywi	Ty Castell	0	4	4	0	0	0.5	0	0	1	1	0	10.5
W	Usk	Trostrey weir	0	4	0	0	0	0	2	0	1	1	0	8
W	Wye	Redbrook	0	0	4	3	0	0.5	2	0	1	1	0	11.5

Table 4: Fish Counter Location and Design

Environment Agency Region	River Name	Site Name	4. Distance of counter from the head of tide in kilometres?	other species included in counter data?	spawning below counter?	extent of spawning activity.	Meets R&D Design criteria	sampling width in metres?	What percentage of river width over which fish migration occurs does the counter sample?	Values			Total
										Spawning Extent	Meets R&D Design criteria	Sample width over which fish migration occurs	
M	Severn	Dolwen, Llanidloes	258	Grayling & Trout	TRUE	0	TRUE	0	100	0	4	3	7
M	Severn	Shrewsbury	146	None. This counter is no longer in operation. Since 1996	TRUE	0	FALSE	0	0	2	0	0	2
M	Severn	Upper Lode fish pass	19	Shad ,Occasional course fish	TRUE	0	TRUE	1	1	3	4	0	7
M	Tanat	Carreghofa	204		TRUE	0	TRUE	1	100	2	4	3	9
M	Tanat	Llanymbodwel	205	None. This counter is now out of action.	TRUE	0	FALSE	0	0	2	0	0	2
M	Teme	Ashford Weir	98	None at Present	TRUE	0	TRUE	0	1	2	4	0	6
NE	Coquet	North Pass	0	Eels and lamprey (and others) but are likely to be below the threshold limits and not included within the count or recorded as non fish events	FALSE	0	TRUE	1	50	3	4	1	8
NE	Coquet	South Pass	0	Eels and lamprey (and others) but are likely to be below the threshold limits and not included within the count or recorded as non fish events	FALSE	0	TRUE	2	50	3	4	1	8
NE	Ouse	Naburn Weir	0	Coarse fish	FALSE	0	FALSE	1	5	3	0	0	3
NE	Tyne	Chollerford	28	Eels, lamprey and brown trout but all are probably below threshold limits of the site and not included within the count or recorded as non fish events	TRUE	60	TRUE	3	4	0	4	0	4
NE	Tyne	Riding Mill	12	Eels, lampreys, dace, chub, brown trout are all present upstream and downstream of the counter. They are likely to be below the threshold limits of this site and therefore not included in the count or recorded as non fish events	TRUE	5	TRUE	13	100	2	4	3	9
NE	Wear	Durham	22	Eels, lampreys, dace, chub, roach, grayling, brown trout are all present upstream and downstream of the counter. They are likely to be below the threshold limits of this site and therefore not included in the count or recorded as non fish events	TRUE	5	TRUE	4	75	2	4	1	7
NE	Yorkshire Esk	Sleights Weir	3	Eel	TRUE	5	FALSE	1	30	2	0	0	2
NW	Derwent (Cumbria)	Yearl	1	Mullet, eels Children playing in summer False counts from turbulent water	FALSE	0	TRUE	32	100	3	4	3	10
NW	Eden	Corby Hill	26	eel and trout, very occasional	TRUE	30	TRUE	45	100	1	4	3	8
NW	Hodder	Winckley	26	Occasional brown trout, rainbow trout, grayling and eels	FALSE	0	FALSE	6	99	3	0	2	5
NW	Kent	Basinghlyl	4	None	TRUE	3	TRUE	26	100	2	4	3	9
NW	Leven	Backbarrow	2	Downstream silver eel migration regularly recorded during the autumn months	TRUE	5	TRUE	26	100	2	4	3	9
NW	Lune	Broadraine	38	occasional brown trout	TRUE	75	TRUE	2	99	0	4	2	6
NW	Lune	Forge	4	occasional brown trout and very occasional rainbow trout	FALSE	0	FALSE*3	21	100	3	0	3	6
NW	Ribble	Locks	72	occasional brown trout	TRUE	0	TRUE	5	100	3	4	3	10
NW	Ribble	Waddow	32	Occasional brown trout, grayling, chub and eels	TRUE	0	TRUE	1	99	3	4	2	9
S	Adur	Sakeham Weir	1	Cyprinid species & eels	TRUE	40	TRUE	6	100*2	1	4	3	8
S	Itchen	Gaters Mill	2	EELS RECORDED SEPERATELY	TRUE	0	TRUE	1	90*1	3	4	2	9

Environment Agency Region	River Name	Site Name	4. Distance of counter from the head of tide in kilometres?	other species included in counter data?	spawning below counter?	extent of spawning activity.	Meets R&D Design criteria	sampling width in metres?	What percentage of river width over which fish migration occurs does the counter sample?	Spawning Extent	Meets R&D Design criteria	Sample width over which fish migration occurs	Total
S	Ouse	Andrews Weir	0	cyprinid sps & eels	TRUE	1	TRUE	2	100 ^{*2}	2	4	3	9
S	Test	Conegar Bridge	2	EELS RECORDED SEPERATELY	TRUE	1	TRUE	1	100	2	4	3	9
S	Test	Nursling Mill	2	EELS RECORDED SEPERATELY	TRUE	1	TRUE	6	100	2	4	3	9
S	Western Rother	Hardham Weir	0	Ad hoc counts of a number of species ie. pike & eels over ~35cm	FALSE	0	TRUE	5	<100 ^{*1}	3	4	2	9
SW	Fowey	Restormel	2	Others, lampreys, shad removed from the raw counter data using video data and analysis of counter data.	FALSE	0	TRUE	17	100	3	4	3	10
SW	Hampshire Avon	Knapp Mill (Great Weir)	1	Eel, lamprey	FALSE	0	FALSE	2	20	3	0	0	3
SW	Hampshire Avon	Knapp Mill (Turbine House)	1	Eel, lamprey	FALSE	0	FALSE	1	20 ^{*1}	3	0	0	3
SW	Tamar	Gunnislake Weir	0	Shad (alosa spp.) Sea Lamprey (Petromyzon marinus) removed from the raw counter data using video data and analysis of counter data.	FALSE	0	TRUE	2	75	3	4	1	8
SW	Tavy	Lopwell	0	Eels, cormorants, ducks, swans	FALSE	0	FALSE	1	100	3	4	3	10
W	Conwy	Conwy Falls Fishpass	15	Validation showed no non-target species.	TRUE	50	TRUE	2	100	1	4	3	8
W	Dee	Manley Hall	55	No other species identified (as yet)	TRUE	20	TRUE	40	0	2	4	0	6
W	Dyfi	Newlyn Run	5		FALSE	1	FALSE	20	85	2	4	2	8
W	Llyfni	Pont Llyfni Guaging weir	1	Eels - could not be distinguished from target species. In validation, around 2% of all events recorded, 16% of all confirmed up and down counts (ie. from trace) Lamprey - not counted as targets. Otter - counted but all removed on the basis of trace	FALSE	0	TRUE	9	100	3	4	3	10
W	Teifi	Glanteifi	5	Possibly Flounder,Pike, Cormorants and Otters but there is no evidence yet	TRUE	0	FALSE	20	80	3	4	2	9
W	Tywi	Ty Castell	6	pike cormorant otter flounder	TRUE	15	FALSE	30	95	2	4	2	8
W	Usk	Trostrey weir	13	Shad, eel, lamprey, flounder, otter, ducks. Also debris and at low flows wave action resulting from wind on the water surface.	TRUE	5	FALSE	27	100	2	0	3	5
W	Wye	Redbrook	7	shad barbel chub	FALSE	0	FALSE	22	60	3	4	1	8

*1 100% was originally submitted but changed following site visit.

*2 Structures for these counters have yet to be built so this may be an over estimation.

*3 Two fish pass channels meet the design but two weir face channels do not.

Continuation of Table 4

Table 5: Counter Operation as Submitted By Regions.

Region	River Name	Site Name	Status	method used to calibrate the counter	frequency of calibration s.	counter events routinely verified?	verification process applied equally to upstream downstream events?	record kept of counter downtime?	recorded for each day on which downtime occurred, or on a weekly/monthly/annual basis?	Are counts extrapolated to account for downtime?	Are downtime extrapolations applied equally to upstream downstream events?	counter been validated	When Validated	validation figures applied to counts?	each of the channels validated?	downstream counts subtracted from upstream counts	apportioned for Species?	How often is the counter interrogated on average?	Report to ICES/ NASCO ?	Years of Reliable Data	Quarterly Report Verified data
M	Severn	Dolwen, Llanidnoes	Commissioning	Dummy fish & Dead fish	Ad hoc basis	No verification	FALSE	FALSE	Not available.	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	TRUE	Weekly	FALSE		FALSE
M	Severn	Shrewsbury	Decommissioned				FALSE	FALSE		FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE		FALSE		FALSE
M	Severn	Upper Lode fish pass	Not Active	Dummy fish	Ad hoc basis	No verification	FALSE	FALSE	Not available.	FALSE	FALSE	TRUE		FALSE	FALSE	FALSE	FALSE	Less Frequently	FALSE		FALSE
M	Tanat	Carreghofa	Commissioning	Dummy fish & dead fish.	Ad hoc basis	No verification	FALSE	FALSE	Not available.	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	TRUE	Weekly	FALSE		FALSE
M	Tanat	Llanyblodwel	Decommissioned				FALSE	FALSE		FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE		FALSE		FALSE
M	Teme	Ashford Weir	Commissioning	Dummy fish, dead fish	Ad hoc basis	No verification	FALSE	FALSE	Not available.	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	TRUE	Weekly	FALSE		FALSE
NE	Coquet	North Pass	Active	Dummy fish and dead fish	Ad hoc basis		TRUE	TRUE	Daily	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	TRUE	Monthly	FALSE		FALSE
NE	Coquet	South Pass	Active	Dummy and dead fish	Ad hoc basis		FALSE	TRUE	Daily	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE	Twice weekly	FALSE		FALSE
NE	Ouse	Naburn Weir	Active	Dead fish	Ad hoc basis	No verification	TRUE	TRUE	Annual Summary	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE	Weekly	FALSE		FALSE
NE	Tyne	Chollerford	Active	Dead and dummy fish	Ad hoc basis	No verification	FALSE	TRUE	Daily	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE	Twice weekly	FALSE		FALSE
NE	Tyne	Riding Mill	Active	Dummy fish, dead fish and the upstream trap have all been used.	Ad hoc basis	All non fish events verified	FALSE	TRUE	Daily	FALSE	FALSE	FALSE		FALSE	FALSE	TRUE	FALSE	Twice weekly	FALSE		TRUE
NE	Wear	Durham	Active	Dummy and dead fish	Ad hoc basis		FALSE	TRUE	Daily	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE	Twice weekly	FALSE		FALSE
NE	Yorkshire Esk	Sleights Weir	Active	Dead fish	Ad hoc basis	No verification	TRUE	TRUE	Annual Summary	FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE	Daily	FALSE		FALSE
NW	Derwent (Cumbria)	Year	Active	Validation has been attempted but need further work. Planned for 2001 or 2002. Some Fish rig work (ie dead fish) has been undertaken.	See standard NW answer attached to Ben's	All fish events will be verified	TRUE	FALSE	Could be constructed when requested for more recent	TRUE	TRUE	FALSE		FALSE	FALSE	TRUE	FALSE	Twice Monthly for counter data	FALSE		FALSE
NW	Eden	Corby Hill	Active	See std NW answer w/ Ben's. Note that for this site it is not possible to undertake fish rig work due to the depth. Video validation is underway but further video work would be req'd to relate signal size to fish size due to validation image size.	See standard NW answer attached to Ben's	All fish events will be verified	TRUE	FALSE	Could be constructed when requested	TRUE	TRUE	TRUE	01-Jul-00	FALSE	FALSE	TRUE	FALSE	Twice Monthly for counter data	FALSE		FALSE
NW	Hodder	Winckley	Active	dummy fish & dead fish	Twice monthly (dummy fish)	All fish events verified	TRUE	FALSE		FALSE	FALSE	FALSE		FALSE	FALSE	TRUE	TRUE	Twice weekly	FALSE		FALSE
NW	Kent	Basinghlyl	Active	* See Notes	* See Notes	All fish events verified	TRUE	TRUE	Daily	TRUE	TRUE	TRUE	01-Sep-96	FALSE	FALSE	TRUE	TRUE	Twice weekly	TRUE	11	FALSE
NW	Leven	Backbarrow	Active	* See Notes	* See Notes	All fish events verified	TRUE	TRUE	Daily	TRUE	TRUE	FALSE		FALSE	FALSE	TRUE	TRUE	Twice weekly	TRUE	7	FALSE
NW	Lune	Broadrairie	Active	Dummy fish, dead fish	Twice monthly (dummy fish)	All fish events verified	TRUE	TRUE	Daily	TRUE	TRUE	FALSE		FALSE	FALSE	TRUE	TRUE	Twice weekly	TRUE	11	FALSE
NW	Lune	Forge	Active	Dummy fish, dead fish	Twice monthly (dummy fish)	All fish events verified	TRUE	TRUE	Daily	TRUE	TRUE	TRUE		FALSE	FALSE	TRUE	TRUE	Twice weekly	TRUE	11	FALSE
NW	Ribble	Locks	Active	dummy fish & dead fish	Twice monthly (dummy fish)	All fish events verified	TRUE	TRUE	Daily	TRUE	TRUE	FALSE		FALSE	FALSE	TRUE	TRUE	Twice weekly	FALSE		FALSE
NW	Ribble	Waddow	Active	dummy fish & dead fish	Twice monthly (dummy fish)	All fish events verified	TRUE	TRUE	Daily	TRUE	TRUE	TRUE		FALSE	FALSE	TRUE	TRUE	Twice weekly	FALSE		FALSE
S	Adur	Sakeham Weir	Proposed	Proposed to use time lapse video recorders.		All fish events verified	TRUE	TRUE	Daily	FALSE	FALSE	FALSE		FALSE	FALSE	TRUE	TRUE	Weekly	FALSE		FALSE
S	Itchen	Gaters Mill	Active	STANDARD TARGET + DUMMY FISH	Monthly	All fish events verified	TRUE	TRUE	Daily	TRUE	TRUE	TRUE	01-Jul-95	FALSE	TRUE	TRUE	TRUE	Twice weekly	TRUE	12	TRUE
S	Ouse	Andrews Weir	Proposed			All fish events verified	TRUE	TRUE	Daily	FALSE	FALSE	FALSE		FALSE	FALSE	TRUE	TRUE	Weekly	FALSE		FALSE
S	Test	Conegar Bridge	Active	STANDARD TARGET + DUMMY FISH	Monthly	All fish events verified	TRUE	TRUE	Daily	TRUE	TRUE	TRUE	01-Jul-95	FALSE	TRUE	TRUE	TRUE	Twice weekly	TRUE	12	TRUE
S	Test	Nursling Mill	Active	STANDARD TARGET + DUMMY FISH	Monthly	All fish events verified	TRUE	TRUE	Daily	TRUE	TRUE	TRUE	01-Jul-95	FALSE	TRUE	TRUE	TRUE	Twice weekly	TRUE	12	TRUE
S	Western Rother	Hardham Weir	Active	Initially calibrated using standard target however no recent calibration tests conducted.	Ad hoc basis	All fish events verified	TRUE	TRUE	Daily	FALSE	FALSE	TRUE	01-Aug-97	FALSE	TRUE	TRUE	TRUE	Weekly, twice weekly during peak migration period.	FALSE		TRUE

Region	River Name	Site Name	Status	method used to calibrate the counter	frequency of calibrations.	counter events routinely verified?	verification process applied equally to upstream downstream events?	record kept of counter downtime?	recorded for each day on which downtime occurred, or on a weekly/monthly/annual basis?	Are counts extrapolated to account for downtime?	Are downtime extrapolations applied equally to upstream downstream events?	counter been validated	When Validated	validation figures applied to counts?	each of the channels validated?	downstream counts subtracted from upstream counts	apportioned for Species?	How often is the counter interrogated on average?	Report to ICES/NASCO?	Years of Reliable Data	Quarterly Report Verified data
SW	Fowey	Restormel	Active	dummy fish, probe calibration	Weekly	combination (depending on circumstances)	FALSE	TRUE	Daily	TRUE	FALSE	TRUE	01-Jun-98	TRUE	TRUE	FALSE	TRUE	Daily	TRUE	2	TRUE
SW	Hampshire Avon	Knapp Mill (Great Weir)	Not Active	Dead fish	Ad hoc basis	All fish events verified	TRUE	FALSE	Not available.	FALSE	FALSE	TRUE	01-Jul-97	FALSE	TRUE	FALSE	FALSE	Twice weekly	FALSE		FALSE
SW	Hampshire Avon	Knapp Mill (Turbine House)	Not Active	Dead fish	Ad hoc basis	All fish events verified	TRUE	FALSE	Not available.	FALSE	FALSE	TRUE	01-Jul-97	FALSE	TRUE	FALSE	FALSE	Twice weekly	FALSE		FALSE
SW	Tamar	Gunnislake Weir	Active	dummy fish and conductivity probe calibration	Weekly	combination (depending on circumstances)	FALSE	TRUE	Daily	TRUE	FALSE	TRUE	01-Jun-99	TRUE	TRUE	FALSE	TRUE	Daily	TRUE	6	TRUE
SW	Tavy	Lopwell	Active	standard target	Twice monthly	combination (depending on circumstances)	TRUE	TRUE	Daily	TRUE	FALSE	TRUE		TRUE	TRUE	FALSE	FALSE	Daily	FALSE		FALSE
W	Conwy	Conwy Falls Fishpass	Active	Dummy and video footage	During validation only	All fish events verified	TRUE	TRUE	Downtime very rare	FALSE	FALSE	TRUE	01-Jul-94	FALSE	TRUE	TRUE	FALSE	Twice Monthly	FALSE		TRUE
W	Dee	Manley Hall	Active	Video of live fish	Ad hoc basis	No verification	FALSE	TRUE	Not available.	FALSE	FALSE	TRUE	01-Oct-99	FALSE	FALSE	FALSE	FALSE	Weekly	FALSE		FALSE
W	Dyfi	Newlyn Run	Proposed	Standard Target	Monthly	All upstream fish events Verified	FALSE	FALSE		FALSE	FALSE	FALSE		FALSE	FALSE	FALSE	FALSE		FALSE		FALSE
W	Llyfni	Pont Llyfni Gauging weir	Active	Dummy and video footage	During validation only period only.	All fish events verified	TRUE	TRUE	No down time so far, no extrapolation will be used	FALSE	FALSE	TRUE	01-Jun-99	FALSE	TRUE	TRUE	FALSE	Twice Monthly	FALSE		TRUE
W	Telfi	Glantell	Active	Standard Target	Monthly	Sub-sample (upstream fish events verified only).	FALSE	TRUE	Daily	TRUE	FALSE	TRUE	17-Nov-00	FALSE	TRUE	FALSE	FALSE	Daily	FALSE		TRUE
W	Tywi	Ty Castell	Active	standard target	Monthly	All upstream fish events Verified	FALSE	TRUE	Daily	TRUE	FALSE	TRUE	01-May-00	FALSE	TRUE	FALSE	FALSE	Daily	FALSE		TRUE
W	Usk	Trostrey weir	Not Active	In built calibration routine. This is done every 30 mins and adjusts the output signal to accommodate changes in water volume and conductivity. Conductivity probe is calibrated on each visit and dummy fish signal test on each visit.	Twice monthly	Sub-sample (all fish events)	TRUE	TRUE	weekly summary	FALSE	FALSE	TRUE	01-Oct-87	FALSE	FALSE	TRUE	TRUE	Twice Monthly	FALSE		FALSE
W	Wye	Redbrook	Active	standard target	Monthly	All upstream fish events Verified	FALSE	TRUE	Daily	TRUE	FALSE	TRUE	01-Sep-00	TRUE	TRUE	FALSE	FALSE	Daily	TRUE	1	TRUE

Continuation of Table 5

R&D Technical Report W2-055/TR

Table 6: Counter Operation Assessment Guidelines

Region	River Name	Site Name	Status	Status Score	Calibration Method	Cali Freq	Verification?	UP/Down Verification	Downtime Recorded	Downtime Rec Freq	Downtime Extrapolation?	Up/Down Extrap	Validated	When Validated?	Validation Applied?	All Channels Validated?	Downstream Subtraction	Species Apportioned?	Counter Checking Freq?	Total
M	Severn	Dolwen, Llanidloes	Commissioning	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4
M	Severn	Shrewsbury	Decommissioned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M	Severn	Upper Lode fish pass	Not Active	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
M	Tanat	Carreghofa	Commissioning	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	5
M	Tanat	Llanyblodwell	Decommissioned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M	Teme	Ashford Weir	Commissioning	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	5
NE	Coquet	North Pass	Active	1	0	0	0	1	1	1	0	0	0	0	0	0	0	3	0	7
NE	Coquet	South Pass	Active	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	4
NE	Ouse	Naburn Weir	Active	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	4
NE	Tyne	Chollerford	Active	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	4
NE	Tyne	Riding Mill	Active	1	0	0	3	0	1	1	0	0	0	0	0	0	1	0	1	8
NE	Wear	Durham	Active	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	4
NE	Yorkshire Esk	Sleights Weir	Active	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3
NW	Derwent (Cumbria)	Yearl	Active	1	0	0	0	1	0	0	3	1	0	0	0	0	1	0	0	7
NW	Eden	Corby Hill	Active	1	0	0	0	1	0	0	3	1	3	2	0	0	1	0	0	12
NW	Hodder	Winckley	Active	1	0	1	3	1	0	0	0	0	0	0	0	0	1	3	1	11
NW	Kent	Basinghyll	Active	1	0	0	3	1	1	1	3	1	3	0	0	0	1	3	1	19
NW	Leven	Backbarrow	Active	1	0	0	3	1	1	1	3	1	0	0	0	0	1	3	1	16
NW	Lune	Broadrairie	Active	1	0	1	3	1	1	1	3	1	0	0	0	0	1	3	1	17
NW	Lune	Forge	Active	1	0	1	3	1	1	1	3	1	3	0	0	0	1	3	1	20
NW	Ribble	Locks	Active	1	0	1	3	1	1	1	3	1	0	0	0	0	1	3	1	17
NW	Ribble	Waddow	Active	1	0	1	3	1	1	1	3	1	3	0	0	0	1	3	1	20
S	Adur	Sakeham Weir	Proposed	0	0	0	3	1	1	1	0	0	0	0	0	0	1	3	1	11
S	Itchen	Gaters Mill	Active	1	2	1	3	1	1	1	3	1	3	0	0	1	1	3	1	23
S	Ouse	Andrews Weir	Proposed	0	0	0	3	1	1	1	0	0	0	0	0	0	1	3	1	11
S	Test	Conegar Bridge	Active	1	2	1	3	1	1	1	3	1	3	0	0	1	1	3	1	23
S	Test	Nursling Mill	Active	1	2	1	3	1	1	1	3	1	3	0	0	1	1	3	1	23
S	Western Rother	Hardham Weir	Active	1	2	0	3	1	1	1	0	0	3	2	0	1	1	3	1	20
SW	Fowey	Restormel	Active	1	0	0	0	0	1	1	3	0	3	2	3	1	0	3	0	18
SW	Hampshire Avon	Knapp Mill (Great Weir)	Not Active	0	0	0	3	1	0	0	0	0	3	2	0	1	0	0	1	11
SW	Hampshire Avon	Knapp Mill (Turbine House)	Not Active	0	0	0	3	1	0	0	0	0	3	2	0	1	0	0	1	11
SW	Tamar	Gunnislake Weir	Active	1	0	0	0	0	1	1	3	0	3	2	3	1	0	3	0	18
SW	Tavy	Lopwell	Active	1	2	1	0	1	1	1	3	0	3	0	3	1	0	0	0	17
W	Conwy	Conwy Falls Fishpass	Active	1	0	0	3	1	1	0	0	0	3	0	0	1	1	0	0	11
W	Dee	Manley Hall	Active	1	0	0	0	0	1	0	0	0	3	2	0	0	0	0	1	8
W	Dyfi	Newlyn Run	Proposed	0	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	6
W	Llyfni	Pont Llyfni Guaging weir	Active	1	0	0	3	1	1	0	0	0	3	2	0	1	1	0	0	13
W	Teifi	Gianteffi	Active	1	2	1	3	0	1	1	3	0	3	2	0	1	0	0	0	18
W	Tywi	Ty Castell	Active	1	2	1	3	0	1	1	3	0	3	2	0	1	0	0	0	18
W	Usk	Trostrey weir	Not Active	0	0	1	0	1	1	0	0	0	3	2	0	0	1	3	0	12
W	Wye	Redbrook	Active	1	2	1	3	0	1	1	3	0	3	2	3	1	0	0	0	21

Table 7: Counter costs by type of counter and width and type of structure being monitored.

Region	River Name.	Site Name	Type of counter.	Structure being monitored	Width sampled by counter in metres?	Operational Costs	Highest Cost Applied
M	Severn	Shrewsbury			0		£12,000.00
M	Tanat	Llanyblodwel			0		
SW	Tavy	Lopwell	Acoustic	Fish Pass / Weir	1	£15,000.00	£15,000.00
W	Dyfi	Newlyn Run	Acoustic	Open River	20	£10,000.00	£15,000.00
W	Teifi	Glanteifi	Acoustic	Open River	20	£10,000.00	£15,000.00
W	Wye	Redbrook	Acoustic	Open River	22	£10,000.00	£15,000.00
W	Tywi	Ty Castell	Acoustic	Open River	30	£10,000.00	£15,000.00
M	Teme	Ashford Weir	Resistivity (open channel)	Fish Pass	0		£12,000.00
M	Severn	Upper Lode fish pass	Resistivity (open channel)	Fish Pass	1		£12,000.00
M	Tanat	Carreghofa	Resistivity (open channel)	Fish Pass	1		£12,000.00
NE	Coquet	North Pass	Resistivity (open channel)	Fish Pass	1	£1,000.00	£12,000.00
NE	Ouse	Naburn Weir	Resistivity (open channel)	Fish Pass	1	£8,000.00	£12,000.00
NE	Yorkshire Esk	Sleights Weir	Resistivity (open channel)	Fish Pass	1	£8,000.00	£12,000.00
NW	Ribble	Waddow	Resistivity (open channel)	Fish Pass	1	£8,000.00	£12,000.00
S	Itchen	Gaters Mill	Resistivity (open channel)	Fish Pass	1	£4,600.00	£12,000.00
SW	Hampshire Avon	Knapp Mill (Turbine House)	Resistivity (open channel)	Fish Pass	1	£50.00	£12,000.00
NE	Coquet	South Pass	Resistivity (open channel)	Fish Pass	2	£1,000.00	£12,000.00
NW	Lune	Broadrairie	Resistivity (open channel)	Fish Pass	2	£5,000.00	£12,000.00
SW	Hampshire Avon	Knapp Mill (Great Weir)	Resistivity (open channel)	Fish Pass	2	£100.00	£12,000.00
NE	Tyne	Chollerford	Resistivity (open channel)	Fish Pass	3	£1,000.00	£12,000.00
NE	Wear	Durham	Resistivity (open channel)	Fish Pass	4	£1,000.00	£12,000.00
NW	Ribble	Locks	Resistivity (open channel)	Fish Pass	5	£5,000.00	£12,000.00
NW	Hodder	Winckley	Resistivity (open channel)	Fish Pass	6	£6,000.00	£12,000.00
SW	Tamar	Gunnislake Weir	Resistivity (open channel)	Fish Pass/Weir	2	£12,000.00	£12,000.00
S	Test	Conegar Bridge	Resistivity (open channel)	Other	1	£4,600.00	£12,000.00
M	Severn	Dolwen, Llanidloes	Resistivity (open channel)	Weir	0		£12,000.00
S	Ouse	Andrews Weir	Resistivity (open channel)	Weir	2	£4,600.00	£12,000.00
W	Conwy	Conwy Falls Fishpass	Resistivity (open channel)	Weir	2	£3,500.00	£12,000.00
S	Western Rother	Hardham Weir	Resistivity (open channel)	Weir	5	£4,600.00	£12,000.00
S	Adur	Takeham Weir	Resistivity (open channel)	Weir	6	£4,600.00	£12,000.00
S	Test	Nursling Mill	Resistivity (open channel)	Weir	6	£4,600.00	£12,000.00
W	Llyfni	Pont Llyfni Guaging weir	Resistivity (open channel)	Weir	9	£3,500.00	£12,000.00
NE	Tyne	Riding Mill	Resistivity (open channel)	Weir	13	£1,000.00	£12,000.00
SW	Fowey	Restormel	Resistivity (open channel)	Weir	17	£12,000.00	£12,000.00
NW	Kent	Basinghyll	Resistivity (open channel)	Weir	26	£6,000.00	£12,000.00
NW	Leven	Backbarrow	Resistivity (open channel)	Weir	26	£6,000.00	£12,000.00
W	Usk	Trostrey weir	Resistivity (open channel)	Weir	27	£0.00	£12,000.00
NW	Derwent (Cumbria)	Yearl	Resistivity (open channel)	Weir	32	£8,000.00	£12,000.00
W	Dee	Manley Hall	Resistivity (open channel)	Weir	40	£5,000.00	£12,000.00
NW	Eden	Corby Hill	Resistivity (open channel)	Weir	45	£8,000.00	£12,000.00
NW	Lune	Forge	Resistivity (open channel)	Weir & Fish Pass	21	£10,000.00	£12,000.00

Table 8: Fish Counter Assessment Guide. Sorted by PURPOSE, then LOCATION AND DESIGN, then OPERATIONAL QUALITY

Counter Details				Guideline Criteria			Funding Source			
Environment Agency Region	River Name.	Site Name	Current Status	Purpose	Location and Design	Operational Quality	Estimated FER Costs	% FER Funded	% WR Funded	% External
SW	Tamar	Gunnislake Weir	Active	16	8	18	0.00	0	100	0
NW	Lune	Forge	Active	13.5	6	20	12000.00	100	0	0
NW	Lune	Broadrairie *1	Active	13.5	6	17	12000.00	100	0	0
NW	Leven	Backbarrow	Active	12.5	9	16	12000.00	100	0	0
NE	Tyne	Riding Mill	Active	12.5	9	8	7200.00	60	40	0
W	Dee	Manley Hall	Active	12	6	8	12000.00	100	0	0
NE	Tyne	Chollerford *2	Active	12	4	4	12000.00	100	0	0
SW	Fowey	Restormel	Active	11.5	10	18	0.00	0	100	0
W	Wye	Redbrook	Active	11.5	8	21	3000.00	20	80	0
S	Itchen	Gaters Mill	Active	11	9	23	6000.00	50	50	0
S	Test	Conegar Bridge *4	Active	11	9	23	6000.00	50	50	0
S	Test	Nursling Mill *4	Active	11	9	23	6000.00	50	50	0
W	Dyfi	Newlyn Run	Proposed	11	8	6	3000.00	20	80	0
SW	Hampshire Avon	Knapp Mill (Great Weir) *4	Not Active	11	3	11	12000.00	100	0	0
SW	Hampshire Avon	Knapp Mill (Turbine House) *4	Not Active	11	3	11	12000.00	100	0	0
W	Tywi	Ty Castell	Active	10.5	8	18	3000.00	20	80	0
NW	Eden	Corby Hill	Active	10	8	12	12000.00	100	0	0
NW	Kent	Basinghyll	Active	9.5	9	19	12000.00	100	0	0
NW	Ribble	Locks *3	Active	9	10	17	12000.00	100	0	0
NW	Ribble	Waddow	Active	9	9	20	12000.00	100	0	0
NE	Wear	Durham	Active	9	7	4	7200.00	60	40	0
NE	Yorkshire Esk	Sleights Weir	Active	9	2	3	6000.00	50	0	50
W	Teifi	Glan-teifi	Active	8.5	9	18	3000.00	20	80	0
W	Usk	Trostrey weir	Not Active	8	5	12	2400.00	20	80	0
SW	Tavy	Lopwell	Active	7	10	17	0.00	0	100	0
NE	Coquet	North Pass *4	Active	7	8	7	7200.00	60	40	0
NE	Coquet	South Pass *4	Active	7	8	4	7200.00	60	40	0
M	Severn	Dolwen, Llanidloes	Commissioning	5	7	4	0.00	0	100	0
M	Severn	Upper Lode fish pass	Not Active	5	7	3	1200.00	10	90	0
M	Severn	Shrewsbury	Decommissioned	5	2	0				
NW	Hodder	Winckley	Active	4	5	11	12000.00	100	0	0
NE	Ouse	Naburn Weir	Active	4	3	4	0.00	0	0	100
W	Conwy	Conwy Falls Fishpass	Active	3.5	8	11	2400.00	20	80	0
W	Llyfni	Pont Llyfni Guaging weir	Active	2.5	10	13	2400.00	20	80	0
NW	Derwent (Cumbria)	Yearl	Active	1	10	7	12000.00	100	0	0
S	Western Rother	Hardham Weir	Active	0.5	9	20	6000.00	50	50	0
S	Ouse	Andrews Weir	Proposed	0	9	11	6000.00	50	50	0
M	Tanat	Carreghofa	Commissioning	0	9	5	12000.00	100	0	0
S	Adur	Sakeham Weir	Proposed	0	8	11	2400.00	20	0	80
M	Teme	Ashford Weir	Commissioning	0	6	5	12000.00	100	0	0
M	Tanat	Llanyblodwel	Decommissioned	0	2	0				
Sum							267600.00			

*1. Broadrairie is the second of two counters on the Lune, 34Km higher up the catchment than Forge. There is some spawning activity between the two counters. Broadrairie is therefore a potential candidate for closure in the absence of a funding source outwith the Fishery Function.

*2. Chollerford is the second of two counters on the Tyne, 16 Km higher up the catchment than Riding Mill. It does not provide a whole river estimate of run size. Chollerford is therefore a potential candidate for closure in the absence of a funding source outwith the Fishery Function.

*3. Locks is the second of two counters on the Ribble, 40 Km higher up the catchment. Although it provides a whole river estimate (the lower site monitors 99% of the river available for fish migration), this is a potential candidate for closure in the absence of a funding source outwith the Fishery Function.

*4. Both counters are required to provide a whole river estimate, although on the Avon a whole river count is not possible even with both counters.